



Electro-Voice®
THE DELTAMAX™ SYSTEM

OWNER'S MANUAL



DMC-1122/DMC-1152 CONTROLLERS
DML-1122/DML-1152 LOUDSPEAKERS

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**WARNING: "TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK,
DO NOT EXPOSE THIS EQUIPMENT TO RAIN OR MOISTURE."**

*DeltaMax Loudspeaker (DML)
DeltaMax Controller (DMC)
The DML and DMC abbreviations are used quite frequently in the manual.

**DESCRIPTION****GENERAL**

The DeltaMax™ System consists of a 2-way biamped, high performance speaker system and a companion electronic controller. The DML-1122 and DML-1152 are full-range loudspeaker systems, intended for high-level sound reinforcement in touring sound and permanent installation applications. The electronic-protection technology incorporated into the DeltaMax™ System allows the loudspeakers to be operated at full capacity with maximum fidelity and reliability. The trapezoidal cabinet shape allows tight cluster designs, enabling maximum mutual coupling and single-point-source arrays.

The DML-1152 employs a 15-inch woofer for low-frequency reproduction, and a standard 2-inch exit DH1A compression driver. The DML-1122 utilizes a 12-inch woofer and a 1.3-inch exit modified DH1A high-frequency driver. Both systems use flat-front, constant-directivity, high-frequency horns which are based on the Electro-Voice HP series (Patent #4,685,532) and are geometrically optimized for performance from 1,250 Hz to 20,000 Hz.

The DeltaMax™ flying versions, models DML-1122F and DML-1152F, include three steel-reinforced aircraft-type pan fittings on the top and bottom of the enclosures to facilitate the hanging of multi-cabinet arrays. The DML-1122F/DML-1152F Flying Manual is packed with each flying speaker system.

The electronic circuits are designed to provide optimum audio performance, even when the audio drive level is increased for maximum loudness. A high-performance compressor is controlled by special speaker modeling circuits to provide speaker excursion protection, speaker temperature protection, and amplifier anti-clip limiting.

Optimum performance of these speakers can only be assured when used with their dedicated electronics. **Do not use with other electronic crossovers and/or processors.**

FEATURE SUMMARY

- Fourth-order Linkwitz-Riley crossover filters provide smooth, accurate response through the crossover region.
- Special equalization circuits allow flat, wideband system response
- Sensing circuits for each driver control the compressor to prevent voice coil overheating and amplifier clipping.
- Voltage-clamp excursion protection does not alter program dynamics.
- Multi-time-constant compressor circuit with variable compression ratio reduces peak and average levels as necessary while preserving relative program dynamics.
- A connection to the control voltage is available through a jack on the back panel. This allows precise gain tracking when more than one unit is used.
- The front panel display shows drive signal level and compressor gain reduction. Sensing display for each sense channel shows amplifier limit, excursion limit, and temperature limit. When its limit is approached, each LED lights yellow.
- Speaker system is trapezoidal for compact arrays. Flying versions feature integral, steel-reinforced fittings to facilitate hanging.
- Both the woofer and the compression driver employ the best available technology for high power and accurate sound reproduction.
- A state-of-the-art, flat-front, constant-directivity horn is utilized for even coverage and flat response.

CONTROLLER SPECIFICATIONS

<p>CHANNEL CONFIGURATIONS — Monaural two-way; two sense channels</p> <p>FILTER TYPE — 4th-order Linkwitz-Riley</p> <p>CROSSOVER FREQUENCY — 1250 Hz</p> <p>GAIN — 6 dB nominal, equalized outputs</p> <p>TOTAL HARMONIC DISTORTION, 20-20,000 Hz — 0.03% typical, 0.1% maximum</p> <p>NOISE, EACH OUTPUT, 20-20,000 Hz NBW, TYPICAL — -86 dBu</p> <p>SIGNAL INPUT — Maximum Level: +18 dBu Impedance: 20,000 ohms CMRR, Typical: -55 dB Connector: Female 3-pin XLR-type</p>	<p>SENSE CHANNEL INPUTS — Maximum Level, LF: 145 V RMS HF: 145 V RMS Impedance: 100 kilohms each side to ground Connector: Two binding posts</p> <p>OUTPUTS (LF and HF) — Type: Transformer floating differential Maximum Level: +18 dBu Minimum Load Impedance for Full Level: 600 ohms Connectors: Male 3-pin XLR-type</p> <p>POWER REQUIREMENTS — 100, 120, 220, 240 V ac, 50-60 Hz, 13 W</p> <p>CHASSIS CONSTRUCTION — Painted steel</p> <p>COLORS — Gray front panel/black chassis with white graphics</p> <p>MOUNTING — EIA 19" rack mount, 1.75" high, 8.25" behind panel (excluding connectors) Supplied with front-panel security cover for controls.</p>
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SYSTEM SPECIFICATIONS

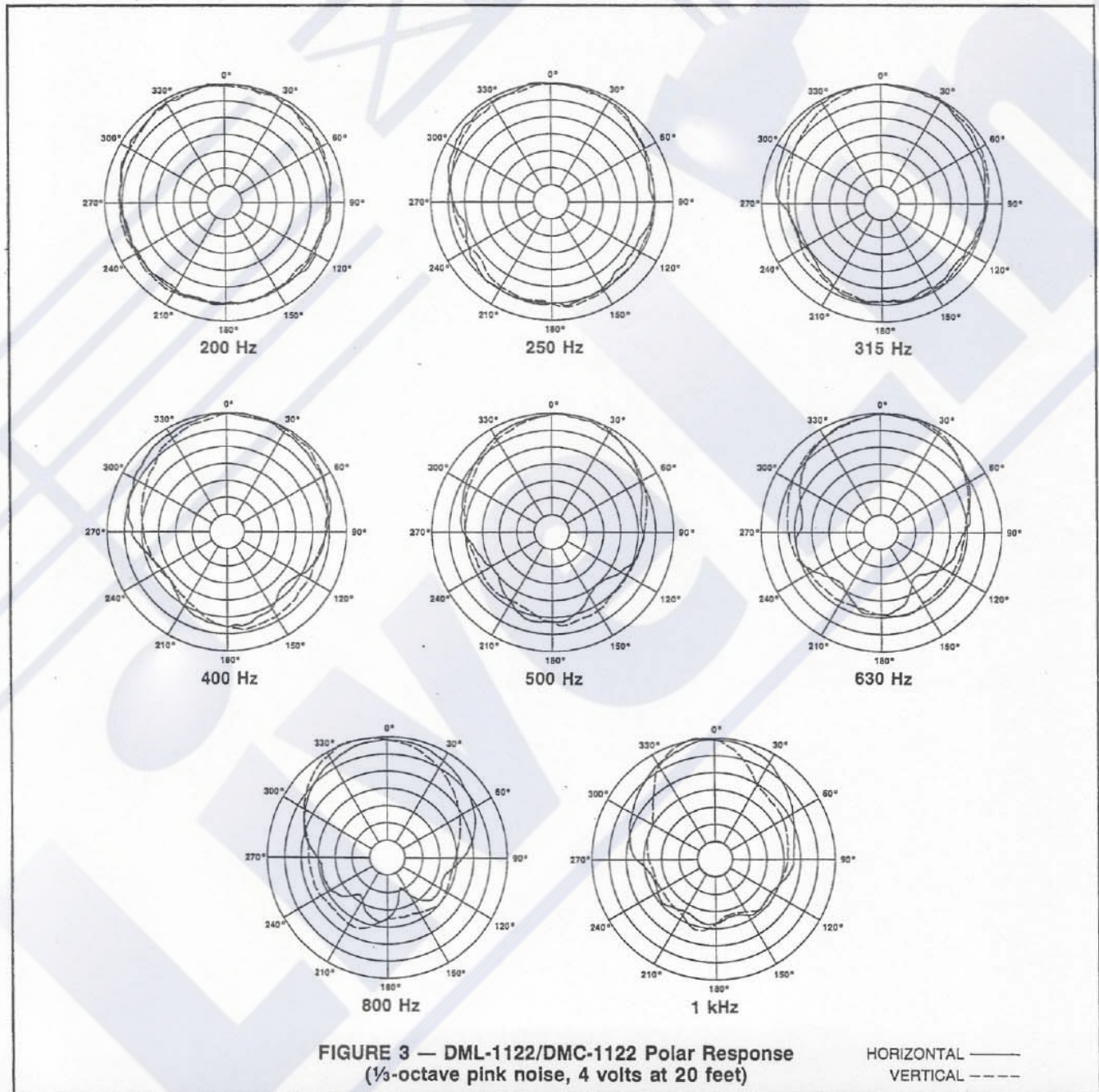
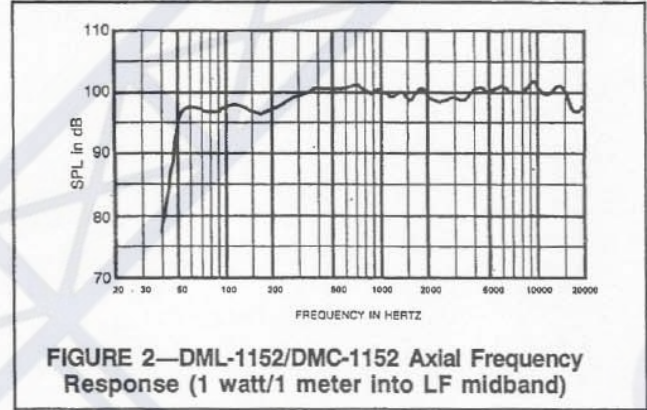
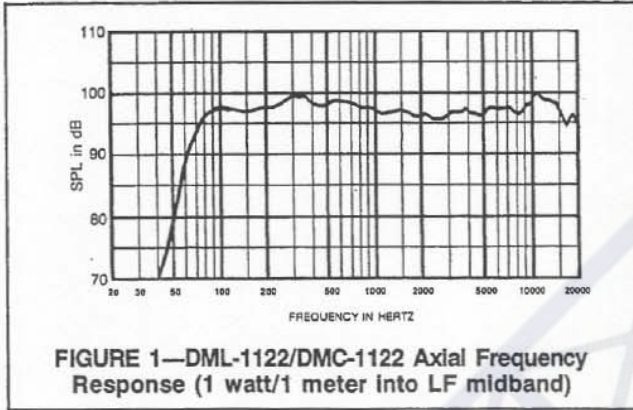
DML-1122/DMC-1122

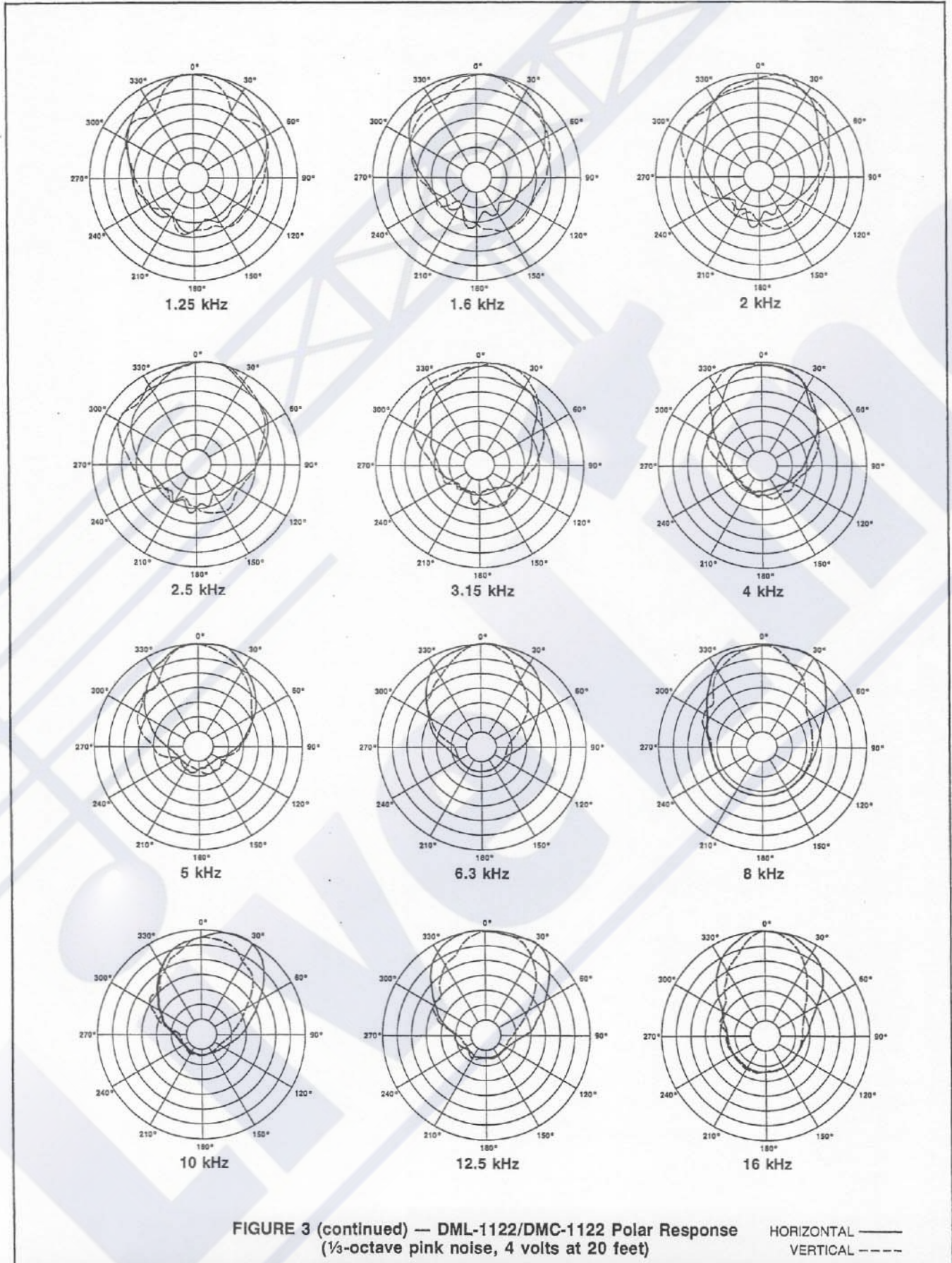
DML-1152/DMC-1152

Frequency Response, Measured In Farfield Calculated to One Meter on Axis, Swept One-Third-Octave Pink Noise, 2.83 V at 500 Hz, Anechoic Environment, ±3 dB:	70 Hz-20 kHz (see Figure 1)	50 Hz-20 kHz (see Figure 2)
Sound Pressure Level at One Meter, One Watt Input Power, Anechoic Environment, Band-Limited Pink-Noise Signal, 400-1,200 Hz:	98 dB	100 dB
Typical Maximum Continuous Sound Pressure Levels at One Meter, Anechoic Environment:	123 dB	126 dB
Typical Maximum Peak Sound Pressure Levels at One Meter, Anechoic Environment:	129 dB	132 dB
Crossover Frequency:	1,250 Hz	1,250 Hz
Dispersion Angle Included by 6-dB-Down Points on Polar Responses, Indicated One-Third-Octave Bands of Pink Noise:	1.0-20 kHz horizontal (see Figure 5) 80° (+25°, -20°) 3.8-20 kHz vertical (see Figure 5) 55° (+25°, -5°)	1.2-20 kHz horizontal (see Figure 6) 60° (+25°, -5°) 1.2-20 kHz vertical (see Figure 6) 40° (+25°, -5°)
Directivity Factor R_0 (Q):	1.0-20 kHz median (see Figure 7) 10.6 (+9.3, -4.0)	1.0-20 kHz median (see Figure 8) 19.3 (+12.8, -7.3)
Directivity Index D_i :	1.0-20 kHz median (see Figure 7) (+3.2 dB, -1.6 dB)	1.0-20 kHz median (see Figure 8) (+3.0 dB, -1.3 dB)
Distortion, Indicated SPL at 1 Meter, Shaped Spectrum Second Harmonic,	115 dB SPL (see Figure 9)	120 dB SPL (see Figure 10)
100 Hz:	4.5%	4.3%
800 Hz:	0.8%	1.0%
2,000 Hz:	0.7%	0.7%
5,000 Hz:	1.6%	1.5%
Distortion, Indicated SPL at 1 Meter, Shaped Spectrum Third Harmonic,	115 dB SPL (see Figure 9)	120 dB SPL (see Figure 10)
100 Hz:	0.9%	0.7%
800 Hz:	1.8%	1.4%
2,000 Hz:	0.9%	0.7%
5,000 Hz:	1.6%	1.7%



SPEAKER SPECIFICATIONS		DML-1122	DML-1152
Transducer Complement, High Frequency:		DH1A variant compression driver (1.3-inch exit)	DH1A compression driver (2-inch exit)
Low Frequency:		DL12X variant 12-inch woofer	DL15X 15-inch woofer
Efficiency, High Frequency:		25%	25%
Low Frequency:		4.5%	5.0%
Long-Term Average Power Handling Capacity Per EIA Standard RS-426A,			
High Frequency:		75 watts	75 watts
Low Frequency:		300 watts	400 watts
Short-Term Power Handling Capacity (10 ms.), High Frequency:		300 watts	300 watts
Low Frequency:		1,200 watts	1,600 watts
Maximum Long-Term Midband Acoustic Output, High Frequency:		18.8 watts	18.8 watts
Low Frequency:		13.5 watts	20.0 watts
Nominal Impedance, High Frequency:		8 ohms	8 ohms
Low Frequency:		8 ohms	8 ohms
Minimum Impedance, High Frequency:		6.0 ohms	6.5 ohms
Low Frequency:		8.4 ohms	7.9 ohms
Dimensions, Height:		58.4 cm (23.0 in.)	75.9 cm (29.88 in.)
Width:		37.1 cm (14.63 in.)	45.2 cm (17.78 in.)
Depth:		35.6 cm (14.0 in.)	41.4 cm (16.28 in.)
Net Weight:		30.7 kg (68 lb)	43.3 kg (96 lb)
Shipping Weight:		33.9 kg (75 lb)	47.4 kg (105 lb)
Enclosure Materials, Structural:		14-ply birch plywood	14-ply birch plywood
Finish:		Black textured paint	Black textured paint
Grille:		Steel with charcoal gray foam	Steel with charcoal gray foam
Hanging (DML-1122F and DML-1152F only):		3-point flying system (accepts Aeroquip 32326 and 32343 fittings)	3-point flying system (accepts Aeroquip 32326 and 32343 fittings)





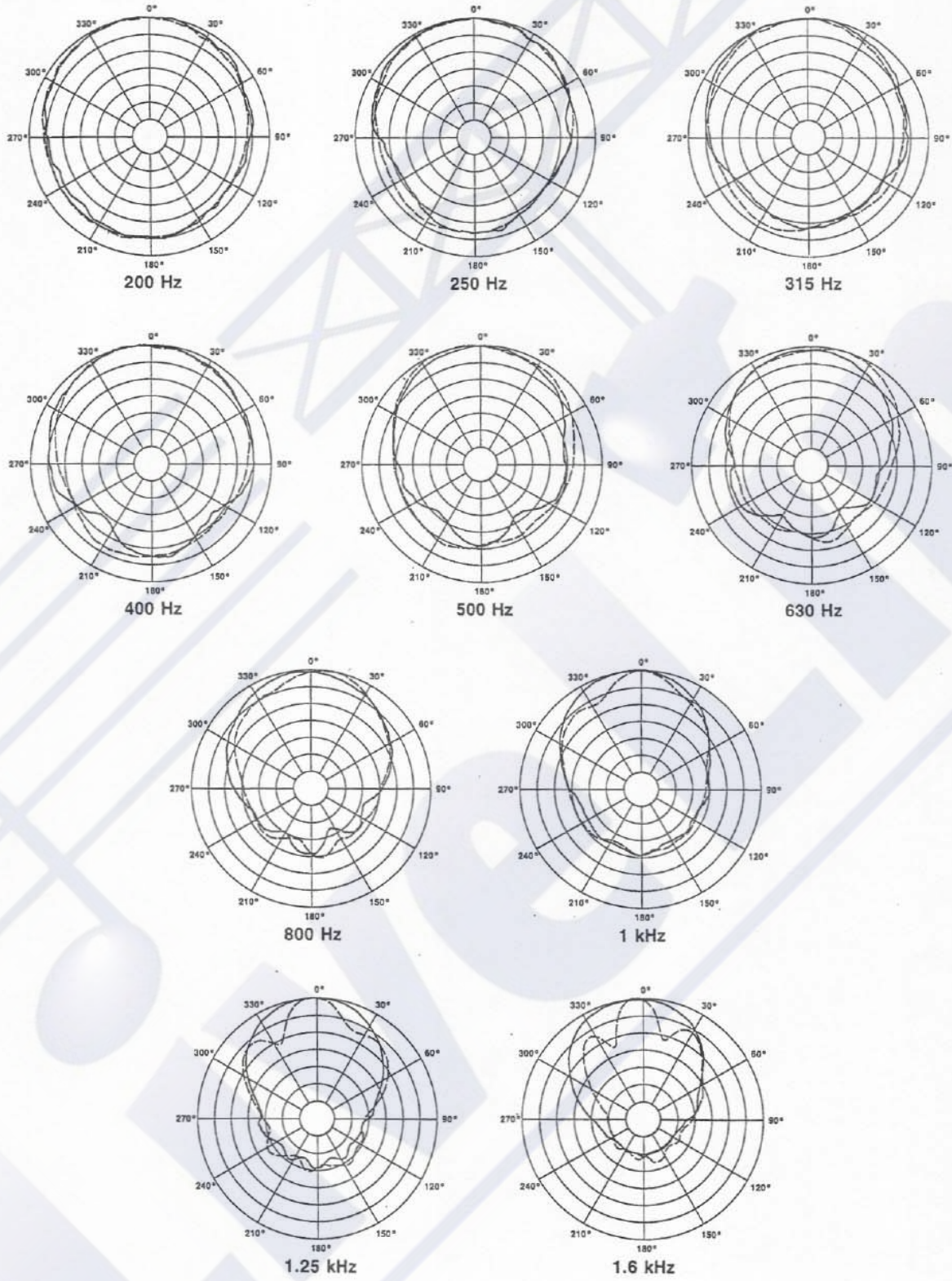


FIGURE 4 — DML-1152/DMC-1152 Polar Response
 ($\frac{1}{3}$ -octave pink noise, 4 volts at 20 feet)

HORIZONTAL ———
 VERTICAL - - - -

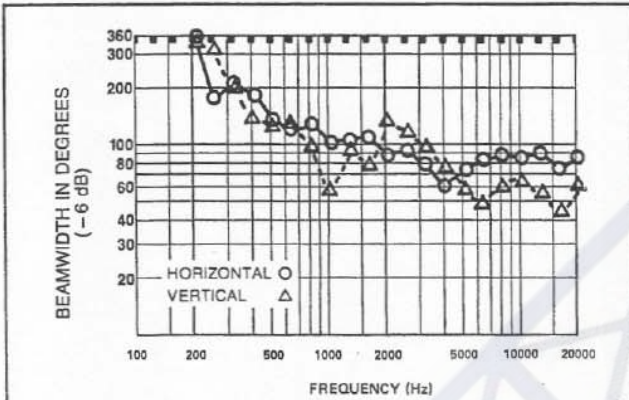


FIGURE 5 — DML-1122/DMC-1122
Beamwidth vs. Frequency
Whole Space (anechoic)

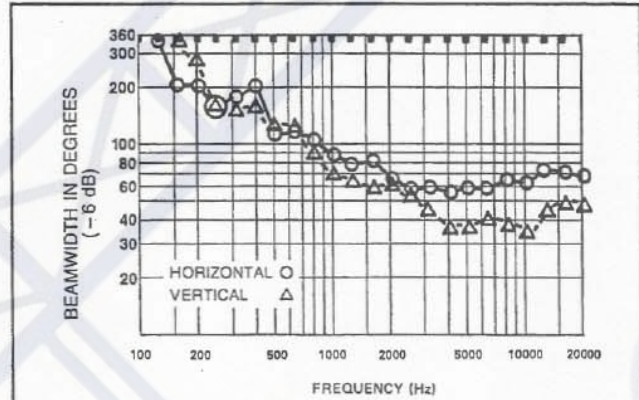


FIGURE 6 — DML-1152/DMC-1152
Beamwidth vs. Frequency
Whole Space (anechoic)

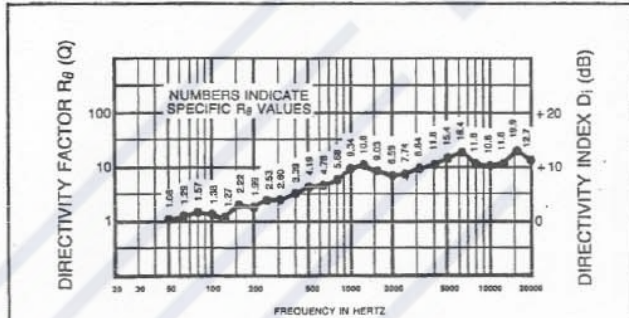


FIGURE 7 — DML-1122/DMC-1122 Directivity
Factor and Directivity Index vs. Frequency
Whole Space (anechoic)

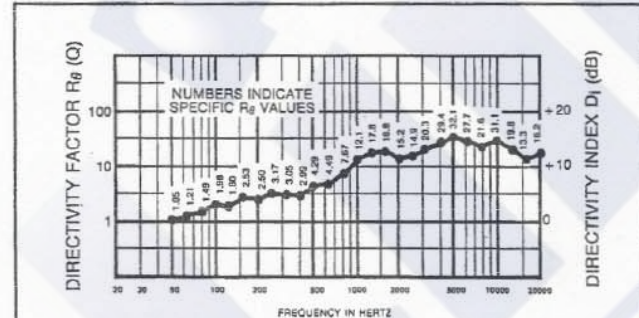


FIGURE 8 — DML-1152/DMC-1152 Directivity
Factor and Directivity Index vs. Frequency
Whole Space (anechoic)

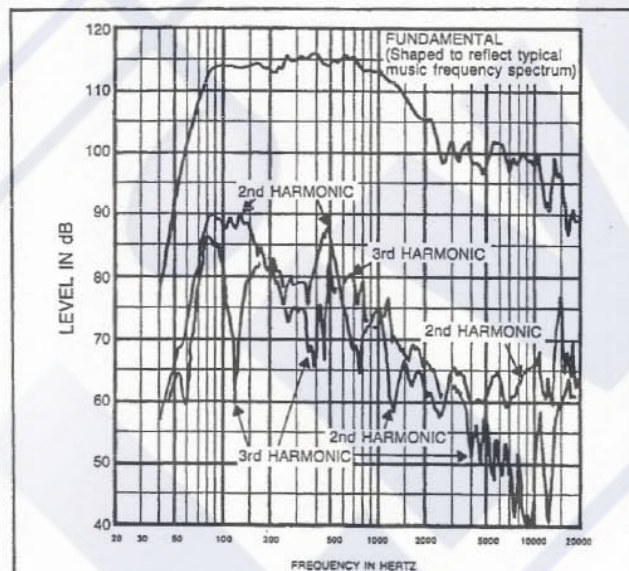


FIGURE 9 — DML-1122/DMC-1122
Harmonic Distortion (115 dB SPL/1 meter
using typical music frequency spectrum)

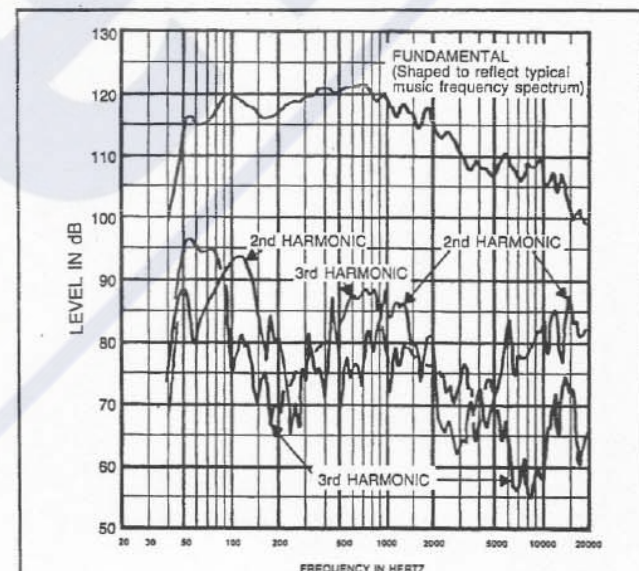
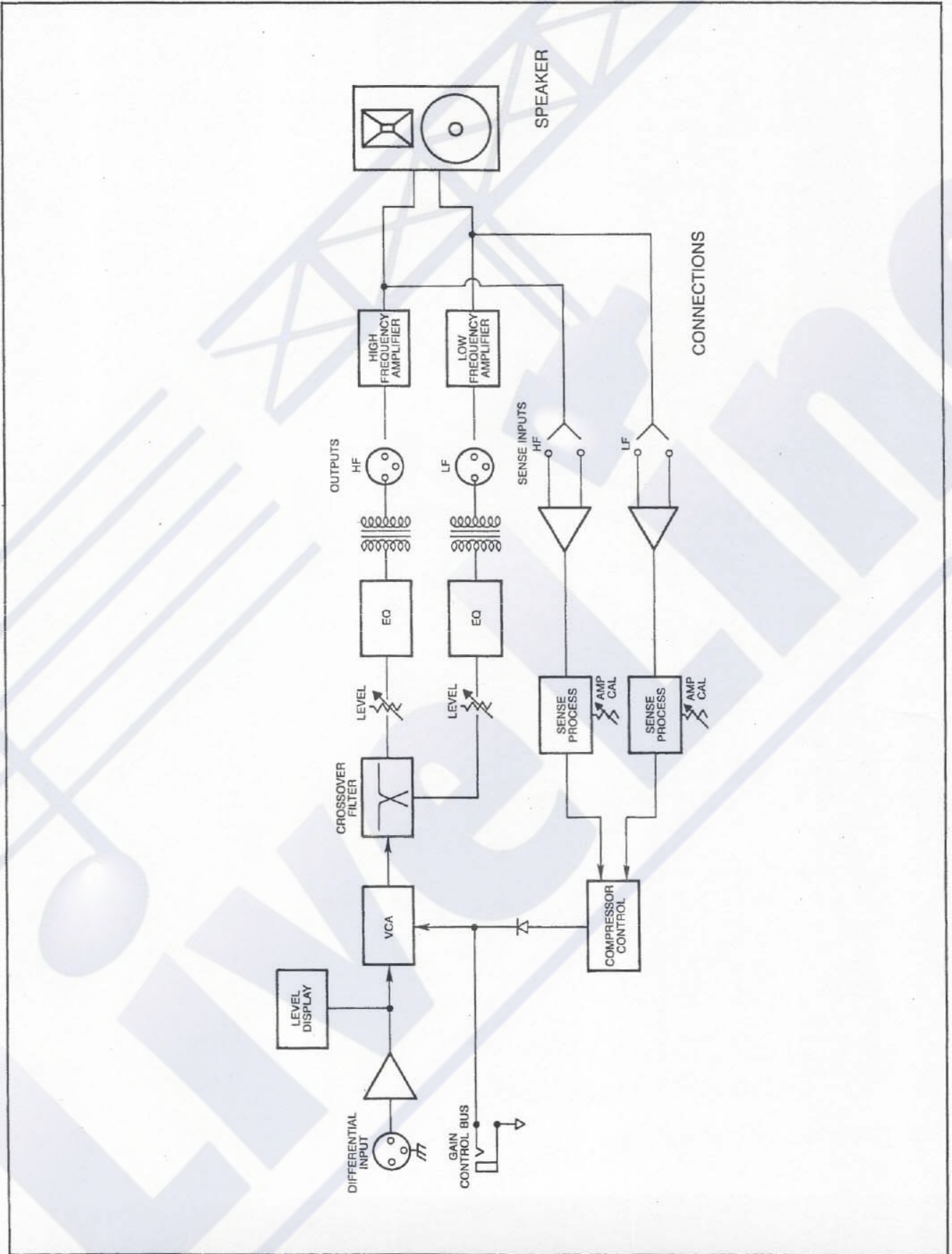


FIGURE 10 — DML-1152/DMC-1152
Harmonic Distortion (120 dB SPL/1 meter
using typical music frequency spectrum)

FUNCTIONAL BLOCK DIAGRAM



OPERATION

CALIBRATION

To prevent amplifier clipping it is necessary to calibrate the DeltaMax™ Controller's internal amplifier limit circuits to the actual clip level of the power amplifiers.

Before connecting ac power to the unit make sure that the unit is compatible with the available mains voltage.

Make Connections

Connect the high- and low-frequency outputs of the DeltaMax™ controller to the designated high- and low-frequency inputs of the power amplifier. See the "Installation" section for details. The maximum power recommendation for the DMC-1122 is 600 watts per channel, and for the DMC-1152 it is 800 watts per channel. The suggested input cable configuration is a balanced pair with a shield.

Connect the low-frequency output of the power amplifier to the LF sense input of the DeltaMax™. Connect the high-frequency output of the power amplifier to the HF sense input of the DeltaMax™. High quality dual banana plugs are recommended. Shielded or unshielded cable may be used. The inputs are high-impedance, floating-differential. Small gauge wire (i.e., 22 gauge) is acceptable, but be sure the connections are secure and safe for the high voltages from the amplifier output. See Figure 13 for a wiring diagram of a single DeltaMax™ Controller to a dual-channel power amplifier.

BE SURE THE SPEAKERS ARE NOT CONNECTED TO THE AMPLIFIERS AT THIS TIME

Front Panel Settings:

1. Set the two output level controls to their center-detent position. The slots of the controls are aligned with the "0" mark when in the center-detent position.
2. Turn the amplifier calibration control to full-counter-clockwise.
3. Press the cal switch to its recessed position with a screwdriver or other suitable tool.
4. Set both amplifier gain controls for 32 dB gain or full-clockwise.
5. Connect an input signal with a 500-Hz test tone. Music program may be used if necessary.
6. Turn the LF output level control clockwise with a screwdriver until the low-frequency channel of the power amplifier begins to clip. Clipping is noted by the clip indicator on the power amp or monitored with an oscilloscope.
7. Turn the LF amplifier calibration control clockwise with a screwdriver until the LF amplifier limit light of the DeltaMax™ just comes on or to a lower, predetermined power level. A lower power level setting is desirable when the power rating of the amplifier is much greater than 250 watts. It should light at or just before amplifier clipping.
8. If using a test tone, adjust the oscillator for a test signal of 5 kHz.
9. Turn the HF output level control clockwise with a screwdriver until the high-frequency channel of the power amplifier begins to clip.

10. Turn the HF amplifier calibration control clockwise with a screwdriver until the HF amplifier limit light of the DeltaMax™ just comes on. Again, the amplifier limit indicator should light at or just before amplifier clipping.
11. Return the LF and HF output level controls to their center detent position, and reset the cal switch to the "Limit" position (out).

NOTE: If the power amplifier has an internal limiter, or if clip protection is not desired, the user has the option to leave the "Limit" switch in the recessed "Cal/Clip" position. When left in the Cal/Clip position the "Amplifier Output Limit" lights on the front panel of the DeltaMax™ will indicate when the amplifier is self-limiting or clipping.

After the calibration sequence has been completed, connect the speaker cables to the output of the amplifier. Make certain that the "lows" are wired to the woofer and that the "highs" are wired to the compression driver. In addition, be sure to observe polarity when making speaker connections.

DISPLAY CIRCUITS

The display circuits indicate to the user what is actually happening in the DeltaMax™ Controller and the DeltaMax™ Loudspeaker:

Input Level

These three indicators show the drive level at the input of the DeltaMax™ Controller. They are calibrated in dBu (-20, 0, and +16).

Gain Reduction

These three indicators show how much attenuation is being imposed on the signal by the compressor. They are calibrated in relative dB (3, 6, and 12), and provide a good indication of how much compression is occurring.

NOTE: Do not allow the 12-dB indicator to stay on continuously. If this happens, then reduce the input signal drive level.

Output Limits (for each output):

Amplifier Limit

With the switch in "Cal/Clip" position, the Amplifier Calibration control should be adjusted so that this indicator lights when the amplifier clips. It then acts as an amplifier clip indicator. With the switch in the "Limit" position the indicator shows the onset of DeltaMax™ limiting due to maximum amplifier power.

If this indicator lights frequently when properly calibrated, then it may be desirable to use a larger power amplifier, or turn down the system level. See the section on Amplifier Requirements.

Excursion Limit

This indicator lights when output voltage clamping is occurring due to the detection of high diaphragm excursion. Excessive diaphragm excursion may occur in the lower frequency ranges of operation of the drivers during high level operation. Selective

OPERATION (continued)

equalization may be used to reduce the level of the frequency range that is causing the excessive excursion, allowing higher overall levels to be achieved. For example, program material with heavy low frequency content played at high levels may activate the woofer protection circuitry, limiting the overall sound pressure level attainable. Reducing the levels of the frequency bands below 100 Hz with an equalizer might eliminate the excursion problems, allowing the overall level to be turned up higher.

Temperature Limit

This indicator lights when the temperature of the speaker voice coil approaches its maximum level. Under this condition, gain reduction will occur so that the maximum temperature will not be exceeded.

INSTALLATION

AMPLIFIER REQUIREMENTS

The DML-1122 and DML-1152 speaker systems require professional power amplifiers with the following ratings:

DML-1122

LF: 300-600 watts continuous into eight ohms
 HF: 125-250 watts continuous into eight ohms

DML-1152

LF: 400-800 watts continuous into eight ohms
 HF: 125-250 watts continuous into eight ohms

The power amplifiers should have a voltage gain between 27 and 35 dB (32 dB is optimum). The use of amplifiers with lower power ratings is acceptable; however, the full-power capabilities of the DML speakers will not be realized. The use of amplifiers with significantly higher power ratings is wasteful and may endanger the loudspeakers; it is generally not recommended. Under certain circumstances higher rated power amplifiers are acceptable. It is acceptable to drive either the DML-1122 or DML-1152 speakers with a stereo power amp utilizing one channel to drive the low frequencies and the other channel to drive the high frequencies. In this configuration the user should set the "Amplifier Calibration" level to the 125-250-watt range to limit excessively high power levels from reaching the compression driver. The user is instructed to consult the "Operation" section of this manual for details of this procedure.

CONNECTOR AND CABLE REQUIREMENTS

Controller

The DeltaMax™ has XLR-type connectors for signal input and output. Pin 1 is ground reference, pin 2 is high (+), and pin 3 is low (-). The LF and HF sense connections are five-way binding posts. Figure 14 illustrates the preferred interconnecting between the DMC and the power amplifier. Two typical system configurations are illustrated in Figures 13 and 15.

The gain control bus is accessed through a two-conductor ¼-inch jack. This feature is used when it is desired for the gain of two or more units to track. Using a standard ¼-inch patch cable, connect the jacks together. For more than two units, use Y-connectors.

Speaker

The DML-1122 and DML-1152 are equipped with ITT-Cannon EP-4 connectors for electrical connection to the woofer and compression driver. Each cabinet has two connectors: one male (EP-4-14) for input signal and one female (EP-4-13) for parallel wiring for connecting additional DML loudspeakers. The mating connectors for the cable ends are the EP-4-11-IC for the input connection and the EP-4-12-IC for the parallel connection.

Cables, connectors and wiring accessories for the DML speakers are manufactured by Pro Co Sound, Inc., and Whirlwind Music Distributors, Inc. To find your local Pro Co or Whirlwind dealer, contact:

Pro Co Sound, Inc.
 135 E. Kalamazoo Ave.
 Kalamazoo, MI 49007

Whirlwind Music Distributors, Inc.
 P.O. Box 1075
 Rochester, NY 14603

The pin connections are as follows:

- Pin 1 = LF (-)
- Pin 2 = LF (+)
- Pin 3 = HF (-)
- Pin 4 = HF (+)

Both the low-frequency and high-frequency inputs present a nominal eight-ohm load to the amplifier; however, the compression driver has a low-frequency protection capacitor in series.

NOTE: DML-1122 speakers may be paralleled with other DML-1122 speakers if the amplifier is capable of delivering adequate power at the lower impedance. The same holds true for the DML-1152 speaker systems.

SPEAKER INSTALLATION

Hanging

The DML-1122F and DML-1152F are flying versions of the DML-1122 and DML-1152.

***** CAUTION *****

The DML-1122F and DML-1152F speaker systems should be suspended overhead only in accordance with the procedures and limitations specified in the DML-1122F/DML-1152F Flying Manual which is packed with each flying speaker system.

Each cabinet has a total of six steel-reinforced aircraft-type pan fittings (three on the top and three on the bottom). This three-point flying system makes maximum use of the trapezoidal cabinets, permitting a wide range of angle adjustment and offering maximum flexibility in array design and implementation for both the touring sound company and the sound contractor. The pan fittings mate with the Aeroquip 32343 and 32326 stud fittings.

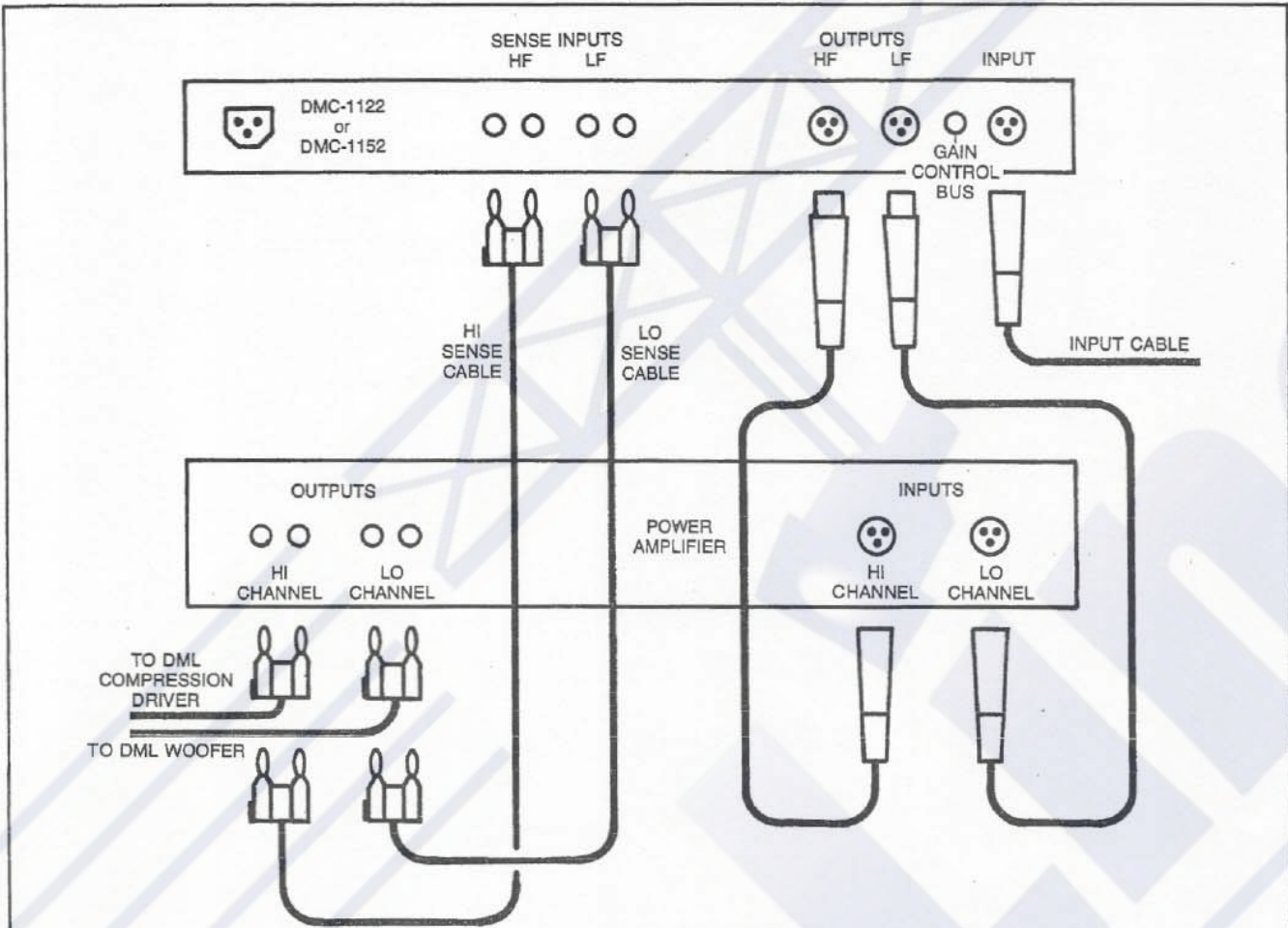


FIGURE 13 — Interconnections for Single Channel Operation

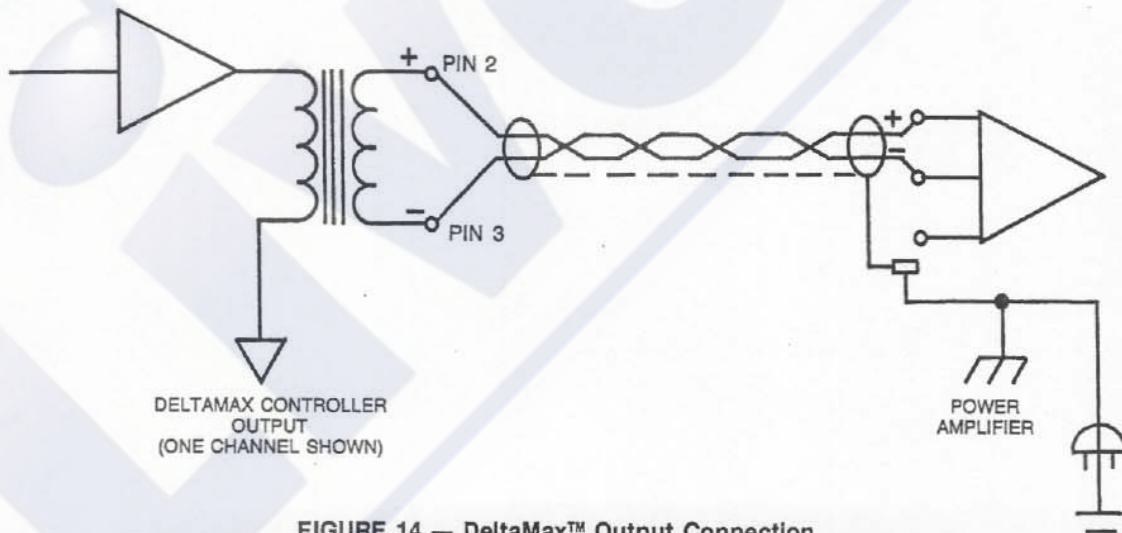


FIGURE 14 — DeltaMax™ Output Connection

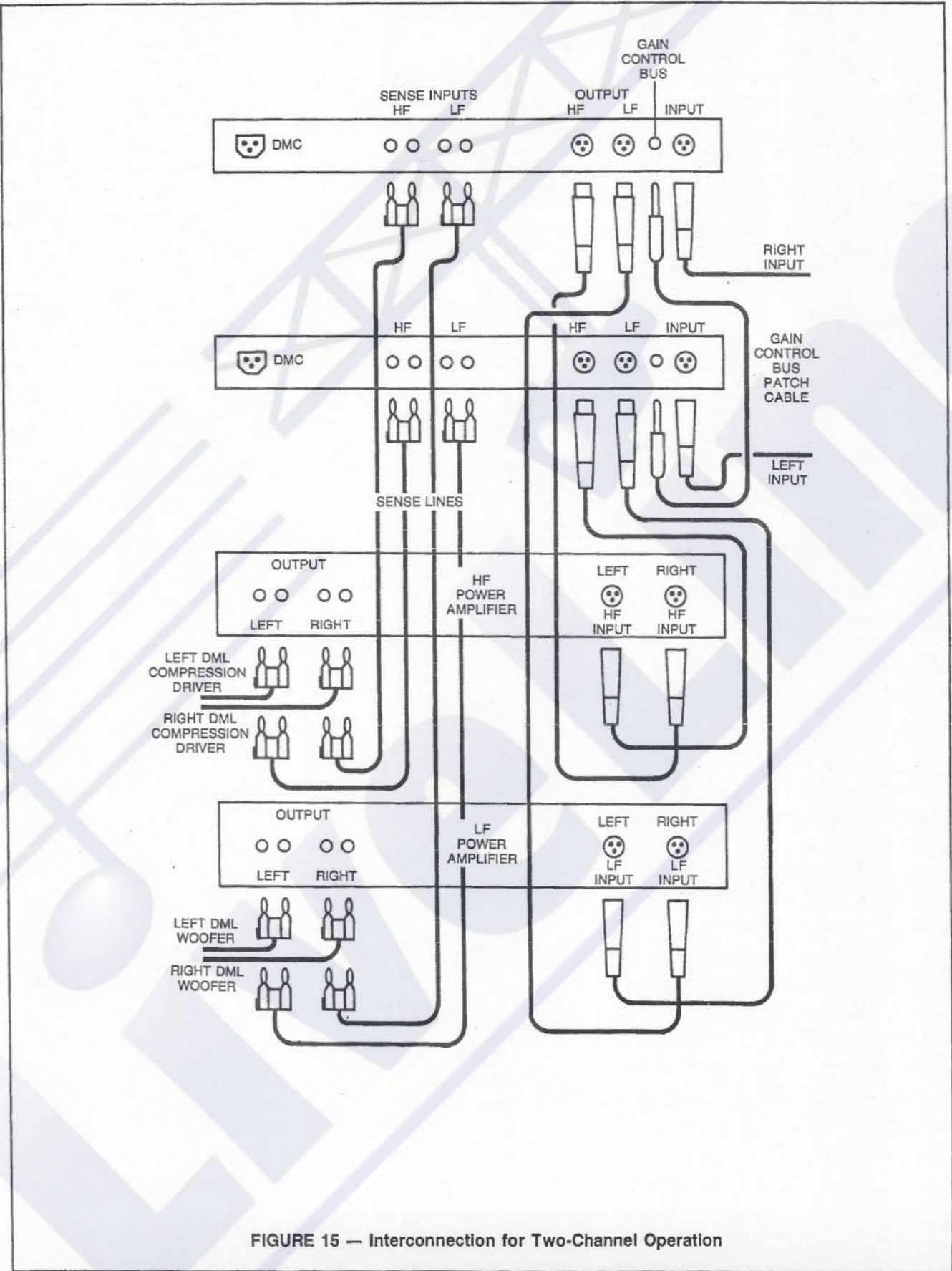


FIGURE 15 — Interconnection for Two-Channel Operation

INSTALLATION (continued)

DELTAMAX™ CONTROLLER INSTALLATION

Operating Voltage Selection

The DMC can be powered with line voltages other than 120 volts by altering the primary wiring of the power transformer.

***** CAUTION *****

No user serviceable parts inside. Hazardous voltage and currents may be encountered within the chassis. To avoid electric shock, do not perform any servicing unless you are qualified to do so.

The service information contained within this document is for use only by Electro-Voice, Inc., authorized warranty stations and qualified service personnel.

To change the transformer primary wiring configuration use the following procedure:

1. Disconnect the DMC from the ac power source.
2. Remove the seven screws securing the top cover. There are two screws on each side, two screws on the rear and one screw in the front panel (center, top).
3. Locate the voltage-selection terminal strip mounted on the bottom of the chassis near the power transformer. The transformer has six primary leads, five of which are soldered to the terminal strip in the following order:

Position #	Wire Color
1	Black
2	Violet
3	Blue
4	Violet/Blue
5	Blue/White

The sixth lead, which is black/white, and two black leads from the fuse holder, are attached to the terminal strip with solderless connectors. Primary operating voltage selection is accomplished by moving these three wires to the appropriate location. See Table I for the correct wire location for the selected mains voltage.

4. Install the correct line fuse. See values in Table II.
5. Plug the DMC into a variac and sweep the mains voltage from zero to full operating voltage while monitoring the voltage on the primary filter capacitors. The measured voltage should be ± 29 volts. See the PCB x-ray view in Figure 17. If the measured voltage is not within 10% of this value turn the unit off and verify the connections in step #3.
6. Reinstall the top cover with the seven screws.

Line Voltage	Line Fuse, MDL Series Slo-Blo
100 V ac	0.25 A/250 V
120 V ac	0.25 A/250 V
220 V ac	0.10 A/250 V
240 V ac	0.10 A/250 V

TABLE II
Main Fuse Selection Guide

<p>100 V ac</p>	<p>120 V ac</p>	<p>220 V ac</p>	<p>240 V ac</p>
<p>TABLE I Primary Power Conversion Chart for 100-, 120-, 220-, and 240-V, 50/60-Hz Operation</p>			

INSTALLATION (continued)**Mounting**

The unit is one rack-space high (1¾") and fits a standard EIA 19-inch rack. Mount the DMC in a rack cabinet near the power amplifier(s) to make wiring easy.

Grounding

A widely accepted grounding technique for audio systems is the single-point ground. The final configuration will be determined by the size of the system and the equipment used in the system. However, the single-point grounding system is recommended as a starting point.

The interconnecting cables of line level equipment, such as the DeltaMax™ Controller should have the shields connected at one point only, usually the receiving end of the signal transmission. See Figure 14.

Never lift the third wire safety ground of the ac power cable. It protects against possible shock hazard.

When deciding how to best ground the DMC in a particular system, note that the DMC's input and output XLR-type connectors have pin 1 referenced to ground. Circuit ground is tied to the chassis ground internally at one point. The input to the DMC is active differential and the output is transformer isolated.

Ventilation

Adequate ventilation should be provided in the rack to maintain a reasonable operating temperature. Under any conditions the ambient temperature inside the rack cabinet should not exceed 60°C, or 140°F.

Security

A security cover and attachment screws are supplied to protect the control settings against uninvited adjustments.

MAINTENANCE

Use a soft damp cloth to clean the unit when it becomes dirty. No other maintenance is required.