Electro-Voice®

MS2500

True-Diversity Wireless Systems

- **Exclusive DNX™ companding combined with excellent audio circuitry for "wired" audio quality**
- **Internal power supply, switchable from 115 V to 235 V**
- **Excellent signal-to-noise ratio: 105 dB, flat; 108 dB, A weighted**
- **Metering for audio level, rf and diversity channel**
- **Balanced XLR output with mic/line switch; unbalanced 1/4-inch output**
- **Rugged bodypack transmitter with TA4F connector for lavalier and headset mics; professional handheld with N/D757B head**
- **Rack-mountable receiver**

MS2500 SYSTEM SPECIFICATIONS

Operating Frequencies (VHF band):
169 MHz to 216 MHz

Standard Frequencies (MHz):
169.505, 170.245, 171.045, 171.905, 178.225, 179.200, 184.025, 185.125, 188.200, 191.300, 195.425, 197.325, 202.425, 208.300, 209.175, 214.150

Frequency Response,
±1.5 dB:
60-14,000 Hz
±3 dB:
30-16,000 Hz

Harmonic Distortion,
Below Transmitter Limiting:
0.5% maximum
Typical at 1,000 Hz:
0.25%

Dynamic Range:
105 dB

Signal-to-Noise Ratio (20-kHz Bandwidth),
Unweighted:
105 dB, minimum
A Weighted:
108 dB

Emission/Modulation:
Direct FM, crystal controlled, 15-kHz deviation, 60 f_3

Audio Processor:
DNX™ 2:1 logarithmic compressor and expander

Working Range:
Up to 1,000 feet under ideal conditions; usually slightly less in typical applications

Operating Temperature:
–20 to +50 °C (–4 to +122 °F)

MR2500 DIVERSITY RECEIVER

Receiver Type:
Single-frequency, single-conversion, superheterodyne FM

Typical Image Rejection:
80 dB

Sensitivity for 50 dB S/N (20 kHz bandwidth):
1.6 microvolts

Ultimate Quieting (signal-to-noise ratio, 20 kHz bandwidth),
Flat: 105 dB
A weighted: 108 dB

Squelch Quieting (referenced to 15 kHz deviation):
>105 dB

Audio Output,
Line (High) Level,
Full Deviation:
+12 to –18 dBm
Minimum at Clipping:
+16 dBm
Mic (Low) Level,
Full Deviation:
–18 to –46 dBm
With Normal Headroom:
–30 to –60 dBm

Output Connectors:
Electronically balanced XLR connector, Pin 2 positive, low impedance; unbalanced 1/4-inch connector, high impedance (approximately 10 kilohms)

Mic/Line Switch Attenuation Capability (mic position):
30 dB

Output Level Control Adjustment:
30 dB

IF Selectivity:
200 kHz, 9 poles, monolithic ceramic and LC filters

rf Selectivity:
Approximately 5 MHz, 4-pole LC filter

Adjustments and Controls:
Power switch, mic/line switch, output level adjustment control, single squelch control for both channels

Front-Panel Displays:
10-segment audio-level bargraph, diversity A/B LED's, rf-signal-detect A/B LED's, power on/off LED

Chassis Construction,
Front Panel:
Painted aluminum
Top, Bottom, Side, and Rear Panels:
Painted steel

Color:
Gray

Antenna Connectors:
BNC type

Power Requirements:
110/120 or 220/240 V, 50-60 Hz ac, 10 watts

Voltage Selection Switch:
115 V ac or 235 V ac, internal switch selectable through opening on right side panel

Power Connector:
Three-conductor grounded IEC connector

Weight:
3 kg (16 lbs, 10 oz)

Dimensions (excluding rack ears):
Height:
44.5 mm (1.75 in)
Width:
429 mm (16.9 in)
Depth:
230 mm (9.0 in)

Supplied Receiver Accessories:
Two quarter-wave whip antennas, configurable in right angle or straight positions; two rack-mount ears; Allen wrench to configure antennas; IEC power cable; 250 mA/250V fuse for 235-V operation; owner's manual

MT2500 HANDHELD TRANSMITTER

Mic Element:
N/D757B

MS2500 SPECIFICATION GRAPHICS

FIGURE 1 — MR2500 Receiver Front and Back Panels

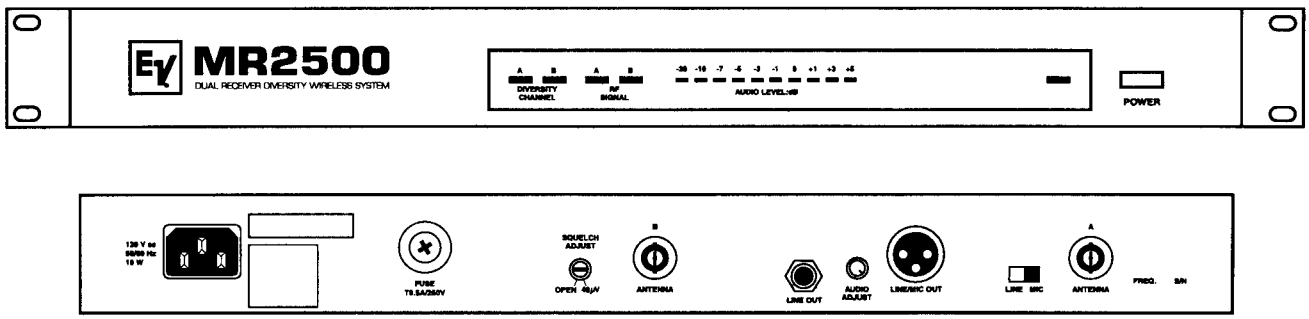


FIGURE 2 — MT2500 Handheld Transmitter

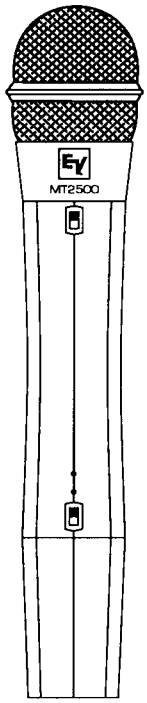
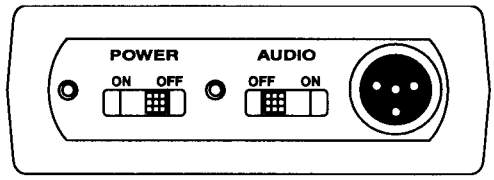


FIGURE 3 — MB2500 Bodypack Transmitter, Top View



Frequency Stability:
±0.005%
Power Output (nominal):
50 mW
Spurious Output,
Minimum: –45 dB
Typical: –55 dB
Audio Adjustment Range (continuously variable potentiometer):
30 dB
Switches:
Power on/off; mic audio on/off
LED Indicators:
Red power-on LED, green battery condition LED
Handle Material:
Black ABS plastic, with black rubberized coating
Battery Life (with 9-V alkaline battery):
8-10 hours
Dimensions,
Length:
260 mm (10.25 in.)
Maximum Diameter:
52 mm (2.05 in.)
Weight (including battery):
298 g (10.5 oz)

MB2500 BODYPACK TRANSMITTER
Power Output (nominal):
50 mW
Spurious Output,
Minimum: –45 dB
Typical: –55 dB
Audio Adjustment Range (continuously variable potentiometer):
30 dB
Switches:
Power on/off; mic audio on/off
Indicators:
Three-function LED
Connector:
Four-pin TA4M
Antenna Type:
Attached external limp wire
Case Material:
Black ABS plastic
Battery Life (with 9-V alkaline battery):
8-10 hours
Optional Microphones (with TA4F connector):
LM20EX omni, CO100EX omni, CS200EX uni, HM1 headset, GC1 instrument cable
Dimensions:
Length:
101.6 mm (4.0 in.)
Width:
63.5 mm (2.5 in.)
Depth:
25.4 mm (1.0 in.)
Weight (including battery):
160 g (5.5 oz)
Supplied Transmitter Accessories:
Attenuator adjustment tool
9-V alkaline battery
Optional Accessories:
TA4F connector, Model 125 dipole antenna, Model 121BNC quarter-wave whip antenna, Model 126 mic clip for handheld transmitter, M-217B one-input/four-output multicoupler, M-282 two-channel rack-mountable multicoupler, RAK-2 one-rack-space antenna panel
System Shipping Weight:
4.5 kg (10 lb)

DESCRIPTION

The MS2500 wireless system is a true-diversity design, with two separate receiver front-end circuits and a diversity switch that monitors the resulting audio signals. The diversity switch then selects the circuit with the best audio quality. Each front-end is linked to its own BNC antenna connector. This design minimizes the chance of signal "dropouts" caused by multipath interference—a problem that occurs when direct signals from the transmitter combine with out-of-phase reflected signals, forming zones where the signal strength is too low at the antenna to maintain audio. When multipath interference occurs, the receiver squelches and a dropout results.

The audio circuitry in the MS2500 was carefully designed to deliver the true signal response of the transducer through the wireless signal chain to the audio system. It includes the exclusive DNX™ companding circuit, a 2:1 compander created especially for wireless microphone transmissions by Vega Wireless. The signal is transmitted without coloration, transient-response anomalies, or artifacts such as "breathing" or "pumping." The audio circuitry is stable to low voltages, so audio quality will not degrade as the battery level drops with use. The combination of the rf, audio, and companding circuitry yields a signal-to-noise ratio of 105 dB flat and 108 dB, A weighted.

Transmitters are made of ABS plastic, forming a rugged nonmetallic case that both protects the circuit boards and permits maximum radiation of rf energy to the receiver. The transmitters radiate 50 milliwatts of rf signal—the maximum level allowed by the FCC.

The handheld transmitter features the N/D757B microphone head, our premium N/DYM™ neodymium-magnet transducer. The bodypack transmitter has a TA4M four-pin mini-XLR connector, permitting connection of a variety of microphones. A selection of omnidirectional and unidirectional lavalier condenser mics, as well as a headset microphone and a 1/4-inch instrument cable, are available from Electro-Voice.

MS2500 wireless systems operate in the VHF band from 169 MHz to 216 MHz. Each system operates on a single frequency using a crystal-controlled oscillator. Systems are available in sixteen standard frequencies, and may also be ordered in custom frequencies for an additional charge.

MR2500 DIVERSITY RECEIVER

The one-rack-space receiver has rf and audio metering on the front panel, and connectors and controls on the rear panel. The on/off switch is also located on the front. The receiver may be rack mounted with the provided rack-mount ears. A ten-segment LED bargraph monitors the audio level from the transmitter, and is useful in setting up the system for optimum signal-to-noise, as well as signal monitoring during use.

A pair of orange LED's monitor the rf level received by each channel. These LED's remain dark when no rf is present at the carrier frequency, will flicker when small to moderate rf is present, and will light brightly when a strong rf signal is received. A pair of green LED's will indicate which channel is selected by the diversity switch as the best source for the audio signal; these LED's will normally switch back and forth as the transmitter is moved.

Two audio output connectors are provided: an electronically balanced XLR connector and an unbalanced 1/4-inch connector. A level control with 30 dB of adjustment affects both outputs. A mic/line switch is connected to the XLR output, providing a 30-dB pad to the output signal strength and permitting signal matching to a variety of inputs.

The receiver voltage can be switched between 115V and 235V, allowing operation worldwide. The switch is located on the right side of the unit; a fuse for 235V operation is also included. The grounded IEC power cable connector can be used with the proper power cable for the local power outlets.

MT2500 HANDHELD TRANSMITTER

The MT2500 handheld transmitter features the Electro-Voice N/D757B microphone head, our premium neodymium-magnet microphone transducer. The transmitter electronics are housed in a durable yet lightweight, molded ABS plastic handle that allows rf energy to radiate efficiently from the transmitter. A hinged battery cover at the bottom of the handle slides securely into a "locked" position to prevent loose battery problems during use.

An on/off switch above the battery compartment turns on the audio and rf circuits. A pair of LED's above the switch indicate "power on" (red) and "sufficient battery power" (green). A mute switch at the collar of the mic decouples the mic head's output from the audio circuitry, while the rf link with the receiver is maintained. Below the small hole adjacent to the mute switch is the variable audio level control, permitting 30 dB of attenuation of the mic head's output. The provided adjustment tool or a 3/32-inch screwdriver can be used.

MB2500 BODYPACK TRANSMITTER

The MB2500 bodypack transmitter is a lightweight, efficient unit, capable of providing excellent radiated rf. It is housed in a rugged ABS plastic case. The hinged battery cover slides and locks securely to prevent accidental opening during use. The attached metal clip allows the user to hook the transmitter to a belt, pocket, or strap.

A four-pin TA4M (mini-XLR-type) connector is located on the end of the case, next to the power and audio switches. It permits the use of a variety of lavalier, headset, and instrument sources when they are wired to the mating TA4F connector. Proper wiring is explained in the section on "Bodypack Transmitter Pin Functions."

The power switch activates the audio and rf circuits. The separate audio switch mutes the output of the microphone while maintaining the rf link with the receiver. In the small hole on the lower left corner of the label is the variable level control, which provides 30 dB of attenuation. The small red LED between the two switches serves three purposes: it blinks once when the unit is switched on; it acts as a peak indicator by

flashing when the audio level into the mic is high enough to cause distortion; and it stays lit when the battery level is low.

BODYPACK TRANSMITTER PIN FUNCTIONS

Pin functions vary among wireless manufacturers, even when the same connector is used. The pin functions for tne MB2500 transmitter are as follows:

Pin 1: Provides bias current to condenser microphones

Pin 2: Provides both bias current and an audio signal path for two-wire condensers

Pin 3: Provides an audio signal path

Pin 4: Shield or ground

Typical wiring for a three-wire condenser microphone is Pin 1 bias current, Pin 3 signal, and Pin 4 shield. For a two-wire condenser, the wiring is Pin 2 signal/bias and Pin 4 shield. For an instrument cable or dynamic microphone, it is Pin 3 signal and Pin 4 shield.

TRANSMITTER AND RECEIVER ANTENNAS

The transmitting antenna on the MT2500 handheld transmitter is an internally mounted dipole antenna. It provides efficient rf radiation in normal handheld microphone positioning and use. The bodypack transmitter uses an external limp wire antenna plus the microphone or instrument cable to form a dipole transmitting antenna. For most efficient rf radiation, the limp wire antenna and the mic cable should be higher on the body and aligned in opposite directions. Less efficient transmission occurs if the two wires are touching or wrapped around each other.

The provided quarter-wave whip antennas attach to the BNC connectors on the back of the receiver. Best performance is achieved if the antennas are placed in the "rabbit ear" position, and are high and in line-of-sight of the transmitter. They are shipped with the connector at right angles to the wire whip. The whip antennas may be reconfigured so that they go straight out the back of the receiver. A small Allen wrench is provided for this purpose.

The chassis of the receiver forms the second part--the "ground plane"--of the receiving antennas. Simply attaching the whip antennas to coaxial cable to extend them out of an equipment rack will result in diminished range. The use of external dipole antennas is recommended for this purpose.

FREQUENCY SELECTION

Active transmitters each require a separate receiver, and each system must be on a different frequency in order to operate properly. Both transmitters (when close to each other) and receivers can interact with each other, with transmitting frequencies combining in the receiver front-end electronic circuitry to create additional frequencies. Therefore, in order to avoid interference problems, a computer frequency compatibility search is required whenever two or more wireless microphone systems are to be used together. Electro-Voice provides this service.

ADDITIONAL INFORMATION

The owner's manual shipped with each MS2500 wireless system contains additional information about setup, use and maintenance. Other sections discuss rf interference sources, rack mounting and antennas, and troubleshooting.

ARCHITECTS' AND ENGINEERS' SPECIFICATIONS

The wireless system will be a true-diversity type, with two separate receiver front ends connected to two antennas and an internal switching system to choose the best audio signal. The receiver will be rack mountable and will have two BNC antenna connectors on the rear panel. It will have a balanced XLR output with a mic/line switch that inserts a 30 dB pad into the circuit; it will also have an unbalanced 1/4-inch output. A 30-dB variable output level control will adjust the output level of both output connectors. The unit will have an internal power supply, with a three-conductor IEC connector mounted on the rear panel. It will be switchable from 115V to 235V operation by moving a switch on the power supply board.

The system will have an ultimate signal-to-noise ratio, processed and with a 20-kHz bandwidth, of 105 dB flat and 108 dB A-weighted. Frequency response will be from 60 Hz to 14,000 Hz, ±1.5 dB, and from 30 Hz to 16,000 Hz, ±3 dB. The system will use DNX™ 2:1 logarithmic compressor and expander circuitry for audio processing. Each unit will operate on a single frequency, using crystal-controlled direct FM emission and modulation. Systems will operate in the VHF bandwidth between 169 MHz and 216 MHz, and be available in 16 standard frequencies as well as custom frequencies.

The receiver will be a single-frequency, single-conversion, superheterodyne FM type. It will have a sensitivity of 1.6 microvolts for 50 dB S/N, 20-kHz bandwidth. Image rejection will be 80 dB, typical. Squelch quieting will be greater than 105 dB. IF selectivity will be 200 kHz, with nine poles of filtering; rf selectivity will be approximately 5 MHz, with four poles of filtering. Indicators on the front panel will include a 10-segment audio-level LED display, two rf-signal-detect A/B LED's, two diversity channel A/B LED's, and a power on/off LED.

Transmitters will be molded from ABS plastic. The handheld transmitter will use the Electro-Voice N/D757B microphone element and will have an internal dipole antenna. The bodypack transmitter will have a four-pin TA4M connector and an external limp-wire antenna. Separate power on/off and audio mute switches will be provided. A continuously variable 30-dB attenuation control will be accessible.

Frequency stability will be ±0.005%, and spurious output will be –45 dB minimum and –55 dB typical. Battery life will be eight to ten hours with one 9-volt alkaline battery. Transmitter deviation for full bandwidth performance will be 15 kHz.

The receiver unit shall be rack mountable in one EIA/IEC standard rack space. Receiver dimensions, excluding rack ears, shall be 44.5 mm (1.75 in.) high by 429 mm (16.9 in.) wide by 230 mm (9.0 in.) deep. The wireless system shall be the Electro-Voice MS2500.

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 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 Wireless Systems are guaranteed against malfunction due to defects in materials or workmanship for a period of one (1) year from the date of original purchase. The Limited Warranty does not extend to cables or cable connectors. 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.

ELECTRO-VOICE a MARK IV company **600 Cecil Street, Buchanan, Michigan 49107**

MANUFACTURING PLANTS AT ■ BUCHANAN, MI ■ NEWPORT, TN ■ SEVIERVILLE, TN ■ OKLAHOMA CITY, OK ■ GANANOQUE, ONT.

Part Number 532722 — 9518