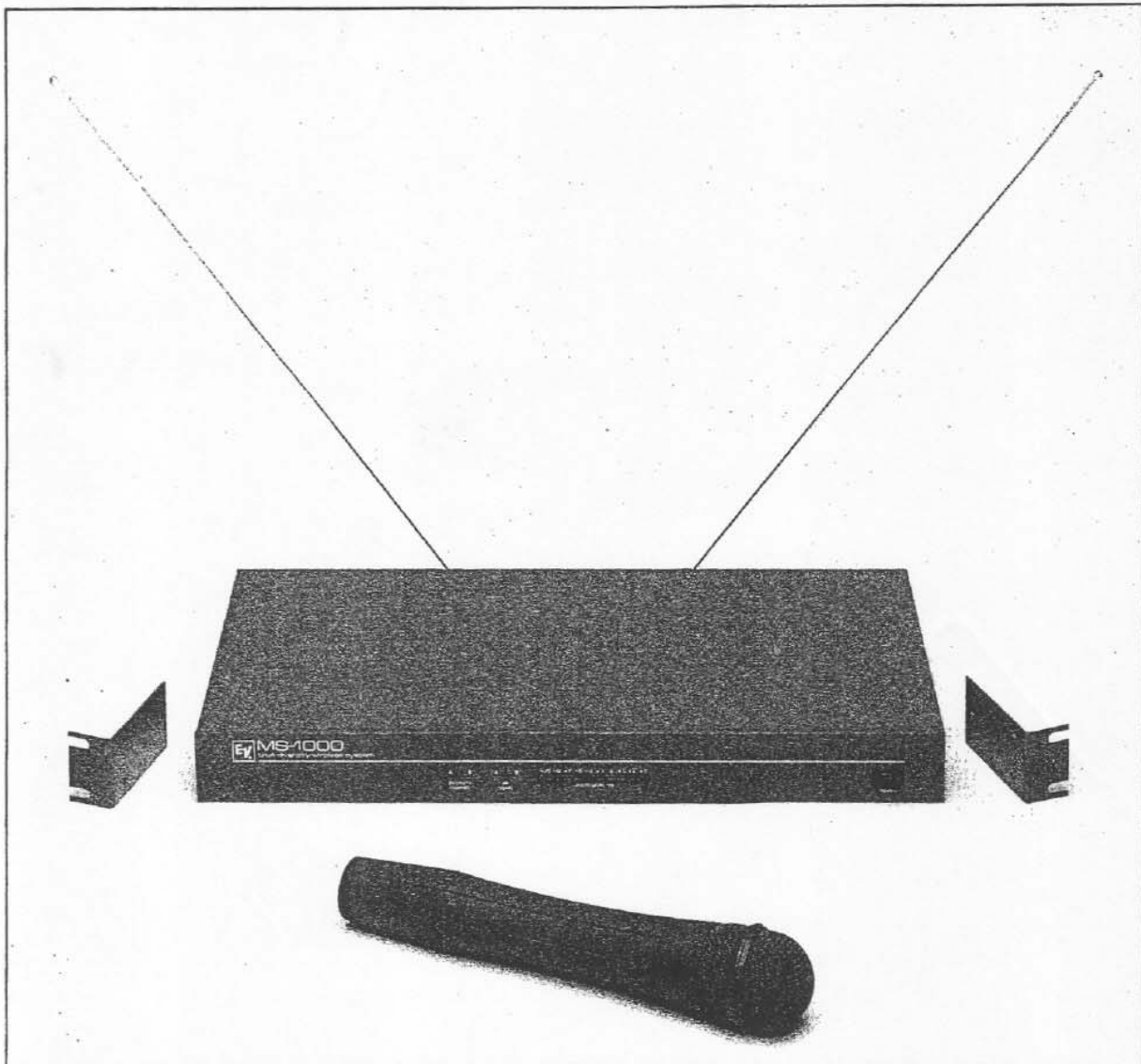


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Electro-Voice®
WIRELESS SYSTEMS

OWNER'S MANUAL



MS-1000 WIRELESS MICROPHONE SYSTEM

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

INTRODUCTION

You have purchased a wireless microphone system of superior quality, built with precise attention to detail in the USA by the world's leader in wireless technology. The transmitter and receiver were fine-tuned together as a system to ensure perfect compatibility. Each system is individually hand-tested and walk-tested for reliability and range prior to shipment.

To assure field reliability, each receiver is "burned in" for 24 hours in a specially designed environmental chamber, which simulates the heat and ventilation conditions that would be found in a rack of live electronics and power amps. Both transmitters and receivers are shock-tested to detect and prevent any loose connections or parts in the finished system.

You will receive many years of superior service from your wireless microphone system, and a new-found freedom now that your movements are no longer limited by a cable. Enjoy the experience. Thank you for your purchase.

WHAT IS A WIRELESS MICROPHONE SYSTEM?

In a wireless microphone system, a radio-frequency (RF) signal substitutes for the cable, forming a circuit between the microphone and the amplification system. The wireless microphone system consists of two parts, the transmitter and the receiver. The transmitter sends the audio signal from the microphone to the receiver. An audio cable connects the output of the receiver to the amplification system.

Only one transmitter can work with one receiver. If multiple wireless systems are needed, a separate receiver is required for each individual transmitter. Each wireless system must operate on a different radio frequency, to avoid interference. MS-1000 wireless microphone systems operate in the radio-frequency band between 169 and 186 MHz. This frequency range avoids the interference and dropout problems that wireless systems operating on other frequencies have had in the past.

FEATURES

- Electro-Voice N/DYM 757 supercardioid dynamic microphone element, providing the ultimate in sound quality for lead vocal performance
- Clean, crisp, natural sound, with advanced DNX "B" 2:1 compander audio processing.
- Quiet VHF high-band operating frequencies for ultimate range, reliability, and overall system audio quality.
- True dual-receiver space diversity system for maximum range and reliability.
- 50 milliwatts transmitter output power — maximum legal limit for the greatest coverage area.
- LED "POWER ON" indicator and separate LED for "BATTERY OK" indication on transmitter — operate wireless anytime with confidence.
- Up to 10 hours of transmitter operation on a single standard 9-volt alkaline battery.
- Separate power-on and audio-mute transmitter switches for critical "live" applications.
- Attractively contoured handheld mic styling
- Ten-segment LED audio VU bargraph display, plus squelch and diversity status indicators on receiver front panel, for fast and easy setup.
- Switchable mic and line output level on professional XLR connector, and line output level on standard 1/4-inch phone jack.
- Solidly built rack-mountable receiver with heavy-duty built-in AC power supply (UL listed, of course).
- 100% made with pride in the USA — backed by a company committed to your success.

QUICK STARTUP PROCEDURE

To put your MS-1000 wireless microphone system into operation immediately, use the following instructions. However, for optimum performance and sound quality, review the detailed information later in this manual.

1) If necessary, convert the whip antennas to the right-angle configuration, using the miniature wrench supplied, as shown in the whip-antenna information sheet included.

2) Plug the whip antennas into the rear-panel "ANTENNA" connectors of the receiver (see Figure 1). Position the antennas in an upright "V" configuration (like TV "rabbit ears"). (Dipole antennas provide better range and reliability in difficult installations. See section on antennas later in this manual.)

3) Keep level low or off on the mixer/preamp/amplifier channel.

4) Plug one end of your audio cable (not supplied) into the appropriate output connector on the rear panel of the receiver (see Figure 2). The receiver XLR output is balanced; for single-ended (unbalanced) applications, use only pins 1 (common) and 2 (signal high). The output level in this mode will be 6 dB less than for the balanced mode. *Do not connect either pin 2 or pin 3 to ground (common) at any time.* The quarter-inch output is line level only, and the XLR output is switchable mic/line. Plug the other end of the audio cable into the mixer/preamp/amplifier input. If the cable from the XLR output is connected directly into an amplifier input, set the "MIC/LINE" switch on the receiver rear panel to "LINE".

5) Plug the receiver power cable into a standard 120-V_{ac} outlet.

6) Turn "ON" the POWER switch on the front panel of the receiver, by pushing the switch to the right. The power LED should illuminate.

7) With the provided screwdriver, turn the "AUDIO ADJ" control on the receiver rear panel to the "12 o'clock" (vertical) position (see Figure 3). Begin with the control in this position; after you have adjusted the transmitter level, you may need to readjust the "AUDIO ADJ" control.

8) Slide the cover of the transmitter battery compartment until it is completely off. Slide a fresh 9-volt alkaline battery into the battery compartment,



Figure 1 - Connect Antennas on Rear Panel



Figure 2 - Connect Audio Cable on Rear Panel



Figure 3 - Adjust Audio Output Level, Rear Panel

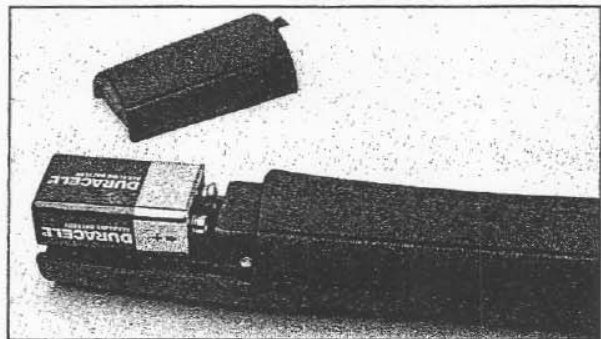


Figure 4 - Install 9-Volt Alkaline Battery into Transmitter, Positive (Smaller) Terminal to the Right (with Battery-Compartment End of Case Toward You)

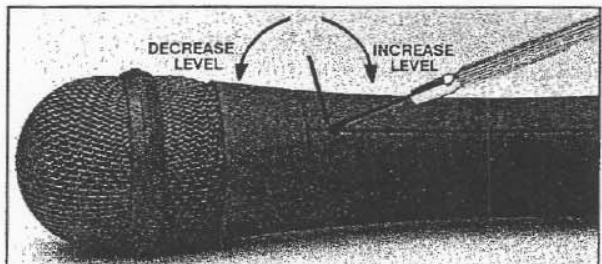


Figure 5 - Adjust Transmit Audio Level Control

with the positive (smaller) terminal to the right (with the battery-compartment end of the case toward you). Push the battery all the way in gently, and slide the cover back into place (see Figure 4).

9) Turn the transmitter "ON" by sliding the power switch (nearest the battery compartment) forward towards the windscreen, and position the transmitter in the approximate center of the area to be covered by the wireless system. Observe that both of the receiver SIGNAL LEDs are lit, and that one of the DIVERSITY CHANNEL LEDs is lit.

10) Begin with the transmitter mic-level adjustment in the "12 o'clock" position.

11) Turn the audio transmission "ON" on the transmitter by sliding the audio switch (nearest the windscreen) forward towards the windscreen. As you speak into the microphone, the "AUDIO LEVEL" display on the receiver should show activity.

12) Adjust the transmitter mic-level control with the provided screwdriver (see Figure 5) so that the top LED on the receiver "AUDIO LEVEL" display flashes only very rarely on the loudest voice peaks. If it does, turn "down" the transmitter mic level control a small amount and try again. Conversely, if the "-20" and "-10" LEDs on the receiver do not illuminate frequently and remain "on" fairly consistently, it will be necessary to turn "up" the transmitter mic level control. Setting the mic level correctly maximizes the system signal-to-noise ratio

while ensuring optimum audio quality. If the mic level is set too high, thumps or pops due to overload may occur; if set too low, the system may "noise-up" at times.

13) Turn up the level on your mixer/preamp/amplifier to your normal setting.

14) Speak into your transmitter microphone, and, if necessary, adjust the "AUDIO ADJ" control on the back of the receiver with the provided screwdriver until the volume level from the wireless system matches the level of your wired systems.

15) "Walk" the coverage area to check for problems. If dropouts (little or no signal in small areas) occur, a problem is indicated. Check the battery to make sure it is new and fresh. Also check the antennas to make sure they are not touching each other or metal objects. There must be a clear path from the transmitter to the receiver for proper operation.

16) In normal operation, the "DIVERSITY" LEDs on the front panel of the receiver should switch back and forth from "A" to "B", indicating proper operation of the internal diversity circuitry. At very close ranges (15 feet, or 5 meters), the signal level may be too high for diversity switching. At longer ranges, failure of the LEDs to switch indicates some type of problem (bad antenna, poor antenna location, transmitter too close to one antenna, etc.) which should be investigated and corrected.

SPECIFICATIONS

MS-1000 WIRELESS MICROPHONE SYSTEM**FREQUENCY RANGE**

169-186 MHz

WORKING RANGE

Up to 1000 ft under ideal conditions; usually somewhat less in typical applications

EMISSION/MODULATION

Direct FM, crystal-controlled, 15-kHz deviation, 60F3

FREQUENCY RESPONSE60 Hz to 14 kHz, ± 1.5 dB, 30 Hz to 16 kHz, ± 3 dB**HARMONIC DISTORTION**0.5% maximum, below transmitter limiting;
0.25% typical at 1 kHz**DYNAMIC RANGE**

105 dB

ULTIMATE S/N (processed, 20-kHz bandwidth)

105 dB (flat) minimum (108 dB typical A-weighted)

OPERATING TEMPERATURE -20°C to $+50^{\circ}\text{C}$ (-4°F to $+122^{\circ}\text{F}$)**FCC DATA**

Approved under Parts 15, 74, and 90, as applicable

MS-1000 DIVERSITY RECEIVER**RECEIVER TYPE**

Single-frequency, single-conversion, superheterodyne FM

IMAGE REJECTION

80 dB, typical

INTERMEDIATE FREQUENCY

10.7 MHz

SENSITIVITY $1.6 \mu\text{V}$ for 50 dB S/N (processed), 20-kHz bandwidth**ULTIMATE QUIETING** (S/N)

105 dB (20 kHz flat); 108 dB (A-weighted)

SQUELCH QUIETING

Greater than 105 dB (referenced to 15 kHz deviation)

AUDIO OUTPUT**LINE LEVEL** $+12$ to -18 dBm (at full deviation), $+16$ dBm minimum at clipping**MIC LEVEL** -18 to -46 dBm at full deviation (-30 to -60 dBm with normal headroom)**IF SELECTIVITY**

200 kHz, 9 poles, monolithic ceramic and LC filters

RF SELECTIVITY

Approximately 5 MHz, 4-pole LC filter

LOCAL OSCILLATOR

Bipolar transistor, third-overtone crystal controlled, low-side injection

AUDIO PROCESSOR

1:2 logarithmic expander

ADJUSTMENTS AND CONTROLS

Power switch, mic/line switch, output level adjust control

INDICATORS

Audio-level bargraph, diversity A/B LEDs, RF-signal-detect A/B LEDs, power ON/OFF LED

POWER120 V_{ac}, 50/60 Hz, 10 W**WEIGHT**

6 lbs, 10 oz (3 kg)

DIMENSIONS (Excluding Rack-Mount "Ears")

1.75 in (4.45 cm) high, 16.9 in (42.9 cm) wide, 9 in (23 cm) deep

MT-1000 HANDHELD TRANSMITTER**MIC ELEMENT**

Electro-Voice N/DYM 757 cardioid

POWER OUTPUT

50 mW nominal

FREQUENCY STABILITY $\pm 0.005\%$ **SPURIOUS OUTPUT** -45 dB minimum, -55 dB typical**CONTROLS**

Power on/off, mic-audio on/off, mic-level adjust

AUDIO ADJUSTMENT RANGE

30 dB

BATTERY LIFE

8-10 hours with one 9-V alkaline

SIZE

10.25 in (26.0 cm) long

WEIGHT

10.5 oz (297.7 g), with battery

COMPATIBILITY

The receiver's VHF high-band frequency must be the same as the transmitter's frequency. When a frequency change is needed, both the transmitter and the receiver should be returned to the factory or authorized service location. Because of the very high performance of these units and the specialized test equipment required to adjust them properly, owners should not attempt to change frequency themselves.

If two or more systems are used at the same location, proper frequency selection is required to avoid interference. Frequency spacing is only one factor. Frequency mixing is another factor, involving not only the wireless frequencies but also frequencies of other transmitters such as local TV stations. Many complex formulas must be used to determine frequencies resulting from a mix. Contact your dealer for frequency-selection assistance if you are planning to add more wireless systems to be run simultaneously at the same location.

DIVERSITY OPERATION

The MS-1000 receiver is a true dual-receiver space diversity design, which is the optimum technique for eliminating potential dropouts caused by reflected signals. A signal from the transmitter can reflect off of surfaces such as air-conditioning ducts, equipment cabinets, and other metal objects, and arrive 180 degrees out of phase with the direct or other reflected signal, causing a "phase cancellation" of the entire signal. With a diversity system, such a phase-cancelling condition virtually never exists on more than one antenna at the same time. A true dual-receiver diversity system such as the MS-1000 is constantly switched to the antenna/receiver with the strongest signal, thus providing maximum reliability.

RECEIVER CONTROLS, CONNECTORS, AND INDICATORS

The MS-1000 diversity receiver is extremely easy to set up and operate. The only controls are a power "ON" switch, a "MIC/LINE" switch, and an adjustable output level control. Once an initial setup has been performed with these controls and front-panel indicators, the "MIC/LINE" switch and the output level control will probably never require resetting.

Front Panel:

"POWER" LED and Switch: Turns the receiver "on" and "off" and indicates when the power is active.

"AUDIO LEVEL" Display: Ten-segment LED bar-graph-type display to indicate the audio output level of the receiver. The metering point is before the "MIC/LINE" switch and the output attenuator, so changes in these two controls will not affect the display reading.

"DIVERSITY CHANNEL" LEDs: Indicate which receiver channel has been selected by the internal diversity circuitry. Proper diversity-circuit operation is indicated when these indicators switch back and forth (except at very short ranges, when one of the indicators locks on, due to strong-signal saturation of both channels).

"RF SIGNAL" LEDs: Indicate that the associated channel is receiving a signal from the transmitter. If one LED is "on" most of the time while the other is "off" far more than it is "on", a problem is indicated (such as a bad receiving antenna, poor antenna location, transmitter too close to one antenna, etc.).

Rear Panel:

"ANTENNA" Connectors: Type BNC for use with the whip antennas supplied.

"AUDIO" Output Connectors: (1) Standard, full-sized, three-pin male XLR for balanced audio output, switchable from mic to line level; (2) 1/4-inch phone, line-level output only.

"MIC/LINE" Switch: Selects line-level output or microphone-level output. Output range (depending upon the setting of the "AUDIO" level control) is approximately 0 dBm to -30 dBm at normal levels in the "line" mode; -24 to -54 dBm in the "mic" mode.

TRANSMITTER CONTROLS AND INDICATORS

Power Switch: Recessed; turns transmitter on and off

Mic Switch: Mutes mic audio

Audio Gain Control: Screwdriver adjust for transmitter preamplifier gain; approximately 30 dB of range

LED INDICATORS: "POWER ON" and "BATTERY OK"

ANTENNAS

The receiver antennas may be the most important components in a wireless system. However, antennas are the most often overlooked items in setting up a system, and are frequently the cause of quite unnecessary problems. Properly locating the receiving antennas is vitally important in any wireless system. Whip antennas (as supplied with the MS-1000) connected directly to the wireless receiver are adequate for many installations. When the distance between the receiver and the transmitter is 200 to 400 feet (60-120 m), or less, and the path between the receiver and the transmitter is clear and unobstructed line-of-sight, good results usually can be obtained. However, other types of antennas may be needed for unusual applications, such as operating at extreme ranges of 500 feet (150 m) or more. TV antennas (with an appropriate matching transformer) are often used for this purpose. A "high-band" wide-bandwidth yagi antenna (Winegard K5-713, or similar) works well in this application. VHF communications antennas are also sometimes used for specialized requirements. However, such antennas are usually narrow-band and must be modified to function properly in the 169 to 186 MHz range.

IN CASE OF DIFFICULTY

If you are having a problem with your wireless system, the following hints may be of help.

PROBLEM	POSSIBLE CAUSES	SOLUTIONS
No audio:	Transmitter audio switch is off.	Turn transmitter audio switch on.
	Disconnected cable at receiver.	Connect, repair, or replace cable.
	Transmitter power switch is off.	Turn transmitter power switch on, with level down on mixer/preamp/amplifier.
	Receiver is off.	Turn receiver on.
	No (or dead) battery in transmitter.	Insert fresh alkaline battery into transmitter battery compartment (Duracell MN1604 or "Eveready" Energizer No. 522 recommended).
	Faulty battery contacts in transmitter.	Clean contacts.
	Gain down on mixing-board channel, mixing-board output, or power amp.	Check each component.
Low gain/volume:	Receiver "MIC/LINE" switch on "MIC" while in a line-level input on mixer/preamp/amplifier line-level input.	Set "MIC/LINE" switch to "LINE".
	Gain not up sufficiently on mixer/preamp/amplifier input.	Increase mixer/preamp/amplifier gain.
	Receiver "AUDIO ADJ" control turned too far counterclockwise.	Increase receiver "AUDIO ADJ" control.
	Transmitter audio level control turned too far counterclockwise.	Turn up transmitter audio level control.
Distortion:	Transmitter audio level control too far clockwise, overloading transmitter circuit.	Turn transmitter audio level control down.
	"MIC/LINE" switch set on "LINE" while plugged into a mic-level input.	Set "MIC/LINE" switch to "MIC", or plug into line-level input.
	Receiver "AUDIO ADJ" control set too far clockwise, overloading the mixer/preamp/amplifier input.	Turn receiver "AUDIO ADJ" control down.
	Battery level low in transmitter.	Insert a fresh battery.
Signal interference:	Another wireless microphone in the immediate vicinity operating on the same frequency, or on a frequency that mixes with another transmitter (such as a TV broadcast transmitter) onto the wireless frequency.	If interference is weak, keep transmitter on to override interference whenever receiver is on (or "fade" audio on mixer/preamp/amplifier). If interference is strong, turn off all other wireless in area to find the one causing the problem.
	Strong electromagnetic field from stage lighting or other source near the transmitter or receiver, producing "RF noise" on or near the operating frequency of the wireless system.	Repair or remove source of interference.
Short range or frequent drop-outs	Faulty receiving antenna system.	Reposition antennas, or replace with dipole antennas; check coaxial-cable connectors.
	Faulty transmitter antenna.	Return to factory or authorized service station.
	Battery level low in transmitter.	Insert a fresh battery.

SERVICE INFORMATION**Shipping Damage**

Inspect the shipping carton for possible damage. If damage is found, notify the transportation company immediately. Save the carton as evidence for the carrier to inspect. If damage occurs during shipping, it is the responsibility of the consignee to file a claim with the carrier. If the carton is in good condition but the equipment is damaged, call Electro-Voice.

Warning

The MS-1000 wireless microphone system is approved by the Federal Communications Commission. Tuning and other internal adjustments by other than FCC-licensed technicians may nullify the equipment's FCC approval and result in illegal operation.

Factory Service

If factory service is required, ship the unit prepaid in its original carton to:

Electro-Voice, Inc.
Wireless Operation
9900 Baldwin Place
El Monte, California 91731-2204

Enclose a note describing the problem along with any other helpful information such as where and how the unit is used.

WARRANTY (Limited)-

Electro-Voice Wireless Components are guaranteed for one year against malfunction due to defects in workmanship and materials. If such malfunction occurs, unit will be repaired or replaced (at our option) without charge for materials or labor if delivered prepaid to the proper Electro-Voice service facility. Unit will be returned prepaid. Warranty does not extend to finish, appearance items, or malfunction due to abuse or operation under other than specified conditions, nor does it extend to incidental or consequential damages. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above exclusion may not apply to you. Repair by other than Electro-Voice or its authorized service agencies will void this guarantee. A list of authorized service centers is available from Electro-Voice, Inc., 600 Cecil Street, Buchanan, MI 49107 (AC/616-695-6831) and/or Electro-Voice West, 8234 Doe Avenue, Visalia, CA 93291 (AC/209-651-7777). This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Service and repair address for this product:

Electro-Voice, Inc.
Wireless Operation
9900 Baldwin Place
El Monte, CA 91731-2204

Specifications subject to change without notice.