

# **MM200**

## **FREQUENCY-AGILE UHF MINIATURE BELT-PACK TRANSMITTER**

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### **OPERATING INSTRUCTIONS and trouble-shooting guide**

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**LECTROSONICS, INC.**

Rio Rancho, NM  
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*The MM200 transmitter is FCC type accepted under Part 74: 536-608 MHz and 614-806 MHz*

### **WARNING! TO PREVENT INTERNAL CORROSION!**

*If the transmitter is wet (either due to immersion or high levels of perspiration), BEFORE opening any covers or connectors, carefully blot the transmitter dry with a clean paper towel or cloth. Remove all moisture. After opening any connector or cover, carefully blot up any remaining moisture that may have remained around the seal. THIS IS IMPORTANT! DO NOT CLOSE ANY COVER OR CONNECTOR BEFORE MAKING CERTAIN THERE IS NO MOISTURE IN OR NEAR THE OPENING. After use, it is important to store the transmitter in a dry place with all access doors and connectors opened to allow any internal humidity to evaporate. Specifically, open the battery door, the frequency cover plate and fully unscrew and remove the microphone connector before storing. Do NOT store wet and do NOT store sealed. If moisture is sealed inside the unit it has nowhere to go other than to chemically react with and destroy components and the printed circuit board.*

## **INTRODUCTION**

Thank you for selecting the Lectrosonics MM200 frequency agile UHF miniature transmitter. The MM200 combines over 80 years of engineering experience with the very latest components, in a design that addresses the most demanding professional applications.

The design of the MM200 was the direct result of numerous conversations with users, staging and touring companies and dealers across the US. The specific concerns and needs brought up in these conversations led directly to the development of the operational features offered on the MM200. Two hundred fifty six frequencies are user selectable in 100kHz steps to alleviate interference problems in traveling venues.

The MM200 is a rugged, machined stainless steel package with a removable, spring loaded belt clip. 3.3 Volts of bias voltage is available to power electret mics. Level indicating LEDs are provided on the control panel to make level settings quick and accurate, without having to view the receiver. The battery compartment accepts AA alkaline or lithium batteries. The antenna is a detachable, locking  $\frac{1}{4}$  wavelength flexible bronze cable that connects to a 50 Ohm SMA port on the transmitter.

Only the MM200 transmitter is covered in this manual. Companion receivers are covered in separate manuals. The transmitter will operate with any 200 Series Lectrosonics receiver in the same frequency group.

The MM200 transmitter uses a Digital Signal Processor to model the dual band compander used in the 200 series with the appropriate compander time constants and frequency division. Since the signals are converted from analog to digital, processed and then converted back to analog, there is a delay as with all digital audio systems. This delay is 1.6 mS or an equivalent audio path length delay of 1.8 ft.

# GENERAL TECHNICAL DESCRIPTION

If the unit will be used in a wet environment (possible immersion, perspiration, rain scenes, etc.) – be certain all connectors have intact gaskets and that a properly sealed Lectrosonics’ waterproof mic connector is installed and used with the microphone.

## GENERAL

The 200 system uses 75kHz wide deviation for an extremely high signal to noise ratio. The switching power supplies provide constant voltages to the transmitter circuits from the beginning (1.5 Volts) to the end (0.85 Volts) of battery life. The input amplifier uses an ultra low noise op amp for quiet operation. It is gain controlled with a wide range dual envelope input compressor which cleanly limits input signal peaks over 30dB above full modulation.

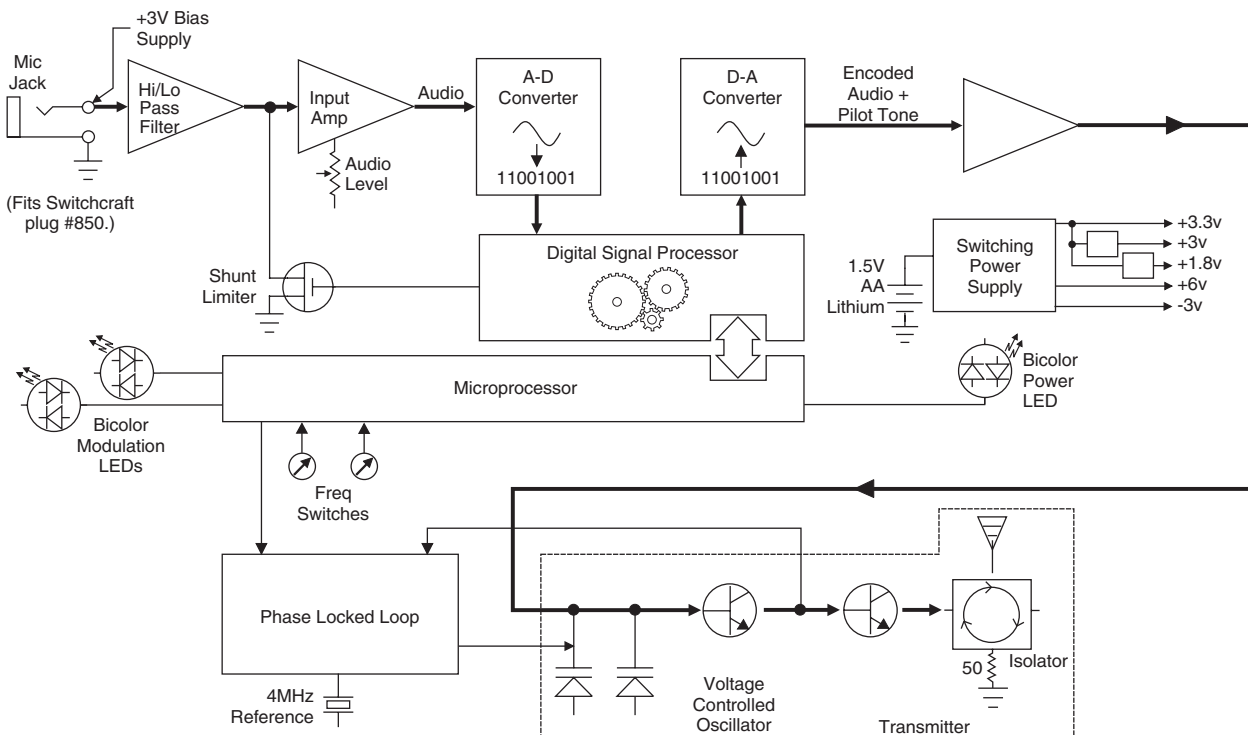
## DUAL BAND COMPANDOR MODELING in the MM200

Traditionally, compandors have been a source of distortion in wireless microphone systems. The basic problem with conventional systems is that the attack and decay times are always a compromise. If the time constants are fast, high frequency transients will not be distorted, but this will cause low frequency distortion. If the time constants are slower, low frequency audio distortion will be low, but high frequency transients will then be distorted. The 200 system introduces an entirely new approach to solving this basic problem, called “dual-band companding.”

There are actually two separate compandors in the 200 system, one for high frequencies and one for low frequencies. A crossover network separates the frequency bands at 1kHz with a 6dB per octave slope, followed by separate high and low frequency compandors. The attack and release times in the high frequency compandor are fast enough to keep high frequency transient distortion at a low level, and the low frequency compandor uses slower time constants, reducing low frequency distortion to well below that of a conventional compandor.

## NO PRE-EMPHASIS/DE-EMPHASIS

The signal to noise ratio of the 200 system is high enough to preclude the need for conventional pre-emphasis (HF boost) in the transmitter and de-emphasis (HF roll off) in the receiver. Pre-emphasis and de-emphasis in an FM radio system usually provides about a 10dB improvement in the signal to noise ratio of the system, but the high frequency boost in the transmitter must be removed in a purely complementary manner or else the frequency response of the original audio signal will be altered.



MM200 Block Diagram

Pre-emphasis can also cause distortion in the receiver. As this signal is passed through the IF filters in the receiver, distortion can be produced, most noticeable at full modulation. De-emphasis cannot be applied until the signal is converted into audio, so there is no way around this problem short of eliminating pre-emphasis altogether. Neither of these problems occur in the 400 system. The dual-band compandor in the modeled 200 Series system essentially provides a dynamic pre-emphasis/de-emphasis function with low distortion.

### **LOW FREQUENCY ROLL-OFF**

A 12 dB per octave low frequency roll-off is provided in the audio section, with the -3dB point at 70 Hz. The actual roll-off frequency will vary somewhat according to the low frequency response of the mic capsule being used.

The low frequency roll-off is used to remove subsonic (or very low frequency) audio, often produced by air conditioning systems, automobile traffic and other sources from the audio signal. Excessive low frequency content in the audio input can cause a variety of audio problems including driving the transmitter into limiting. In sound reinforcement systems, as one instance, excessive low frequency content can cause excessive power amplifier drain or even damage to loudspeaker systems.

### **PILOT TONE SQUELCH**

The 200 system utilizes an ultrasonic tone that modulates the carrier to operate the receiver squelch. The “pilot tone” frequency is 32.765 kHz which is low enough to be passed by the system but not so low that it can be heard. The pilot tone squelch system will keep the receiver muted until it receives the pilot tone from the matching transmitter, even if a strong RF signal is present on the carrier frequency of the system.

### **WIDE-BAND DEVIATION**

$\pm 75$ kHz deviation improves the capture ratio, signal to noise ratio and AM rejection of a wireless system dramatically, compared to the more commonly used  $\pm 15$ kHz deviation.

### **BATTERY LIFE**

Switching power supplies throughout the design allow about 4.5 hours of operation using a single AA lithium battery. (An alkaline or NiMh AA battery will provide about 2 hours of operation.) The battery contacts are spring loaded to prevent “rattle” as the unit is handled.

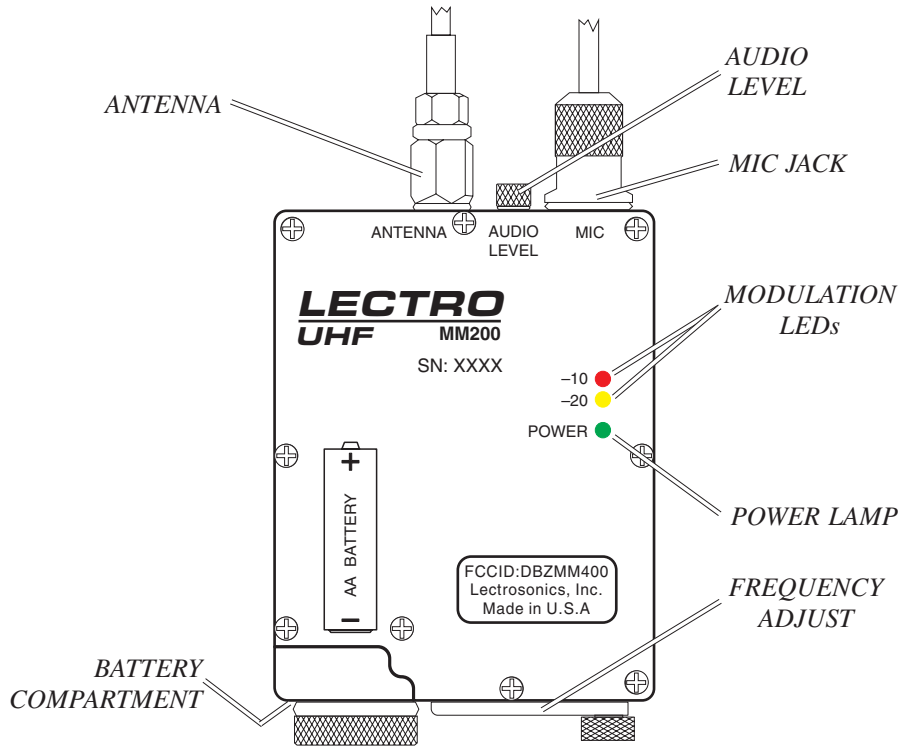
### **FREQUENCY AGILITY**

The transmitter section uses a synthesized, frequency selectable main oscillator. The frequency is extremely stable over a wide temperature range and over time. Two rotary switches, located on the side panel of the unit, provide 256 frequencies in 100kHz steps over a 25.5MHz range. This alleviates carrier interference problems in mobile or traveling applications.

### **CIRCULATOR**

The RF output circuit includes a one way circulator/isolator using a magnetically polarized ferrite. This device greatly reduces RF intermodulation produced when multiple transmitters are used at separations of less than five feet. It also provides additional RF output stage protection but is rarely seen in a wireless microphone transmitter due to its high cost.

## CONTROLS AND FUNCTIONS



### MIC JACK

The Microplug (2.5 mm) input on the transmitter accommodates 2 wire positive bias lavalieres. A waterproof mic connector is available from Lectrosonics as an assembly kit. A Switchcraft 850 connector can be used in an emergency though it is not waterproof. *See the separate sheet titled "Waterproof Microplug Wiring" regarding the correct connections for various microphones, and other sources.*

### ON/OFF SWITCH

There is no on/off switch for this unit. Simply remove the battery to turn the unit off. There will be a thump in the receiver when the transmitter battery is removed, so turning the received audio off in the main sound system may be necessary.

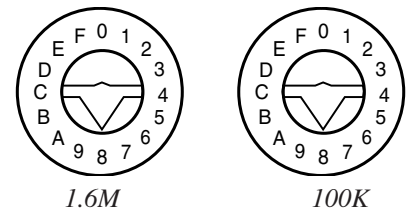
### "POWER" LAMP

Glows green when the battery is good. When the lamp glows red, there is about 30 minutes of operation left with the recommended lithium battery. An alkaline battery will have about 20 minutes of life left. The lamp will flash red when there are only a few minutes of life. A NiMh battery will give little or no warning when it is depleted. If you wish to use NiMh batteries in the MM200, we recommend trying fully charged batteries in the unit, noting the length of time that the batteries will run the unit and in the future use somewhat less than that time to determine when the battery needs to be replaced. A weak battery will sometimes light the POWER LED to the "good" green indication immediately after being put in the unit, but will soon discharge to the point where the LED will go red or shut down, just like a flashlight with "dead" batteries.

### FREQUENCY ADJUST

These two rotary switches adjust the center frequency of the carrier. The 1.6M is a coarse adjustment and the 100K is the fine adjustment.

Unscrew the knurled knob a few turns to loosen the water tight cap to gain access to the two frequency switches.



## **MODULATION LEDS**

Indicate the proper setting of the MIC LEVEL control. There are two bicolor modulation LEDs that can light either red or green.

**“-20dB level”** One modulation LED glows green and the transmitter is 20 dB below full modulation.

**“-10 dB level”** Both modulation LEDs glow green and the transmitter is close to full modulation.

**“+0 dB level”** -20 LED is red. The transmitter is in slight limiting and is fully modulated. This is probably desirable. See the discussion below.

**“+10 dB level”** Both LEDs are red. The transmitter is in limiting and you may want to reduce the transmitter audio gain. See the discussion below.

The MM200 transmitter employs a digitally-controlled analog audio limiter just before the analog-to-digital converter. The limiter has a range of more than 30dB for excellent overload protection. A dual release envelope makes the limiter acoustically transparent while maintaining low distortion. It can be thought of as two limiters in series, connected as a fast attack and release limiter followed by a slow attack and release limiter. The limiter recovers quickly from brief transients, so that its action is hidden from the listener, but recovers slowly from sustained high levels, to both keep audio distortion low and preserve short term dynamic changes.

The audio level LEDs indicate limiter activity. The first red LED indicates that the limiter is active and that the transmitter is fully modulated (audio level is between +0 and +10 dB). The second red LED indicates that the level is 10dB or more into limiting. Occasional forays into the red are desirable for most applications, since the distortion introduced by the limiter is so minimal, and full modulation is thus assured. We strongly recommend setting the gain of the transmitter high enough so that the first red LED occasionally lights.

Generally speaking, some limiting is desirable in normal operation to improve the signal to noise ratio of the system. The limiting action is not audible and does not create distortion. A highly trained ear would hear only the compression of the peaks in the audio signal, which is desirable with most recorders and many sound reinforcement systems.

## **AUDIO LEVEL**

Used to adjust the audio input level for the proper modulation.

## **ANTENNA**

The flexible bronze cable antenna supplied with the transmitter is cut to  $\frac{1}{4}$  wavelength of the center of the frequency block (the frequency range) of the transmitter. It is removable via an SMA connector. The SMA connector is a 50 Ohm RF port which can also be connected directly to test equipment. Replacement antennas are available in pre-cut lengths for specific frequency blocks, or as a kit with instructions to cut the antenna for any frequency block.

## **THE BELT CLIP**

The belt clip may be removed for special applications by gently spreading the spring wire clip and pulling the ends out of the holes in the case. The clip can be installed in two positions so that when worn, the antenna can be pointing up or down.

## BATTERY INSTALLATION

The transmitter is powered by a standard lithium, NiMh or alkaline AA 1.5 Volt battery. Standard zinc-carbon batteries marked “**heavy-duty**” or “**long-lasting**” will not work. NiMh rechargeable batteries will only provide 2 hours of operation but will run down quite abruptly. Alkaline batteries provide over 2 hours of operation with some warning. Lithium batteries can be used to provide up to 4.5 hours. The battery status circuitry is designed for the voltage drop over the life of lithium batteries.

To open the battery compartment, unscrew the battery door. Remove the door and take note of the polarity marked on the case showing the location of the positive (+) and negative (-) terminals. You can see the small contact hole inside the battery compartment with the door open.

Insert the battery correctly and close the cover by screwing the door shut. If the battery is inserted incorrectly, the door will not screw in easily and the unit will not work.

## OPERATING INSTRUCTIONS

- 1) Insert the microphone plug into the input jack, aligning the pins; be sure that the connector locks in.
- 2) Attach the antenna to the SMA connector on the top of the transmitter.
- 3) Mute the sound system.
- 4) Install a fresh battery according to the instructions above.
- 5) Position the microphone in the location you will use in actual operation.
- 6) While speaking or singing at the same voice level that will actually be used, observe the MODULATION LEDs. Adjust the AUDIO LEVEL control until the LEDs begin to light. Start at a low setting where neither LED lights as you speak. Gradually, turn the gain up until the -20 dB LED lights green and then the -10 dB lights green. We strongly recommend setting the gain of the transmitter even higher so that the first red LED occasionally lights.
- 7) Once the gain has been adjusted, the audio system audio can be turned on to make level adjustments in the main audio system.

## OPERATING NOTES

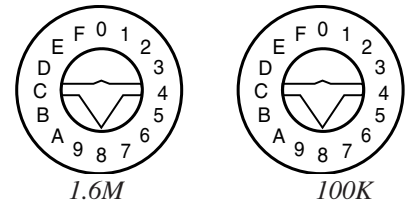
The AUDIO LEVEL control should not be used to control the volume of your sound system or recorder levels. This gain adjustment matches the transmitter gain with the user’s voice level and microphone positioning.

If the audio level is too high — both red LEDs will light frequently or stay lit. This condition may reduce the dynamic range of the audio signal.

If the audio level is too low — neither LED will light, or the -20 LED will light green. This condition may cause hiss and noise in the audio. Different voices will usually require different settings of the AUDIO LEVEL control, so check this adjustment as each new person uses the system. If several different people will be using the transmitter and there is not time to make the adjustment for each individual, adjust it for the loudest voice.

## ADJUSTING THE TRANSMITTER FREQUENCY

If you are experiencing interference from another signal on your frequency, you may want to change the operating frequency of your system. The left switch changes the operating frequency by 1.6 MHz per step and the right switch changes it 100 kHz per step. If you are experiencing interference, change the operating frequency in 100 kHz steps to find a clear channel. If it is not possible to find a clear channel using the 100 kHz switch, return it to its original position and change the 1.6 MHz switch by one click then try the 100 kHz switch again.



To gain access to these switches, unscrew the retaining bolt that holds the access door to the case. It is not necessary to remove the bolt from the case since it is retained by the case with enough room to still remove the access door. Pull the access door away from the case and swing the door to the side to gain access to the frequency switches.

## MICROPHONE RF BYPASSING

Some mics require RF protection to keep the radio signal from affecting the capsule, even though the transmitter input circuitry is already RF bypassed.

If the mic is wired as directed, and you are having difficulty with squealing, high noise, or poor frequency response; RF is likely to be the cause.

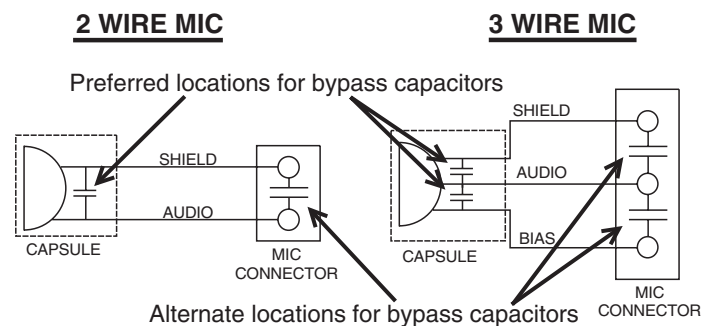
The best RF protection is accomplished by installing RF bypass capacitors at the mic capsule. If this is not possible, or if you are still having problems, capacitors can be installed on the mic wires inside the TA5F connector housing.

Install the capacitors as follows: Use 330 pF capacitors. Capacitors are available from Lectrosonics. Please specify the part number for the desired lead style.

Leaded capacitors: P/N 15117

Leadless capacitors: P/N SCC330P

All Lectrosonics lavalier mics are already bypassed and do not need any additional capacitors installed for proper operation.



## TROUBLESHOOTING

Before going through the following chart, be sure that you have a good battery in the transmitter. It is important that you follow these steps in the sequence listed.

SYMPTOM	POSSIBLE CAUSE
<b>TRANSMITTER BATTERY LED OFF</b>	<ol style="list-style-type: none"> <li>1) Battery is inserted backwards.</li> <li>2) Battery is dead.</li> </ol>
<b>NO TRANSMITTER MODULATION LEDs</b>	<ol style="list-style-type: none"> <li>1) Gain control turned all the way down.</li> <li>2) Battery is in backwards. Check power LED.</li> <li>3) Mic capsule is damaged or malfunctioning.</li> <li>4) Mic cable damaged or mis-wired.</li> </ol>
<b>RECEIVER INDICATES NO RF</b>	<ol style="list-style-type: none"> <li>1) Transmitter not turned on.</li> <li>2) Transmitter battery is dead.</li> <li>3) Receiver antenna missing or improperly positioned.</li> <li>4) Transmitter and receiver not on same frequency. Check switches/display on transmitter and receiver.</li> <li>5) Operating range is too great.</li> <li>6) Transmitter antenna not connected</li> </ol>
<b>NO SOUND (OR LOW SOUND LEVEL), RECEIVER INDICATES PROPER AUDIO MODULATION</b>	<ol style="list-style-type: none"> <li>1) Receiver output level set too low.</li> <li>2) Receiver output is disconnected; cable is defective or mis-wired.</li> <li>3) Sound system or recorder input is turned down.</li> </ol>
<b>DISTORTED SOUND</b>	<ol style="list-style-type: none"> <li>1) Transmitter gain (audio level) is far too high. Check mod level lamps on transmitter and receiver as it is being used. (refer to "Operating Instructions" section for details on gain adjustment)</li> <li>2) Receiver output may be mis-matched with the sound system or recorder input. Adjust output level on receiver to the correct level for the recorder, mixer or sound system.</li> <li>3) Excessive wind noise or breath "pops." Reposition microphone and/or use a larger windscreen.</li> <li>4) Transmitter is not set to same frequency as receiver. Check that frequency select switches on receiver and transmitter match.</li> </ol>
<b>HISS AND NOISE -- AUDIBLE DROPOUTS</b>	<ol style="list-style-type: none"> <li>1) Transmitter gain (audio level) far too low.</li> <li>2) Receiver antenna missing or obstructed.</li> <li>3) Transmitter antenna missing.</li> <li>4) Operating range too great.</li> </ol>
<b>EXCESSIVE FEEDBACK</b>	<ol style="list-style-type: none"> <li>1) Transmitter gain (audio level) too high causing limiting. Check gain adjustment and/or reduce receiver output level.</li> <li>2) Transmitter too close to speaker system.</li> <li>3) Mic is too far from user's mouth.</li> </ol>

## SPECIFICATIONS AND FEATURES

<b>Operating frequencies:</b>	537.600 to 607.900 MHz 614.100 to 793.500 MHz
<b>Frequency selection:</b>	256 frequencies in 100kHz steps
<b>RF Power output:</b>	100 mW (nominal)
<b>Pilot tone:</b>	32.765 kHz; 5kHz deviation
<b>Frequency stability:</b>	± 0.002%
<b>Deviation:</b>	± 75 kHz (max)
<b>Spurious radiation:</b>	90 dB below carrier
<b>Equivalent input noise:</b>	-123 dBV
<b>Input level:</b>	Nominal 2 mV to 300 mV, before limiting. Greater than 1.5V maximum, with limiting.
<b>Input impedance:</b>	2 kOhm
<b>Input compressor:</b>	Soft compressor, >30 dB range
<b>Gain control range:</b>	43 dB; semi-log rotary control
<b>Modulation indicators:</b>	Dual bicolor LEDs indicate modulation of -20, -10, 0, +10 dB referenced to full modulation.
<b>Low frequency roll-off:</b>	-12dB/octave; 70 Hz
<b>Controls:</b>	Front panel knob adjusts audio gain. Rotary switches on bottom panel adjust transmitter frequency.
<b>Audio Input Jack:</b>	2.5 mm Microjack (matches Switchcraft 850 Microplug)
<b>Antenna:</b>	Detachable, flexible bronze wire supplied. 50 Ohm port allows connection to test equipment.
<b>Battery:</b>	1.5 Volt AA lithium recommended
<b>Battery Life:</b>	1.5 hours (alkaline); 4 hours (lithium)
<b>Weight:</b>	7.3 ozs. including battery
<b>Overall Dimensions:</b>	3.03 x 2 x 0.69 inches (not including microphone or antenna)

***Emission Designator: 180KF3E***

*Specifications subject to change without notice.*

The FCC requires that the following statement be included in this manual:

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This device complies with FCC radiation exposure limits as set forth for an uncontrolled environment. This device should be installed and operated so that its antenna(s) are not co-located or operating in conjunction with any other antenna or transmitter.

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## SERVICE AND REPAIR

If your system malfunctions, you should attempt to correct or isolate the trouble before concluding that the equipment needs repair. Make sure you have followed the setup procedure and operating instructions. Check out the interconnecting cords and then go through the TROUBLESHOOTING section in the manual

We strongly recommend that you **do not** try to repair the equipment yourself and **do not** have the local repair shop attempt anything other than the simplest repair. If the repair is more complicated than a broken wire or loose connection, send the unit to the factory for repair and service. Don't attempt to adjust any controls inside the units. Once set at the factory, the various controls and trimmers do not drift with age or vibration and never require readjustment. **There are no adjustments inside that will make a malfunctioning unit start working.**

LECTROSONICS service department is equipped and staffed to quickly repair your equipment. In-warranty repairs are made at no charge in accordance with the terms of the warranty. Out of warranty repairs are charged at a modest flat rate plus parts and shipping. Since it takes almost as much time and effort to determine what is wrong as it does to make the repair, there is a charge for an exact quotation. We will be happy to quote approximate charges by phone for out of warranty repairs.

## RETURNING UNITS FOR REPAIR

You will save yourself time and trouble if you will follow the steps below:

**A.** DO NOT return equipment to the factory for repair without first contacting us by letter or by phone. We need to know the nature of the problem, the model number and the serial number of the equipment. We also need a phone number where you can be reached 8 am to 4 pm (Mountain Standard Time).

**B.** After receiving your request, we will issue you a return authorization number (R.A.). This number will help speed your repair through our receiving and repair departments. The return authorization number must be clearly shown on the outside of the shipping container.

**C.** Pack the equipment carefully and ship to us, shipping costs prepaid. If necessary, we can provide you with the proper packing materials. UPS is usually the best way to ship the units. Heavy units should be "double-boxed" for safe transport.

**D.** We also strongly recommend that you insure the equipment, since we cannot be responsible for loss of or damage to equipment that you ship. Of course, we insure the equipment when we ship it back to you.

**Mailing address:**

Lectrosonics, Inc.  
PO Box 15900  
Rio Rancho, NM 87174  
USA

**Shipping address:**

Lectrosonics, Inc.  
581 Laser Rd.  
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**World Wide Web:** <http://www.lectrosonics.com>

**Email:** [sales@lectrosonics.com](mailto:sales@lectrosonics.com)

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## LIMITED ONE YEAR WARRANTY

The equipment is warranted for one year from date of purchase against defects in materials or workmanship provided it was purchased from an authorized dealer. This warranty does not cover equipment which has been abused or damaged by careless handling or shipping. This warranty does not apply to used or demonstrator equipment.

Should any defect develop, Lectrosonics, Inc. will, at our option, repair or replace any defective parts without charge for either parts or labor. If Lectrosonics, Inc. cannot correct the defect in your equipment, it will be replaced at no charge with a similar new item. Lectrosonics, Inc. will pay for the cost of returning your equipment to you.

This warranty applies only to items returned to Lectrosonics, Inc. or an authorized dealer, shipping costs prepaid, within one year from the date of purchase.

This Limited Warranty is governed by the laws of the State of New Mexico. It states the entire liability of Lectrosonics Inc. and the entire remedy of the purchaser for any breach of warranty as outlined above. NEITHER LECTROSONICS, INC. NOR ANYONE INVOLVED IN THE PRODUCTION OR DELIVERY OF THE EQUIPMENT SHALL BE LIABLE FOR ANY INDIRECT, SPECIAL, PUNITIVE, CONSEQUENTIAL, OR INCIDENTAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THIS EQUIPMENT EVEN IF LECTROSONICS, INC. HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. IN NO EVENT SHALL THE LIABILITY OF LECTROSONICS, INC. EXCEED THE PURCHASE PRICE OF ANY DEFECTIVE EQUIPMENT.

This warranty gives you specific legal rights. You may have additional legal rights which vary from state to state.

## LECTROSONICS, INC.

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581 LASER ROAD  
RIO RANCHO, NM 87124 USA  
[www.lectrosonics.com](http://www.lectrosonics.com)

# **UCR211**

## **UHF RECEIVER**

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### **OPERATING INSTRUCTIONS and trouble-shooting guide**

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**LECTROSONICS, INC.**

Rio Rancho, NM

[www.lectrosonics.com](http://www.lectrosonics.com)

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## GENERAL TECHNICAL DESCRIPTION

The UCR211 is a portable, high performance, triple-conversion, frequency synthesized, UHF receiver fully compatible with all Lectrosonics 200 series transmitters. The RF performance is extremely stable over a very wide temperature range, making the UCR211 perfectly suited to the rough environmental conditions found in the field. The proprietary audio processing includes a dual-band compandor for very low distortion and a superior signal to noise ratio. The Smart Squelch system is operated by a pilot tone and mutes the audio output directly at the output connector.

The UCR211 features a menu-driven LCD graphic display and a three button control panel as a convenient means of viewing and altering user settings. The main window, for example, shows the pilot tone indicator, antenna diversity phase, RF level, audio level, receiver battery status and transmitter battery status. It is also possible to bypass the pilot tone from the main display window. Other display windows show operating frequency, audio output level, battery status in tenths of volts, test tone status and provide for selection of levels or functions using the select buttons. The frequency scan mode provides a graphical means of observing all signals "on the air" within the frequency range of the receiver in order to find operating frequencies that are free of interference.

### DIVERSITY RECEPTION

The UCR211 antenna phase diversity technology with SMART Diversity™ minimizes dropouts in situations where multi-path reflections can cause serious problems. The phase diversity network and PIN diode RF switches are controlled by the microprocessor using a sophisticated algorithm. This design keeps the receiver compact enough for camera mounting or shoulder bag applications.

### RF FREQUENCY TRACKING FRONT-END AND MIXER

The receiver is frequency agile and can be set to operate on any one of 256 frequencies within the tuning range. To significantly reduce unwanted interference and intermodulation problems, the UCR211 has a frequency selective front-end section that tracks and tunes to the desired signal frequency and rejects or "tunes out" unwanted interfering signals. The design consists of four varactor tuned ceramic transmission line resonators controlled by the microprocessor to provide good selectivity. The low noise high current RF amplifier was designed with feedback regulation for stability and precise gain in order to handle stronger RF signals without output overload. The first mixer is of new GaAs technology that has a very high third order intercept point. This produces a robust front-end that is as selective as fixed single frequency designs and is suitable for use in close proximity to other receivers and transmitters commonly used in field production "bag" systems.

### MICROCONTROLLER, PLL AND VCO CIRCUITS

The 8-bit microprocessor is truly the "heart" of the UCR211 receiver. It monitors user command inputs from the front panel control buttons and numerous other internal signals such as RF level, audio levels, pilot tone levels and external/internal power voltages. Outputs from the microcontroller operate the front-end tuning, PLL/VCO circuits, antenna phase switch, drive the LCD display and backlight, and control the squelch and audio output attenuator. The microcontroller also generates an audio test tone used to adjust input levels of the equipment being fed by the receiver. The UCR211 design and the advanced technology of the microprocessor control arguably set a new standard in wireless microphone development.

### IF AMPLIFIERS AND SAW FILTERS

The first IF low noise amplifier is controlled with feedback regulation and drives the first of two quartz SAW (Surface Acoustical Wave) filters. The 244 MHz SAW filters combine sharp tuning, constant group delay, wide bandwidth and excellent temperature stability, far superior to conventional LC filters. The 244 MHz first IF signal is converted to 10.7 MHz, filtered through two ceramic filters for sharp selectivity, then converted to 300 kHz in one integrated circuit.

### DIGITAL PULSE COUNTING DETECTOR

The UCR211 receiver uses an elegantly simple, yet highly effective digital pulse detector to demodulate the FM signal, rather than a conventional quadrature detector. This unusual design eliminates thermal drift, improves AM rejection, and provides very low audio distortion.

### TRI-MODE DYNAMIC FILTER

The audio signal is passed through a "dynamic noise reduction circuit" that automatically controls the audio cutoff frequency. The cutoff frequency of this filter is varied automatically by measuring the amplitude and frequency of the audio signal and the quality of the RF signal. The audio bandwidth is held only to that point necessary to pass the highest frequency audio signal present at a given moment. This results in a dramatic reduction of the higher frequency "hiss" normally present particularly with low RF signal levels. During passages of high frequency audio content, this filter dynamically passes the signals with no decrease in high frequency content. This filter has proven very effective and is totally transparent.

### PILOT TONE MUTE

The UCR211 uses a pilot tone muting technique in order to protect against the reception of stray signals. The Lectrosonics transmitter adds an inaudible signal, known as the pilot tone, to the transmitted signal. The receiver detects (and removes) the pilot tone, and is thus able to identify the desired signal and mute all others.

When the receiver is powered up, receive audio is muted unless a proper pilot tone is detected. The pilot tone must be present for approximately one second before the signal is accepted.

The PILOT TONE BYPASS mode is set from the main window. In this mode, the received audio remains unmuted regardless of the presence or absence of a pilot tone. This mode is useful for locating a clear frequency, since any potential interference may be heard. It may also be used in situations where squelching behavior is undesirable. The PILOT TONE BYPASS disables the squelch, as described below.

### SMART SQUELCH™

The UCR211 employs a sophisticated squelching system in an attempt to deliver the cleanest possible audio during marginal conditions of reception. Any squelching system faces inevitable trade-offs: squelch too much and valuable audio information may be lost, squelch too little and excessive noise may be heard; respond too rapidly and the audio sounds “choppy,” respond too sluggishly and syllables or entire words can be cut off.

The UCR211 combines several techniques to achieve an optimal balance, removing distracting noise, without the squelching action itself becoming a distraction. One of these techniques involves waiting for a word or syllable to complete before squelching. Another incorporates recent squelching history and recent signal strength, adjusting squelching behavior dynamically for the most serviceable result under variable conditions. Using these and other techniques, the UCR211 can deliver acceptable audio quality from otherwise unusable signals.

In the PILOT TONE BYPASS mode, the squelch system is disabled. Received audio remains unmuted at all times with this setting.

### OUTPUT LEVEL ADJUST

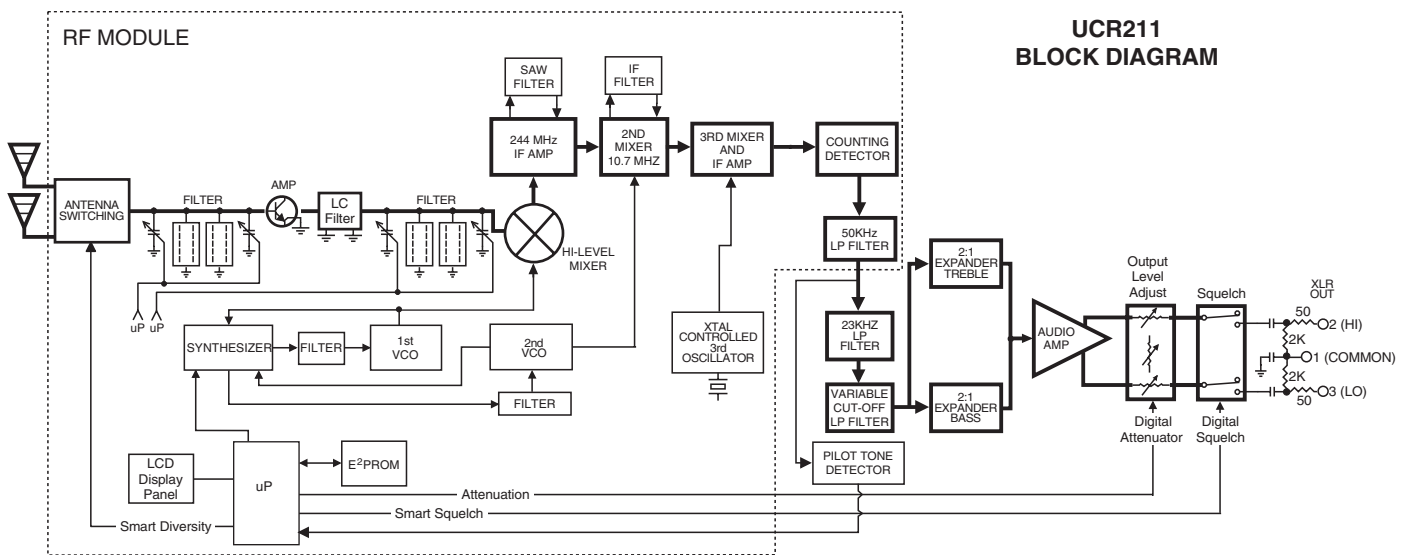
One of several setup screens is provided for adjusting the audio output level in 1dB steps from -50 to +10dBu using the UP and DOWN buttons on the front panel.

### TEST TONE

The UCR211 provides a 1kHz audio test tone at the XLR connector for level adjustment of connected equipment. The level is adjustable from -50 to +10 dBu in 1 dB steps to allow a precise match.

### BATTERIES

The UCR211 operates on two 9V alkaline or lithium batteries. Access to the battery compartment is gained by lifting one end and turning the rear panel door. NOTE: Do not use an alkaline *and* a lithium in the same unit. Standard or “heavy duty” batteries are not recommended.



## POWER SUPPLY

The UCR211 may be operated from an external DC source (see Specifications and Features section for allowed voltages.) The receiver has a built-in Poly-Fuse to protect the unit. This fuse resets if the power supply is disconnected for about 15 seconds. The power section also has protection circuits that prevent damage to the receiver if a positive ground power source is applied.

## LCD DISPLAY

The display has four main windows. Pressing the MENU button rotates through each of these windows.

If the battery gets low on either transmitter or receiver, a message will interrupt the display every few seconds and flash a “LOW BATTERY” warning.

After power is turned off and back on again, the unit defaults to the main window and to the most recent frequency, audio level, transmitter battery type and locked/unlocked status settings. These settings are retained even if the batteries are removed.

## POWER UP SEQUENCE

The power-up sequence consists of four messages that appear automatically over a period of a few seconds after the power is switched on.

- 1) LOCKED or UNLOCKED status
- 2) The name LECTROSONICS
- 3) The model number and firmware revision
- 4) The frequency block of operation

After these introductory messages are displayed, the main window will appear.

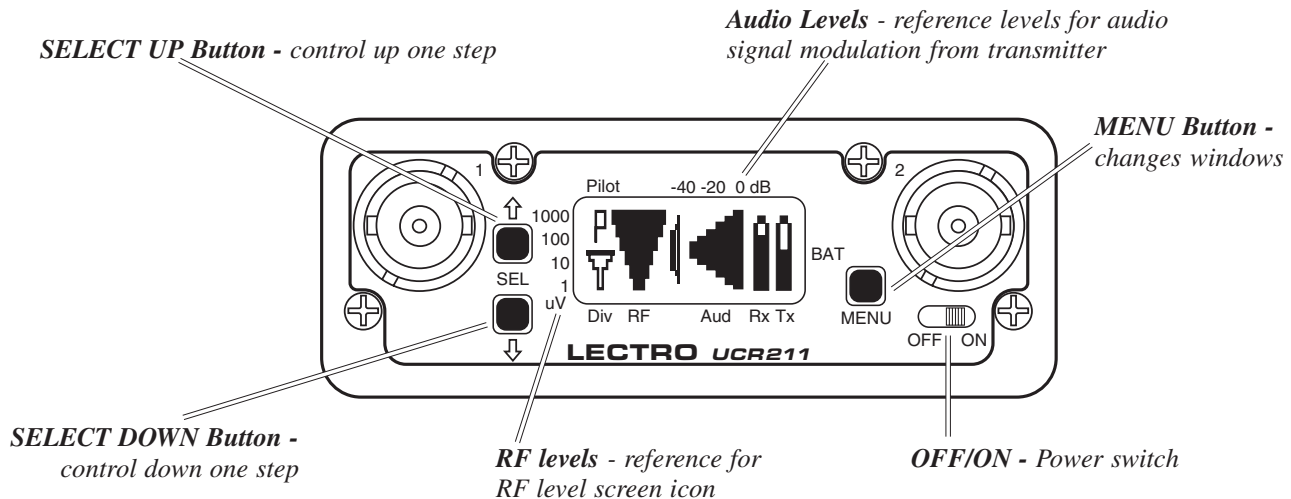
The UCR211 is fully operational during the power up sequence and will immediately respond to button pushes made before the automatic sequence is completed. If a valid transmitter signal is already present when the receiver is turned on, the audio output will typically be engaged somewhere in the middle of the power-up sequence, following a brief delay to allow the audio circuits to stabilize.

(See LOCKING AND UNLOCKING THE UCR211.)

## POWER OFF

When the power switch is moved to the OFF position the audio output is instantly muted (squelched) and the message “POWERING OFF...” is displayed briefly before switching off.

## FRONT PANEL CONTROLS AND FUNCTIONS



### MAIN WINDOW

**Pilot tone indicator** - A steady “P” icon will be displayed when a pilot tone from the transmitter is present. The icon will flash if no pilot tone is detected and will change to a small “b” if the pilot tone has been bypassed. To bypass the pilot tone, hold MENU and press the UP button. Hold MENU and press UP again to restore normal pilot tone squelch.



**Antenna Phase indicator** - This icon shows antenna phase switching activity. As the antenna phase is switched, the symbol will flip vertically.



**RF level** - This icon changes in size vertically to indicate the strength of the incoming RF signal. RF levels are engraved from 1uV to 1000uV on the bezel to the left of the LCD display.



**Audio Levels** - This icon changes in size horizontally to indicate the audio level (modulation) of the signal received from the transmitter. The icon display will change to a solid rectangular block when the audio signal is being limited in the transmitter. Levels in dB are engraved into the bezel above the LCD display.



**Battery Levels** - The icon above the **Rx** symbol indicates the receiver battery condition and will flash when approximately one hour of operational time is remaining. The icon above the **Tx** symbol works in the same manner to indicate the transmitter battery condition. The **Tx** battery icon usually appears 5 to 10 seconds after the transmitter signal is acquired. When external power is being used, the **Rx** battery icon changes to look like a power plug.

### LOCKING AND UNLOCKING THE UCR211

The panel controls can be “LOCKED” to prevent accidental changes being made during operation and handling.

**To LOCK the UCR211** - Hold the MENU button down until a bar tracks horizontally across the screen and the word “LOCKED” appears. If the MENU button is released before the word “LOCKED” appears, the unit will remain UNLOCKED. When in a LOCKED state, the pilot tone bypass toggle is also defeated.

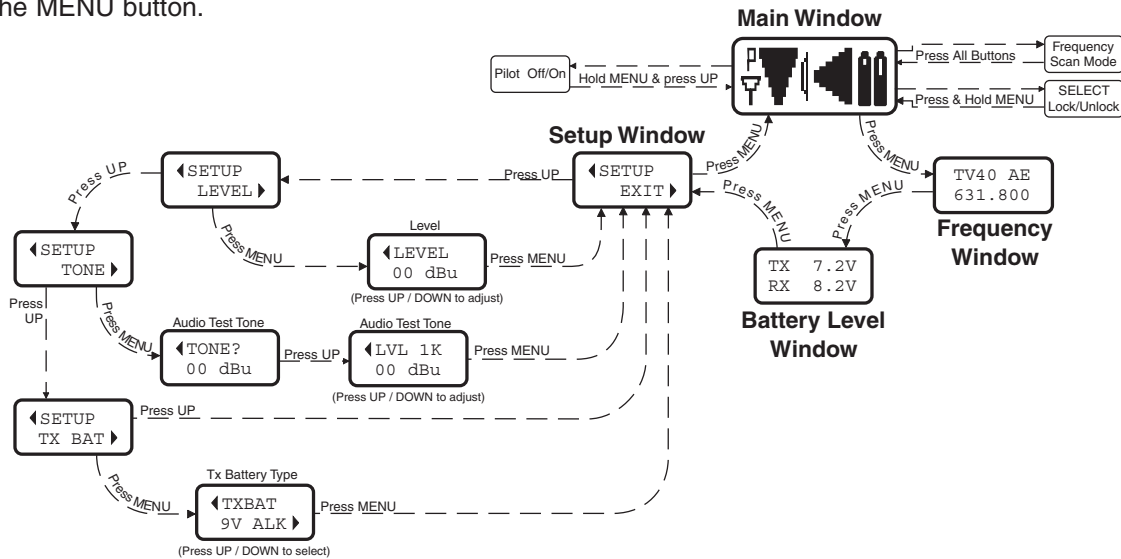
In LOCKED state, the use of the MENU and UP/DOWN buttons is limited to “view only” and attempts to change selections will result in a screen displaying the word “LOCKED.” The unit cannot be used for RF scanning when it is set in the LOCKED state.

**To UNLOCK** - Hold the MENU button down until a bar tracks horizontally across the screen and the word “UNLOCKED” appears. When the unit is UNLOCKED, all settings can be altered.

The UCR211 can be LOCKED or UNLOCKED from any of the main four windows. It cannot be switched when it is in the scanning mode or from other subordinate screens.

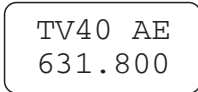
## MENU SELECTIONS FROM MAIN WINDOW

From the Main Window, you can navigate to the Frequency, Battery Level and Setup windows in a circular sequence by pressing the MENU button.



### FREQUENCY WINDOW

TV channel - which television broadcast channel this frequency falls within.

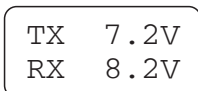


Transmitter switch settings - these are the correct switch settings for the frequency switches on your transmitter - see your transmitter instructions.

Frequency - Press the Select Up and Select Down buttons to change the frequency of the receiver. Be certain to change the transmitter switches to match the settings shown in the upper right hand corner.

### BATTERY LEVEL WINDOW

This window shows the transmitter (TX) and receiver (RX) battery voltage in tenth volt increments. These levels will flash when the voltages drop below suggested optimum working levels. Typically, there will be about one hour operating time remaining after the indicators begin to flash. The RX voltage changes to EX when operating on external power and displays the external power source voltage. (Disclaimer: We don't guarantee 0.1 Volt accuracy.)



### SETUP WINDOW

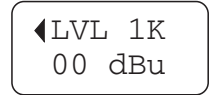
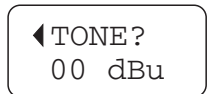
In the SETUP window, the UP and DOWN buttons scroll through a list of four possible destinations: EXIT, LEVEL, TONE and TXBAT. Each of these destinations allows a variety of settings to customize the receiver operating parameters. Press MENU at the screen shown here to return to the main window.



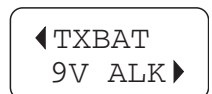
The LEVEL setup screen shows the audio output level of the receiver in dBu. Use the UP or DOWN buttons to change the level. Range is from -50 to +10 dBu in 1dB steps. Press MENU to leave this screen.



The TONE setup screen enables an audio test tone at the receiver output for precise level matching with other equipment. The first screen prompts you to press the UP button to enable the tone at the receiver output jack. The next screen that appears allows the level to be adjusted in 1dB steps using the UP and DOWN buttons. When the audio test tone is enabled, the received audio is muted and an internally generated 1kHz test tone is routed to the XLR connector. Since there is only one audio output level setting for both received audio and tone, the level set here will be retained in the receive mode (it will supersede the setting made in the LEVEL setup screen). The test tone has 5% distortion and is intended for confirmation of output levels only. To exit the test tone screen and stop the tone press the MENU button.

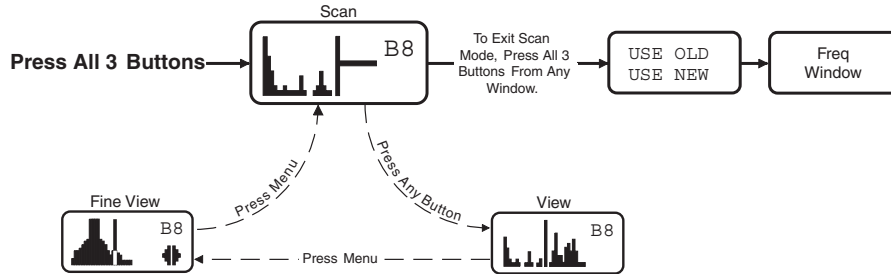


The TXBAT setup screen allows you to select the exact battery being used in the transmitter to provide more accurate battery level monitoring. Four different types of batteries are commonly used in Lectrosonics transmitters: 9 Volt alkaline, 9 Volt lithium, AA alkaline, and AA lithium. Correctly set, this will ensure that the information in the MAIN and BATTERY LEVEL windows will be accurate, and adequate warning will be provided in advance of battery failure. Press MENU to leave this screen.



## FREQUENCY SCAN MODE

To use the integrated scanning function, press both UP/DOWN buttons and the MENU button at the same time. The display will switch to the SCAN WINDOW and start scanning immediately. Data gathered during a scan is stored until it is purposely erased or the power is turned off. Previous data will remain and subsequent scans can be made to search for additional signals or to accumulate higher peaks.



### SCAN & VIEW WINDOW ELEMENTS

**Cursor** - shows relative position of the scanner within the 25MHz band of the receiver

**Scan level indications** - showing relative level of RF activity across the 25MHz bandwidth of the receiver.

**Switch Settings** - shows the transmitter switch settings will change rapidly while the unit is scanning.

**Remaining unscanned part of band.**

### FINE VIEW WINDOW ELEMENTS

**Cursor (center bar)**

**Transmitter Switch Settings**

**RF Level indicators**

**SCROLL reminders**

To stop scanning, press the MENU button once. The scanning will stop immediately, and the display will switch to the VIEW window. In this window, each vertical band of the display represents 8 frequencies (800kHz). Pressing the UP or DOWN buttons will scroll the cursor coarsely across the tuning range. The transmitter switch settings matching the frequency indicated by the cursor are shown in the upper right corner of the screen.

Spectrum data is collected only when the receiver is scanning. Successive scanning with repeated passes through the tuning range will accumulate the highest peaks encountered to aid in finding clear frequencies. To clear the scan memory without leaving scan mode, turn the power switch off and back on quickly.

Pressing the MENU button once will shift the display to the FINE VIEW window which will show an expanded portion of the spectrum around the cursor.

In the FINE VIEW window, each vertical band represents one frequency the UCR211 is capable of tuning. The upper right corner shows the transmitter switch settings for the. In this screen, a vertical center bar is the cursor. Underneath the switch settings are two arrows to remind you that this is a partial picture of the spectrum and that you can scroll left or right to view the entire spectrum of the receiver by pressing the UP and DOWN buttons.

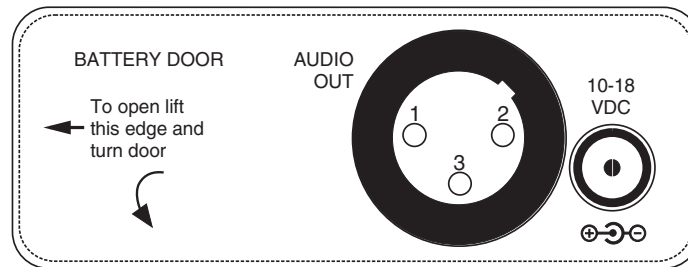
Pressing the UP button will make the display scroll left, showing higher frequencies. Pressing the DOWN button will make the display scroll right, showing lower frequencies. The cursor remains in place while the display scrolls left or right

In addition to assessing the congestion within the RF tuning range of the receiver, the scanning mode is also used to find a clear operating frequency. Scroll through the screen and find a frequency where no RF signals are present (or in the worst case, only very weak RF signals). With the cursor on this frequency, press the UP, DOWN and MENU buttons at the same time to leave the scan mode.

When leaving the scan mode, you are given the option of using the frequency the unit was on before entering the scan mode, or using the frequency just selected in the scan mode. The display shows USE OLD and USE NEW to prompt you to make a frequency selection. To accept the new frequency just selected in the scan mode, press the DOWN button for USE NEW. To return to the frequency you were using before entering the scan mode, press the UP button for USE OLD. (the MENU button defaults to USE OLD).

Once you leave the scan mode, the Frequency Window will be displayed. Set your transmitter switches to the same settings as shown on the display and your system will be ready for operation.

## REAR PANEL FEATURES



### XLR AUDIO OUTPUT JACK

This is a standard XLR configuration with pin 2 “positive” with reference to hand-held and plug-on transmitters. With lavalier microphones and belt-pack transmitters, however, phase will vary with different types of microphones (2-wire vs. 3-wire for example). The audio output is balanced but not floating, so an unbalanced signal is available using pin 1 as ground and pin 2 as signal, leaving pin 3 open.

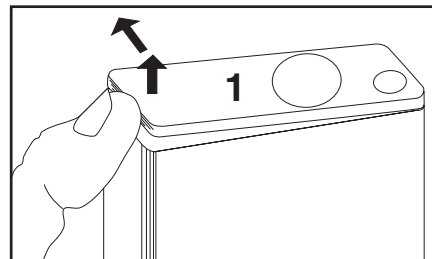
### POWER INPUT JACK

The power input jack can accept 10-18 VDC - the center pin is positive and sleeve is ground. The input is diode protected to prevent damage if the power is applied with reversed polarity, but the unit will not work until the reversed polarity condition is fixed. Strain relief to avoid accidental disconnection can be provided with the included small hook and loop strip. Attach the adhesive strip side to the side of the receiver or mount with the opening end of the strip up - place the cable in the strip and secure.

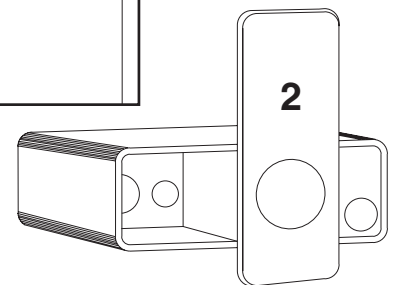


### TO REPLACE THE BATTERIES

Lift and open the bottom battery door cover with your thumb, rotate the door until it is perpendicular with the case and allow the batteries to fall out of the compartment into your hand. It is difficult to install a battery backwards. Observe the large and small holes in the battery contact pad before inserting new batteries. Insert the contact end of the battery first, making sure the contacts are aligned with the holes in the contact pad, and then swing the door closed. You will feel it snap into place when it is fully closed.



*To open the battery compartment door, push the door up and away from the case with your thumb, then swing open.*



### CAUTION

Lithium batteries will expand and swell if allowed to go into a deep discharge. Be sure to remove lithium batteries as soon as possible after warnings. If lithium batteries are allowed to fully discharge while still inside the battery compartment, they will be very difficult to remove.

Stuck lithium batteries can be avoided by removing the label wrapping around the battery before use. This will allow the battery to swell but will still leave enough room in the compartment for the battery to fall out normally.

## ANTENNA USE AND PLACEMENT

The receiver is supplied with two straight BNC antennas. In some circumstances remote antennas such as the SNA600 or ALP700 may be useful for improving reception. Position remote antennas at least three or four feet apart and so that they are also not within 3 or 4 feet of large metal surfaces. If this is not possible, try to position the antennas so that they are as far away from the metal surface as is practical. It is also good to position the receiver so that there is a direct "line of sight" between the transmitter and the receiver antenna. In situations where the operating range is less than about 100 feet, the antenna positioning is much less critical. The antennas can also be configured with one whip mounted directly onto the panel of the receiver, and the other one mounted remotely.

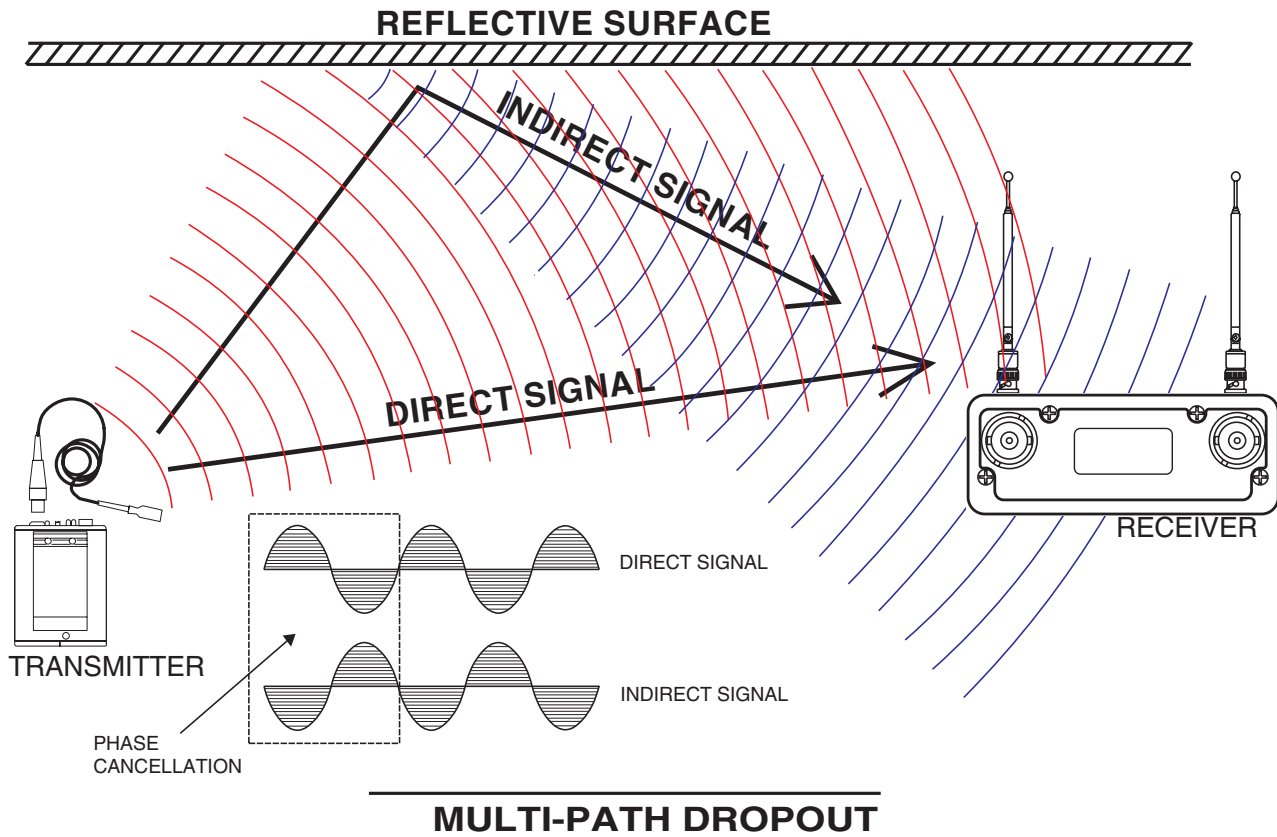
Be careful about the length of cabling from antenna to receiver. Long cable runs can have serious signal loss. Lectrosonics has in-line RF amplifiers suitable for compensating for long cable runs. Contact your dealer or the factory for more information.

A wireless transmitter sends a radio signal out in all directions. This signal will often bounce off nearby walls, ceilings, etc. and a strong reflection can arrive at the receiver antenna along with the direct signal. If the direct and reflected signals are out of phase with each

other a cancellation may occur. The result would be a "dropout." A dropout sounds like either audible noise (hiss), or in severe cases, may result in a complete loss of the carrier and the sound when the transmitter is positioned in certain locations in the room. A UHF dropout normally sounds like a short "hiss" or a "swishing" sound. Moving the transmitter even a few inches will change the sound of the hum or hiss, or eliminate it. A dropout situation may be either better or worse as the crowd fills and/or leaves the room, or when the transmitter or receiver is operated in a different location.

The receiver offers a sophisticated diversity design which overcomes dropout problems in almost any situation. In the event, however, that you do encounter a dropout problem, first try moving the receiver at least 3 or 4 feet from where it was. This may alleviate the dropout problem at that location. If dropouts are still a problem, try moving the unit to an entirely different location in the room or moving the receiver in closer to the transmitter location.

Lectrosonics transmitters radiate power very efficiently, and the receivers are very sensitive. This reduces dropouts to an insignificant level. If, however, you do encounter dropouts frequently, call the factory or consult your dealer. There is probably a simple solution.



## INSTALLATION AND OPERATING INSTRUCTIONS

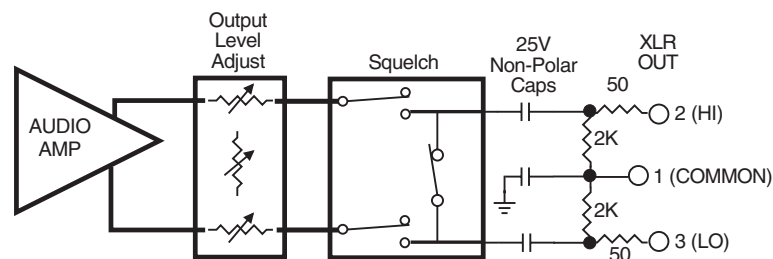
1. Install batteries or connect the power cord.
2. Attach the antennas.
3. Turn the unit on. Check to see that the LCD display panel activates.
4. Set the frequency to match the transmitter frequency switch setting. See page 7.
5. Turn transmitter on and verify that an RF signal is being indicated on the LCD screen. See page 6.
6. Connect the audio cable to the audio output XLR.
7. Adjust the transmitter gain. **THIS IS PERHAPS THE MOST IMPORTANT STEP IN THE SET UP PROCEDURE.** See your transmitter manual (Operating Instructions section) for details on how to adjust the transmitter gain. In general, adjust the transmitter gain so that the voice peaks will cause the audio modulation Level display on the front of the receiver and transmitter to show full modulation on the loudest peak audio levels. Normal levels should cause the audio level icon to fluctuate fully (see page 6). This will result in the best possible signal to noise ratio for the system.

*A common mistake at this point is to use the transmitter audio gain control to set the overall audio level of the entire audio system. The transmitter gain control is not a volume control and must be set independently of the overall system audio level. The transmitter gain control is only used to set the proper modulation of the transmitter. To explain it another way, it is used to match the transmitter to the type of microphone and the sound levels that will be present at that microphone. We encourage users to either disconnect the rest of the sound system or turn the sound system gain way down to prevent feedback or overload as the transmitter gain is set. That way, feedback from the sound system or overload of other equipment does not get in the way of setting the transmitter gain properly. Only after the transmitter gain control is set should the gain of the rest of the audio system be adjusted to achieve the desired sound or signal levels.*

8. Adjust the audio output level to match the required input level of the connected device (camera, mixer, recorder, etc.). Use the LEVEL or TONE setup screen under the LEVEL WINDOW menu and adjust the output level with the Up and Down buttons. The adjustment range is from -50dBu to +10dBu in 1dB steps.

The test tone output is especially useful for an exact level match. With the test tone running, adjust for the maximum desired peak level using the metering on the connected device.

*UCR211 Simplified Audio Output Circuit*



## UCR211 REPLACEMENT PARTS and ACCESSORIES

<u>Part No.</u>	<u>Description</u>
32251	Velcro mounting strips
35753	Zippered, padded vinyl system pouch
CH12	AC power supply
VSR1	Thin velcro loop for power cable strain relief.
A8U	UHF marine phosphor bronze antenna - straight connector, specify block.

## TROUBLESHOOTING

### POWER SUPPLY AND FUSE

#### LCD display not active or lit.

- External power supply disconnected or inadequate.
- Main power supply fuse tripped. Turn the receiver off, remove the cause of the overload and turn the receiver back on.
- Wrong polarity power source. The external DC in requires POSITIVE to be on the center pin.
- Battery may be low. Try a fresh battery

### PILOT TONE SQUELCH

#### PILOT indicator is solid “P”, but no sound

- Audio output cable bad or disconnected.
- Audio Output level set too low. Use the built-in test tone to verify levels.

#### PILOT “P” keeps flashing when transmitter audio switch is turned on

- It takes several seconds for the relay to actuate the PILOT. Turn on the transmitter power (and the audio switch on some models) and wait 3 to 5 seconds for the “P” to indicate steadily.
- Transmitter and receiver not on same frequency.

#### Noise on audio and Pilot indicator is “b”.

- The pilot tone bypass has been activated. Hold MENU and press UP to reset (works only from the Main Window).

#### NOTE:

The PILOT indicator on the front panel shows as a solid “P” to indicate that the audio has been turned on at the transmitter, and that the audio output on the receiver is enabled. When the “P” is on, the audio is enabled. If the “P” is flashing the pilot tone is not detected and the audio will be muted (squelched).

When the pilot tone is bypassed, the “P” icon changes to a “b” shape.

### ANTENNAS AND RF SIGNAL STRENGTH

#### RF Level is weak.

- Receiver may need to be moved or reoriented.
- Antenna on transmitter may be defective or poorly connected - double check antenna on transmitter.
- Improper length of antenna, or wrong antenna on transmitter. UHF whip antennas are generally about 3 to 5 inches long. UHF helical antennas may be shorter, but are often less efficient.

#### No RF Signal

- Make certain frequency switches on transmitter match the receiver frequency setting.
- Check battery in transmitter

### AUDIO SIGNAL QUALITY

#### Poor signal to noise ratio

- Transmitter gain set too low
- The noise may not be in the wireless system. Turn the transmitter audio gain all the way down and see if the noise remains. If the noise remains, then turn the power off at the transmitter and see if it remains. If the noise is still present, then the problem is not in the transmitter.
- If noise is still present when the transmitter is turned off, try lowering the audio output level on the UCR211 and see if the noise lowers correspondingly. If the noise remains, the problem is not in the receiver.
- Receiver output is too low for the input of the device it is feeding. Try increasing the output level of the UCR211 and lowering the input gain on the device the UCR211 is feeding.

#### Distortion

- Transmitter input gain too high. Check and/or readjust input gain on transmitter according to the LEDs on the transmitter and then verify the setting with the audio meter in the main window.
- Audio output level too high for the device the UCR211 is feeding. Lower the output level of the UCR211.

## SPECIFICATIONS AND FEATURES

### Operating Frequencies (MHz):

Block 21: 537.600 - 563.100	Block 26: 665.600 - 691.100
Block 22: 563.200 - 588.700	Block 27: 691.200 - 716.700
Block 23: 588.800 - 607.900	Block 28: 716.800 - 742.300
and 614.100 - 614.300	Block 29: 742.400 - 767.900
Block 24: 614.400 - 639.900	Block 30: 768.000 - 793.500
Block 25: 640.000 - 665.500	Block 31: 793.600 - 805.600

<b>Frequency Adjustment Range:</b>	25.5 MHz in 100kHz steps
<b>Receiver Type:</b>	Triple conversion, superheterodyne, 244MHz , 10.7MHz and 300kHz
<b>Frequency Stability:</b>	±0.001 %
<b>Front end bandwidth:</b>	±5.5MHz @ -3dB
<b>Sensitivity</b>	
20 dB Sinad:	0.9 uV (-108 dBm), A weighted
60 dB Quieting:	1.12 uV (-105 dBm), A weighted
<b>Squelch quieting:</b>	Greater than 125 dB
<b>AM rejection:</b>	Greater than 60 dB, 2 uV to 1 Volt (Undetectable after processing)
<b>Modulation acceptance:</b>	85 kHz
<b>Image and spurious rejection:</b>	85dB
<b>Third order intercept:</b>	+8 dBm
<b>Diversity method:</b>	Phased antenna diversity
<b>FM Detector:</b>	Digital Pulse Counting Detector operating at 300kHz
<b>Antenna inputs:</b>	Dual BNC female, 50 Ohm impedance
<b>Audio outputs</b>	
<b>Rear Panel XLR:</b>	Adjustable from -50dBu to +10dBu in 1 dB steps. Calibrated into a typical 10K Ohm balanced load. Actual output impedance max 500 Ohms, min 200 Ohms.
<b>Front Panel Controls and Indicators</b>	LCD control panel - menus include:
<b>Main window:</b>	Pilot tone; antenna phase, receiver battery level; transmitter battery level; audio level, RF level
<b>Frequency window:</b>	Frequency, TV channel; Transmitter switch setting
<b>Audio output level adjustment:</b>	-50dBu to +10dBu
<b>Battery level tracking:</b>	Both transmitter and receiver in 1/10th volt steps, accuracy +/- 10%.
<b>Scanning mode:</b>	Coarse and fine modes for spectrum check
<b>Audio test tone:</b>	1kHz, -50dBu to +10dBu output, < 5% THD
<b>Transmitter battery type selection:</b>	9V alkaline, 9V lithium, AA alkaline, AA lithium
<b>Rear Panel Controls and features:</b>	XLR audio output jack; External DC input; Battery compartment access
<b>Power Options</b>	
<b>Ext DC:</b>	Minimum 10 Volts to maximum 18 Volts DC; 1.6 W, 130 mA at 12VDC
<b>Int Batt:</b>	9V alkaline or lithium (110 mA @ 9V, 160mA @ 6V)
<b>Battery Life</b>	
<b>9V alkaline:</b>	6 to 8 hours continuous, up to 12 hours intermittent
<b>9V lithium:</b>	Up to 20 hours (continuous and intermittent usage are the same)
<b>Weight:</b>	14 oz. with batteries
<b>Dimensions:</b>	3.23" wide x 1.25" high x 4.64" deep
<b>System Audio Specifications</b> (UCR211 Receiver / UM200C Transmitter)	
<b>Signal to Noise Ratio:</b>	108 dB; A-weighted at full quieting
<b>Distortion:</b>	Less than 0.5% at 50% modulation, 1kHz
<b>Frequency Response:</b>	+/- 3dB from 40Hz to 18kHz

*Specifications subject to change without notice.*

## SERVICE AND REPAIR

If your system malfunctions, you should attempt to correct or isolate the trouble before concluding that the equipment needs repair. Make sure you have followed the setup procedure and operating instructions. Check out the interconnecting cords and then go through the TROUBLESHOOTING section in the manual

We strongly recommend that you **do not** try to repair the equipment yourself and **do not** have the local repair shop attempt anything other than the simplest repair. If the repair is more complicated than a broken wire or loose connection, send the unit to the factory for repair and service. Don't attempt to adjust any controls inside the units. Once set at the factory, the various controls and trimmers do not drift with age or vibration and never require readjustment. **There are no adjustments inside that will make a malfunctioning unit start working.**

LECTROSONICS' service department is equipped and staffed to quickly repair your equipment. In warranty repairs are made at no charge in accordance with the terms of the warranty. Out of warranty repairs are charged at a modest flat rate plus parts and shipping. Since it takes almost as much time and effort to determine what is wrong as it does to make the repair, there is a charge for an exact quotation. We will be happy to quote approximate charges by phone for out of warranty repairs.

## RETURNING UNITS FOR REPAIR

You will save yourself time and trouble if you will follow the steps below:

**A.** DO NOT return equipment to the factory for repair without first contacting us by letter or by phone. We need to know the nature of the problem, the model number and the serial number of the equipment. We also need a phone number where you can be reached 8 am to 4 pm (Mountain Standard Time).

**B.** After receiving your request, we will issue you a return authorization number (R.A.). This number will help speed your repair through our receiving and repair departments. The return authorization number must be clearly shown on the outside of the shipping container.

**C.** Pack the equipment carefully and ship to us, shipping costs prepaid. If necessary, we can provide you with the proper packing materials. UPS is usually the best way to ship the units. Heavy units should be "double-boxed" for safe transport.

**D.** We also strongly recommend that you insure the equipment, since we cannot be responsible for loss of or damage to equipment that you ship. Of course, we insure the equipment when we ship it back to you.

**Mailing address:**

Lectrosonics, Inc.  
PO Box 15900  
Rio Rancho, NM 87174  
USA

**Shipping address:**

Lectrosonics, Inc.  
581 Laser Rd.  
Rio Rancho, NM 87124  
USA

**Telephones:**

Regular: (505) 892-4501  
Toll Free (800) 821-1121  
FAX: (505) 892-6243

**Web:** <http://www.lectrosonics.com>

**E-mail:** [sales@lectrosonics.com](mailto:sales@lectrosonics.com)

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## LIMITED ONE YEAR WARRANTY

The equipment is warranted for one year from date of purchase against defects in materials or workmanship provided it was purchased from an authorized dealer. This warranty does not cover equipment which has been abused or damaged by careless handling or shipping. This warranty does not apply to used or demonstrator equipment.

Should any defect develop, Lectrosonics, Inc. will, at our option, repair or replace any defective parts without charge for either parts or labor. If Lectrosonics, Inc. cannot correct the defect in your equipment, it will be replaced at no charge with a similar new item. Lectrosonics, Inc. will pay for the cost of returning your equipment to you.

This warranty applies only to items returned to Lectrosonics, Inc. or an authorized dealer, shipping costs prepaid, within one year from the date of purchase.

This Limited Warranty is governed by the laws of the State of New Mexico. It states the entire liability of Lectrosonics Inc. and the entire remedy of the purchaser for any breach of warranty as outlined above. NEITHER LECTROSONICS, INC. NOR ANYONE INVOLVED IN THE PRODUCTION OR DELIVERY OF THE EQUIPMENT SHALL BE LIABLE FOR ANY INDIRECT, SPECIAL, PUNITIVE, CONSEQUENTIAL, OR INCIDENTAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THIS EQUIPMENT EVEN IF LECTROSONICS, INC. HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. IN NO EVENT SHALL THE LIABILITY OF LECTROSONICS, INC. EXCEED THE PURCHASE PRICE OF ANY DEFECTIVE EQUIPMENT.

This warranty gives you specific legal rights. You may have additional legal rights which vary from state to state.

### **LECTROSONICS, INC.**

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581 LASER ROAD  
RIO RANCHO, NM 87124 USA  
[www.lectrosonics.com](http://www.lectrosonics.com)

November 12, 2002