UDR200A

RATIO DIVERSITY RECEIVER

OPERATING INSTRUCTIONS
and trouble-shooting guide

LECTROSONICS, INC.

Rio Rancho, NM

A little bit of Lectrosonics history...

Founded in 1971, Lectrosonics began with the manufacture of portable sound systems sold under the Voice Projector© registered trademark. The first product line consisted of a self-contained lectern/sound system and two over-the-shoulder portable sound systems.

In 1975 the first wireless microphone systems were introduced to audio visual markets. The first system was a lavalier system consisting of a belt-pack transmitter and matching receiver. Soon after this, the receiver was equipped with a rechargeable battery pack to allow it to be used with the portable sound systems. A year or so later a special version of the receiver was designed to be built inside of one of the lecterns providing a completely cordless, wireless portable sound system in a lectern configuration. In keeping with the "total portability" concept, the first self-contained speaker/ amplifier/wireless system was developed. The advent of wireless microphone products introduced new prospective markets and set the stage for the future direction of engineering. The first UNICHANNEL© receiver was designed with ultra-narrow band crystal IF filtering to eliminate interference.

By the early 1980's, wireless microphone products had come to dominate the growth of the company, leading to further investment in engineering. The first VHF high band wireless systems were introduced in 1987, taking the proven UNICHANNEL© design to a higher frequency band. The product line expanded rapidly over the following 5 or 6 years, leading to the introduction of UHF wireless systems in 1993.

In 1989 the first automatic mixer products were introduced. The most recent models include an advanced microprocessor controlled mic/line mixer that provides an adaptive algorithm* that keeps track of microphone activity to prevent background noise from affecting the mixing action. Future products in the audio group will include even more advanced microprocessor and computer controlled components for automation of entire sound systems.

Lectrosonics remains an engineering driven company. Ongoing efforts continuously produce new designs with the latest technology in electronics and mechanical engineering.

*US Patent Pending

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FRONT PANEL CONTROLS AND FUNCTIONS

TRANSMITTER AUDIO LEVEL

The modulation (audio level) of the incoming signal is indicated by a fast responding LED strip. The strip is calibrated in 6dB steps over an expanded scale (54dB) which provides an extremely accurate visual "picture" of the signal dynamics, even at a distance away from the receiver. Audio signal peaks easily exceed the response time of VU meters, however, the LED strip is fast enough to track even brief transients.

RF LEVEL INDICATORS

Two separate LED strips are provided to indicate the level of the incoming RF signals. The LED strips are calibrated to provide accurate indications from 1uV to 1mV. The LEDs are highly visible from a distance, making antenna set up more accurate. The dual LED strips are especially useful in "trouble-shooting" difficult antenna installations.

OPTI-BLEND LEDs

The UDR200 receiver operates with a method of audio ratio blending of two audio outputs. RF level in each receiver is compared and the audio signals from the two receivers are mixed together in a ratio that favors the quieter receiver. As this blending action occurs, the brightness of the two OPTI-BLEND LEDs will vary. The brighter the LED, the more audio is being mixed in from that receiver.

FREQUENCY SWITCHES

The UDR200 is frequency agile within the 5 MHz passband of the front-end filters. To gain access to these switches, slide the access door up with a fingernail. 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.

PILOT LED

The audio output muting (squelch) function of the UDR200 is controlled by a 33kHz tone modulation of the RF carrier. The audio output is muted until this tone is present. As soon as the tone is received, this LED is turned on to indicate the audio output is enabled.

The pilot tone function can be defeated by pressing a switch on the rear panel. The PILOT LED, however, operates the same regardless of whether or not the defeat switch is pressed. The PILOT LED strictly indicates the presence of the pilot tone carrier from the transmitter.

DIVERSITY MODE

This switch is set to the DIVERSITY position for normal operation. For trouble-shooting or when the receiver is used with a single antenna, the switch can be set to select a single antenna only.

MONITOR

This is an audio output to drive a wide variety of different types of headphones. It is also useable as a secondary audio output to drive recorders or external audio devices.

POWER

Pressing the upper half of the rocker switch applies power to the receiver. At turn on, there are various relays and delays built into the receiver to allow various stages to stabilize before the audio output is activated. This will prevent an audio "thump" when powering up the receiver and/or the transmitter.

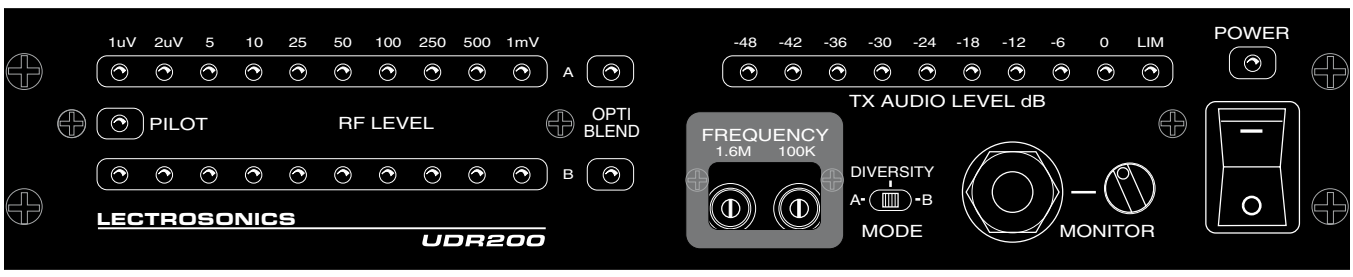

Figure 1 - UDR200 Front Panel

REAR PANEL CONTROLS AND FUNCTIONS

AUDIO OUTPUT

A calibrated control on the rear panel adjusts the output level in 5 dB steps, referenced in dBu. This control knob adjusts the absolute output level at the XLR connector. The AUDIO OUTPUT level control is located after the output transformer. This allows the signal to noise ratio to remain constant regardless of the setting of the control. As the audio level is reduced, the noise is also reduced maintaining the same ratio.

PHASE REV

This switch reverses the polarity of the audio output signal.

AC POWER SUPPLIES

The UDR200 can be powered from conventional 110 or 220 Volt AC supplies via an internationally approved connector. A standard grounded socket, fuseholder and voltage selector switch are combined into a single assembly. The fuseholder also contains a spare fuse. To remove the fuseholder, simply pry it out with a screwdriver or similar tool (it pulls straight outward from the assembly). To select the operating voltage, disconnect the AC power and then turn the voltage selector (located to the left of the fuse) using a flatblade screwdriver or other similar tool so that the desired voltage is lined up with the mark at the top.

DC IN

The receiver can be powered from external 12 to 14 Volt DC sources via the three pin jack. Pin 1 is GND, Pin 2 is +12V, and Pin 3 is –12V. The relays and power supply stage are fully protected by automatic reset poly fuses. The ground side of the power supply is protected with a self resetting poly fuse in case the UDR200 is connected to a positive ground device through the audio cabling. The poly fuse will trip to protect the receiver and the offending ground path can then be removed.

PILOT TONE BYPASS

This switch defeats the audio output muting and triggering action of the pilot tone. When the pilot tone is bypassed, the Opti-Blend and the Variable Cutoff Low Pass Filter will still provide a squelching action during weak signal conditions. These circuits will provide approximately 50 dB of muting when the pilot tone is bypasssed.

NOISE FILTER

A dynamic noise reduction filter can be switched in to minimize excessive high frequency audio noise present in the acoustic environment, or generated by the RF link in difficult environments or operating distances.

ANTENNA JACKS

These are standard 50 Ohm BNC terminals for the RF input to the receiver.

Figure 2 - UDR200 Rear Panel

ANTENNA USE AND PLACEMENT

There are two remote antenna assemblies included with this receiver. Position the antennas at least three or four feet apart and so that they are 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 50 feet, the antenna positioning is much less critical. The antennas can also be configured with one whip mounted directly onto the rear panel of the UDR200 receiver, and the other one mounted remotely.

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 "drop-out." A drop-out 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 drop-out normally sounds like "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 drop-out 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 UDR200 receiver offers a sophisticated diversity design which overcomes drop-out problems in almost any imaginable situation. In the event, however, that you do encounter a drop-out problem, first try moving the antenna at least 3 or 4 feet from where it was. This may alleviate the drop-out problem on that antenna. If drop-outs are still a problem, try moving the antenna to an entirely different location in the room or moving the antennas in closer to the transmitter location. By observing the OPTI-BLEND LEDs on the front panel, you can determine which antenna is suffering weak signals.

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

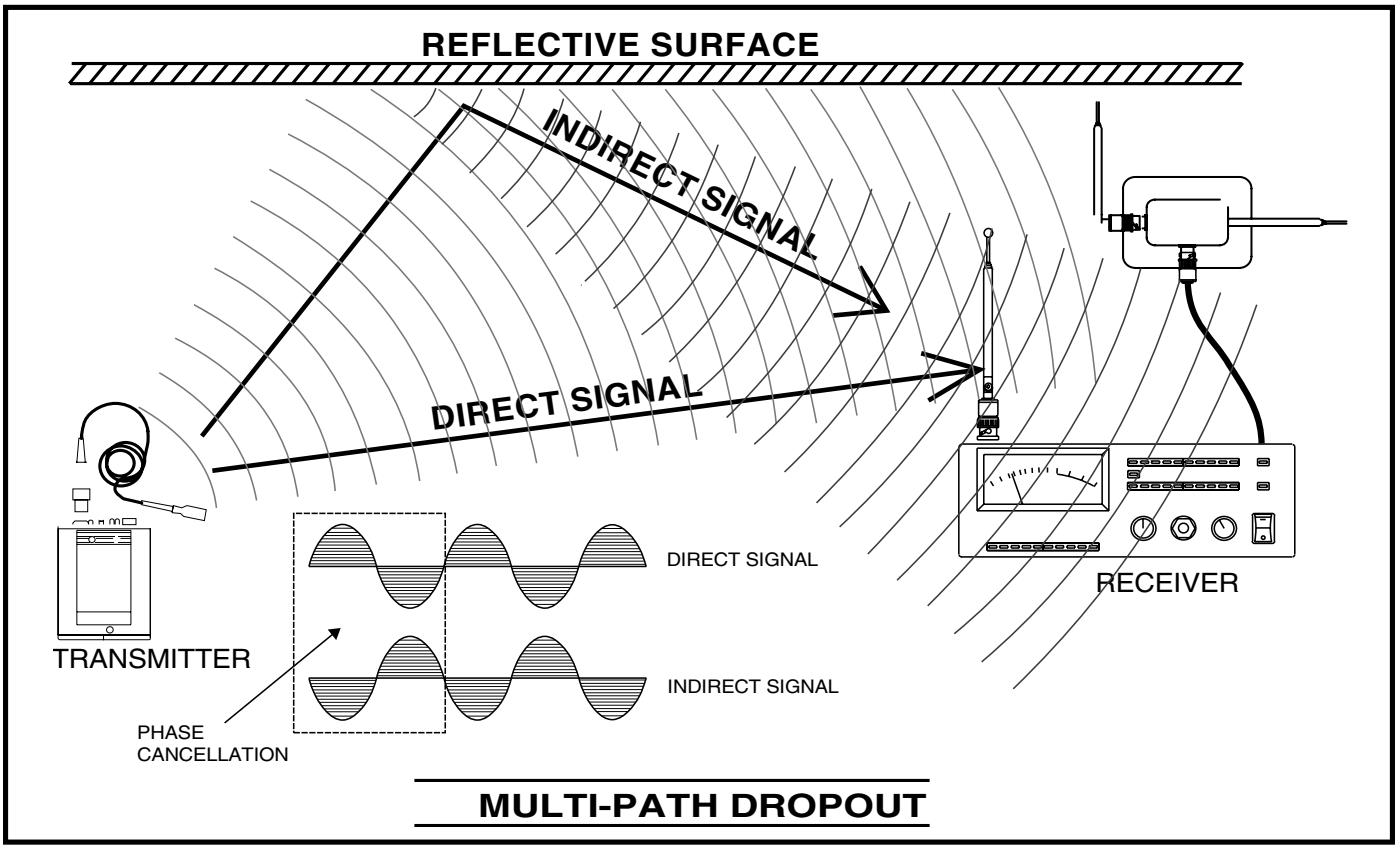

Figure 3 - Drop-outs

INSTALLATION AND OPERATING INSTRUCTIONS

1) If operating the unit from AC power, determine the line voltage to be used and set the Line Voltage Selector on the rear panel to match. The units are shipped with the proper size fuse for use with 120V systems (315mA). If the unit will be used in a 220V environment, change the fuse to a 160mA of the same type. See the section "UDR200 Replacement Parts and Accessories" for manufacturer part numbers of the correct type and value for 110 and 220 Volt supplies.

2) Locate a suitable operating location where the receiver will not be subjected to extreme temperature variations and possible bumps and drops. Try to route all wiring so it will not cross walkways or isles.

3) Connect the power. For 120V AC operation, connect the power cord to the AC input jack on the rear panel and plug the other end into a suitable electrical outlet. If 12 to 14 Volt DC operation is desired, a power cord will need to be fabricated. Use a three-pin connector for the UDR200 end and wire the +12 to pin 2, –12 to pin 3, and Gnd to pin 1. Make the length of the DC cable long enough to suit your installation and prepare and connect the source end of the cable.

4) Attach the antenna cables to the BNC jacks on the rear of the UDR200 and place the antennas. Best performance will be obtained if the antennas are placed at least 3 feet from each other. Try to mount them as high as possible with a direct line of sight path to the transmitter.

5) Set the Audio Output level control to minimum (CCW) and connect the Audio Output XLR jack to the mixer input. Pins 2 and 3 of the XLR jack are HI and LO and can be reversed with the Phase switch, pin 1 is common.

6) Preset the following controls:

MODE (front panel) to DIVERSITY
MONITOR (front panel) to minimum (CCW)
PHASE (rear panel) to 0
AUDIO OUTPUT (rear panel) to -40 (full CCW)

7) Turn the unit on with the front panel Power switch and check to see that the red Pilot LED is off (be sure the transmitter is turned off.)

8) Turn on the transmitter and adjust the transmitter gain. ***This is perhaps the most important step in the setup procedure.*** Adjust the transmitter so that voice peaks will light the 0 LED on the UDR200 front panel Transmitter Audio Level dB strip. The red LIM LED on the transmitter may flash occasionally. This is normal but it should not happen very often. See your transmitter manual (Operating Instructions section) for specific directions on how to adjust the gain of your particular transmitter.

9) After adjusting the transmitter gain, set the rear panel Audio Output level control to the desired level. The -40 setting is approximately equal to 10mV, the 0 position will give 0.775VRMS, and the +15 setting will allow up to 4.4 VRMS. This setting will depend on the requirements of your system.

10) Operate the system and re-adjust the receiver output level as required for your equipment. The input levels on different VCR's and PA equipment vary, which may require that you set the Audio Output control in an intermediate position. Try different settings and listen to the results. If the output of the receiver is too high, you may hear distortion or a loss of the natural dynamics of the audio signal. If the output is too low, you may hear steady noise (hiss) along with the audio.

11) Set the operating frequency. 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, slide the access door up with a fingernail.

The UDR200 is frequency agile within the 5 MHz passband of the front-end filters. It is possible to choose a frequency that is outside the passband of the front-end filters. Reduced operating range and increased noise can result if the receiver is operating outside of its range.

We recommend that you never set the 1.6MHz switch more than one click from the default position

Each receiver is factory aligned at the center of its operating range. The default position of the frequency select switches is in the center of the receiver passband.

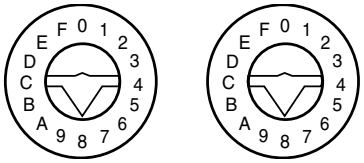

Figure 4 - Frequency Select Switches, Default Position

TROUBLESHOOTING

POWER SUPPLY AND FUSE

LEDs not lit or dimly lit — When the UDR200 is powered from an external DC supply, the LEDs are dimmed to conserve battery life.

- AC power cord disconnected.
- External power supply disconnected or inadequate.
- Main power supply fuse blown.
- For 110 Volt operation: 315 mA, 250 Volt Buss GDC-315 or Littlefuse 218.315 (Lectrosonics part #22090)
- For 220 Volt operation: 160mA, 250 Volt Buss GDC-160 or Littlefuse 218.160 (Lectrosonics part #22091)
- Rear panel voltage selector incorrectly set.

PILOT TONE SQUELCH

The PILOT indicator lamp on the front panel lights up to indicate that the audio has been turned on at the transmitter, and that the audio output on the receiver is enabled. When the lamp is on, the audio is on. When the lamp is off, the audio is muted.

PILOT lamp on, but no sound

- Audio output cable bad or disconnected. Try monitoring at the headphone output on the front panel. The headphone output signal is taken just ahead of the output transformer.
- AUDIO OUTPUT level set too low.

PILOT lamp off, but sound still comes through

- PILOT TONE BYPASS switch may have been pressed. Turn receiver power off and then back on again to reset the audio output relays.

PILOT lamp does not come on when transmitter audio switch is turned on

- It takes several seconds for the relay to actuate the PILOT lamp. Turn the transmitter power and audio switches on and wait 2 to 5 seconds for the lamp to come on.

ANTENNAS AND RF SIGNAL STRENGTH

RF LEVEL is weak on one (or both) channels

- Antenna is disconnected or there is a bad connection
- Antenna may need to be moved or re-oriented
- Improper length of antenna, or wrong antenna. UHF whip antennas should be about 5 to 6 inches long. VHF whip antennas should be about 14 to 20 inches long.
- Operating frequency is outside the passband of the receiver. Check the frequency range of the unit and be sure the frequency switches are not set beyond the limits of the receiver. (See step 11 on page 7 for more info.)

One OPTI BLEND LED does not come on or is dimly lit

- DIVERSITY switch is set to one or the other channels. Needs to be in the center position for normal operation.
- Reverse the antennas on the rear panel inputs. If the opposite OPTI BLEND LED now indicates the same problem, there may be an antenna or cabling problem. Try re-positioning the antenna(s).

AUDIO SIGNAL QUALITY

Poor signal to noise ratio

- Transmitter gain set too low
- Noise may not be in wireless system. Mute the audio signal at the transmitter and see if 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 UDR200 rear panel and see if the noise lowers correspondingly. If the noise remains, the problem is not in the receiver.
- Receiver output does not match the input of the device it is feeding. Try increasing the output level of the UDR200 and lowering the input gain on the device the UDR200 is feeding.

Distortion

- Transmitter input gain too high. Check and/or re-adjust input gain on transmitter according to the LEDs on the transmitter and then verify the setting with the transmitter audio level LED strip on the UDR200 front panel.
- Audio output level too high for the device the UDR200 is feeding.

UDR200 REPLACEMENT PARTS and ACCESSORIES

Part No.	Description
A-185-BNC	Telescoping 1/4 wave VHF/UHF whip; BNC connector.
A-200	Remote dipole UHF/VHF antenna with aluminum mounting block; supplied with one built-in telescoping whip and one detachable telescoping whip. Operates on VHF or UHF frequencies.
A-9775	Coaxial extension cable for A-200 dipole antenna; BNC male/male connectors, 10 ft, RG-58 cable.
21475	Replacement power cord
22090	Replacement fuse, GDC, 315ma, 250V
22091	Replacement fuse, GDC, 160mA, 250V

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 inter-connecting cords and then go through the TROUBLE SHOOTING 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.

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SPECIFICATIONS AND FEATURES

Operating Frequencies:	512 to 608 MHz, 614 to 806 MHz
Frequency Adjustment Range:	4.7 MHz
Receiver Type:	Dual conversion, superheterodyne
Frequency Stability:	±0.002 %
Front end selectivity:	>22 dB at ±4 MHz
Sensitivity	
20 dB Sinad:	0.707 uV (-110 dBm), A weighted
60 dB Quieting:	0.63 uV (-111 dBm), A weighted
Squelch quieting:	Greater than 125 dB
AM rejection:	Greater than 60 dB, 2 uV to 1 Volt (Undetectable after processing)
Modulation acceptance:	>90 kHz
Image and spurious rejection:	>120 dB
Third order intercept:	–10 dBm
Diversity technique:	Ratio diversity. Dual simultaneous receivers with dynamic audio combining (Opti-blend).
FM Detector:	Digital Pulse Counting Detector
Antenna inputs:	Dual BNC female; 50 Ohm impedance
Audio outputs	
Rear Panel XLR:	600 Ohm Balanced, transformer isolated, adjustable from -45 dBu to +15 dBu in 5 dB steps, at 60 kHz deviation
Monitor out:	Front panel ¼" Phone jack, adjustable from 0 to 635 mV RMS into 8 Ohms at 60 kHz deviation; 0 to 5.7V RMS into 600 Ohms at 60 kHz deviation.
Front Panel Controls and Indicators:	Power on/off switch and LED; Dual 10 segment RF signal level display; 10 segment transmitter audio level display; Coarse and fine frequency select controls; Diversity operation selector switch; Opti-Blend operation LEDs; Pilot tone indicator; Monitor output jack and level control.
Rear Panel Controls and features:	Ant A and Ant B BNC connectors; Pilot tone bypass switch; Audio phase reversal switch; Noise filter bypass switch; XLR audio output jack and 12-step audio attenuator; External ±12VDC input; 120/240 VAC input jack with integral voltage selector switch and fuse.
Power Options:	120/240 VAC, 50/60 Hz, 10 Watts ±12V DC, +325mA/–120mA
Weight:	4 lbs, 7 ozs
Dimensions:	8.2" wide x 2.1" high x 10.6" deep

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

This warranty applies only to items returned to us, shipping costs prepaid, within one year from the date of purchase.

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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July 6, 1999