UCR511

UHF RECEIVER

(Includes IFB Compatibility Mode)

Featuring Digital Hybrid Wireless™ Technology
(US Patent Pending)

OPERATING INSTRUCTIONS

CE 0560 !

LECTROSONICS®
Rio Rancho, NM, USA
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DIGITAL HYBRID WIRELESS™

(US Patent Pending)

The Lectrosonics Digital Hybrid Wireless™ uses innovative technology to combine the new advantages of digital audio with the classic advantages of analog RF transmission, thus delivering the superior sound quality of a digital system and the excellent range of an analog system. A proprietary algorithm encodes the digital audio information into an analog format which can be transmitted in a robust manner over an analog FM wireless link. The receiver employs the latest filters, RF amplifiers, mixers and detector to capture the encoded signal and a DSP recovers the original digital audio.

This digital/analog hybrid technique has some very beneficial properties. Because the information being transmitted is digitally encoded, immunity to noise is much higher than a compandor can offer. Because the encoded audio is sent in analog format, spectral and power efficiency and operating range are not compromised. Under weak RF conditions, the received signal degrades gracefully, like an analog system, delivering as much usable audio as possible at maximum range. Because the audio is not companded, no compandor artifacts are present at any audio or RF signal level. This greatly reduces the pumping and breathing problems commonly found in wireless systems with compandors.

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GENERAL TECHNICAL DESCRIPTION

The UCR511 is a portable, high performance, triple-conversion, frequency synthesized, UHF receiver fully compatible with all Lectrosonics 500 series transmitters (and some other transmitter types – see Compatibility Modes for details.) The RF performance is extremely stable over a very wide temperature range, making the UCR511 perfectly suited to the rough environmental conditions found in the field. The proprietary audio processing includes a digital signal processor for very low distortion and a superior signal to noise ratio.

The UCR511 features a menu-driven LCD graphic display and three control buttons to conveniently view and alter user settings. The main window, for example, displays 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/squelch from the main display window. Other display windows show operating frequency, audio output level, battery voltage and test tone status. The frequency scan mode provides a spectrum analyzer for 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.

COMPATIBILITY MODES

The UCR511 receiver was designed to operate with Lectrosonics 500 Series transmitters and will yield the best performance when doing so. However, due to the flexibility of digital signal processing, the UCR511 is also able to operate with Lectrosonics 300 Series, Lectrosonics 100 Series, and certain non-Lectrosonics transmitters in special compatibility modes.

DIVERSITY RECEPTION

The UCR511 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 to use both antennas simultaneously. This design keeps the receiver compact enough for camera mounting or shoulder bag applications, yet provides effective diversity reception.

RF FREQUENCY TRACKING FRONT-END AND MIXER

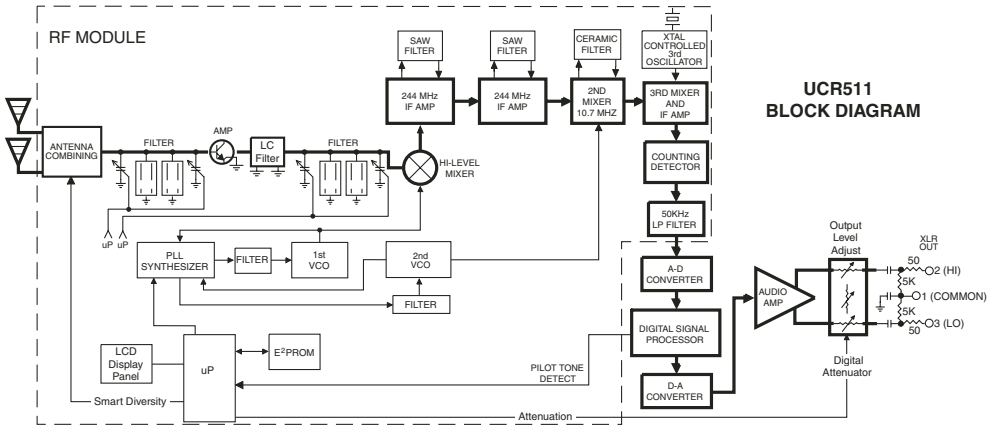
The receiver is frequency agile and can be set to operate on any one of 256 frequencies within its tuning range. To significantly reduce unwanted interference and intermodulation problems, the UCR511 has a frequency selective front-end section that tracks and tunes to the desired signal frequency and rejects or "tunes out" unwanted interfering signals. The design consists of four varactor tuned ceramic transmission line resonators controlled by the microprocessor to provide excellent 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 UCR511 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 drive the LCD display and backlight, control the squelch and audio output attenuator, and operate the front-end tuning, the PLL/VCO circuits and the antenna phase switch. The UCR511 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 down to 10.7 MHz, filtered through two ceramic filters for sharp selectivity, then converted to 300 kHz.

DIGITAL PULSE COUNTING DETECTOR

The UCR511 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.

DSP-BASED PILOT TONE

Note

The above description applies only in 500 Series mode. In 300 Series mode, only one pilot tone frequency is used on all channels, emulating the original crystal-based system. In other compatibility modes, no pilot tone is used.

The 500 Series system design uses a DSP generated ultrasonic pilot tone to control the receiver audio muting (squelch). Brief delays (preset into the UCR511 circuitry) eliminate thumps, pops or other transients that can occur when thewhen the associated 500 Series transmitter is turned on or off. The pilot tone frequency is different for each of the 256 frequencies in the tuning range of a system (frequency block.) This eliminates squelch problems in multichannel systems where a pilot tone signal can appear in the wrong receiver via intermodulation products. The DSP generated pilot tone also eliminates the need for fragile crystals, allowing the receiver to survive shocks and mishandling much better than older analog-based pilot tone systems.

SMART SQUELCH™

The UCR511 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 UCR511 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 UCR511 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. (See Front Panel Controls and Functions.)

SMART NOISE REDUCTION (SmartNR™)

Note

The SmartNR setting is user selectable only in 500 Series mode. In other modes, noise reduction is applied in such a way as to emulate the original analog system as accurately as possible and is not user adjustable.

The UCR511 has been meticulously designed using the best available low noise components and techniques. Nonetheless, the wide dynamic range of digital hybrid technology, combined with flat response to 20 kHz, makes it possible to hear the -120 dBV noise floor in the mic preamp, or the (usually) greater noise from the microphone itself. (To put this in perspective, the noise generated by the recommended 4 k Ohm bias resistor of many electret lavaliere mics is –119 dBV and the noise level of the microphone’s electronics is much higher.) In order to reduce this noise and thus increase the effective dynamic range of the system, the UCR511 is equipped with a Smart Noise Reduction algorithm, which removes hiss without sacrificing high frequency response.

The Smart Noise Reduction algorithm works by attenuating only those portions of the audio signal that fit a statistical profile for randomness or “electronic hiss”. Because it isn’t simply the same sophisticated variable low pass filter as in Lectrosonics’s 300 Series designs, much greater transparency is thus obtained. Desired high frequency signals having some coherence such as speech sibilance and tones are not affected.

The Smart Noise Reduction algorithm has three modes, selectable from a user setup screen - **OFF/NORMAL/FULL**.

OFF, no noise reduction is performed and complete transparency is preserved. All signals presented to the transmitter’s analog front end, including any faint microphone hiss, will be faithfully reproduced at the receiver.

NORMAL, the factory default setting, enough noise reduction is applied to remove most of the hiss from the mic preamp and some of the hiss from lavaliere microphones. The noise reduction benefit is dramatic in this position, yet the degree of transparency maintained is exceptional.

FULL, enough noise reduction is applied to remove most of the hiss from nearly any signal source of reasonable quality, assuming levels are set properly at the transmitter. This additional noise reduction comes at the cost of some transparency for low-level room noise, yet the

algorithm remains undetectable under most circumstances.

RF-CONTROLLED DIGITAL NOISE FILTER

In addition to SmartNR™, the UCR511 contains an RF sensitive variable frequency filter, which reduces high frequency response under extremely weak RF conditions. This filter does nothing until the RF signal strength drops below 3 uV at which point it begins to roll off high frequencies. Usable audio remains unaffected, but noise-ups or "hits" occurring near the fringe of reception sound much less harsh.

OUTPUT LEVEL ADJUST

One of several setup screens is provided for adjusting the audio output level in 1 dB steps from -50 to +5 dBu using the SEL Up and Down buttons on the front panel.

TEST TONE

To assist in matching the audio levels of equipment connected to the UCR511, a 1 kHz audio test tone, adjustable from -50 to +5 dBu in 1 dB increments, is available at the XLR connector. This tone is available through the TONE display window.

BATTERIES

The UCR511 operates on two 9 V 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 UCR511 may be operated from an external (Negative Ground) DC power 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 primary windows: Main, Setup, Battery Level, Frequency. 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 other user settings. These settings are retained even if the batteries are removed. After five minutes of no key activity, the LCD backlight goes off and the display reverts back to the Main Window.

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) UCR511
   BLK xx (xx is the frequency block number)

2) VERSION

   R.R/A.A (R.R is the RF board firmware version, A.A is the audio board firmware version)

3) COMPAT mode (mode is one of the following:
   500 - native 500 Series mode
   100 - Lectrosonics 100 Series compatibility
   300 - Lectrosonics 300 Series compatibility
   MODE 3 - compatible with certain non-Lectrosonics transmitters)
   IFB - compatible with all Lectrosonics IFB transmitters.

4) TUNING mode (mode is one of the following:
   NORMAL - tune in single channel increments
   GRP x - tune in precoordinated intermod-free frequencies (x is A, B, C or D))

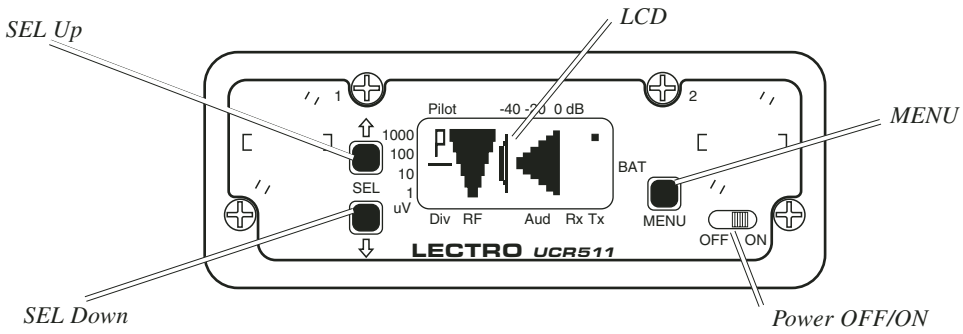
The Main Window will appears after these introductory messages are displayed.

The UCR511 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.

POWER OFF

When the Front Panel Power ON/OFF 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



SEL Up/Down

The SEL Up and Down pushbutton switches are used in conjunction with the MENU pushbutton to move through the submenus and set operating conditions and parameters. (See also Menu Selections From Main Window.)

MENU

The MENU pushbutton is used to rotate through the various set up menus of the UCR511.(See also Menu Selections From Main Window.)

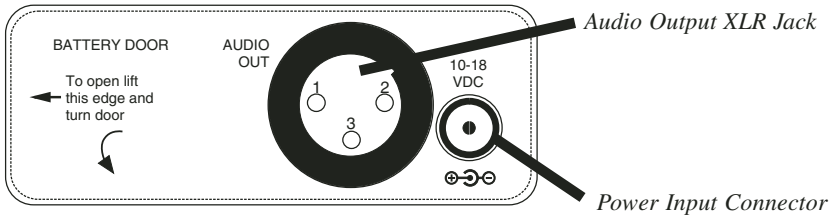
POWER ON/OFF

The Power ON/OFF switch is used to apply or remove power from the UCR511.

LCD

The LCD is used to provide feedback to the user on menu selections and system operating conditions.

REAR PANEL FEATURES



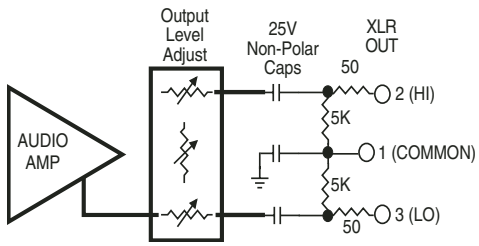
XLR AUDIO OUTPUT JACK

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. (See Installation and Operating Instructions.)

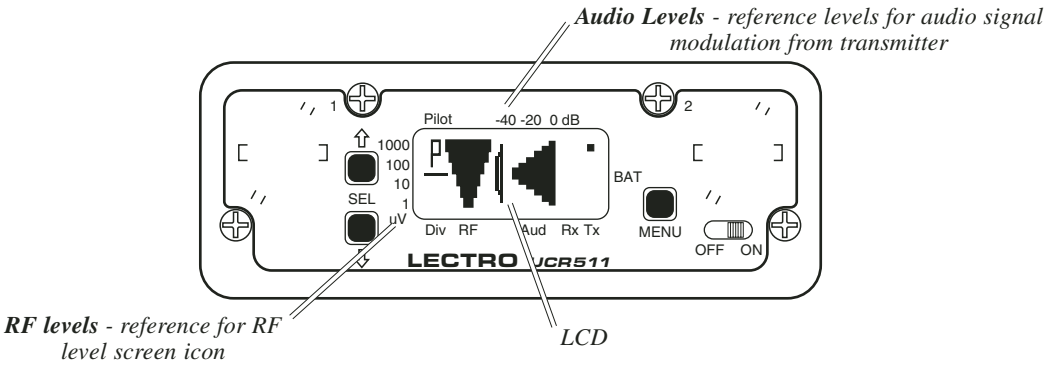
POWER INPUT JACK

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 condition is fixed. Strain relief to avoid accidental disconnection can be provided with the included small

UCR511 Simplified Audio Output



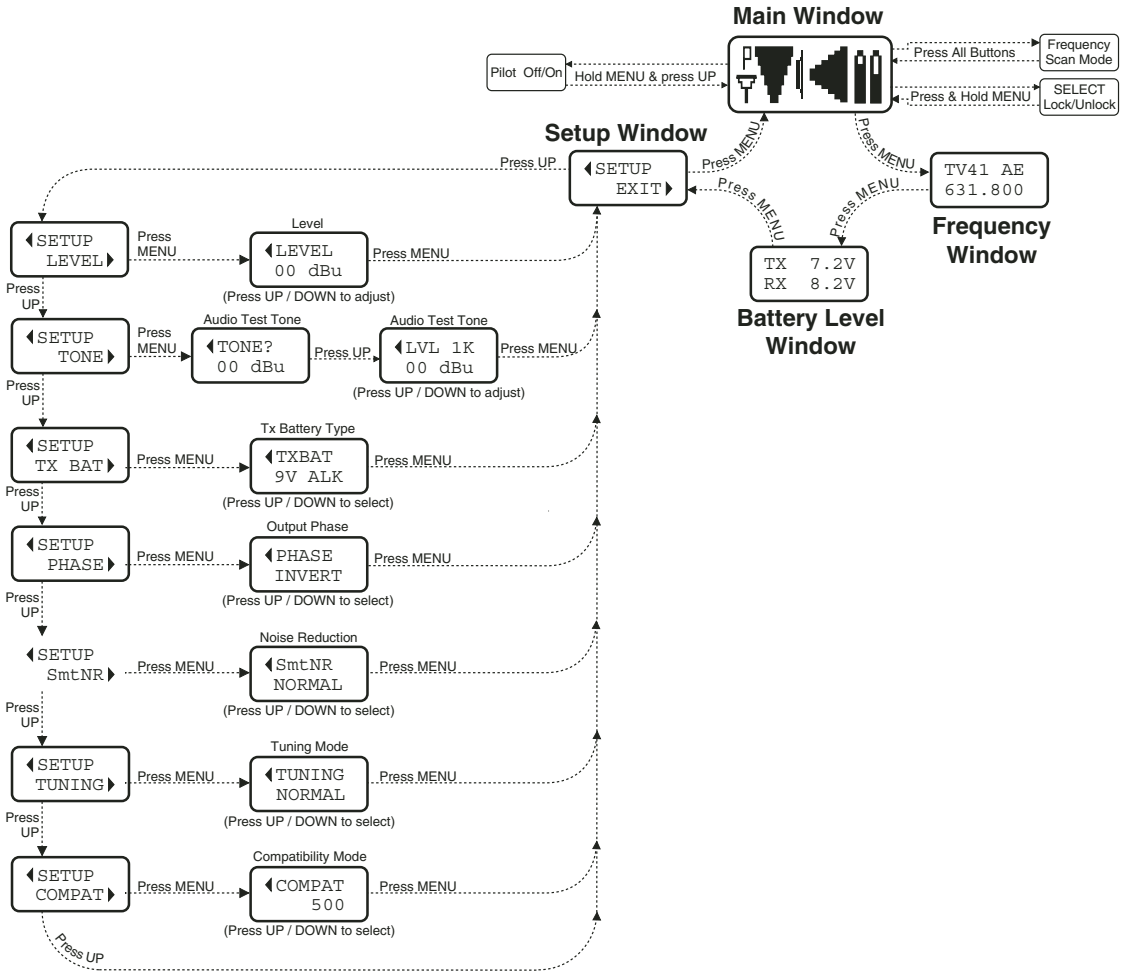
MAIN WINDOW (LCD)



The Main Window displays information concerning the condition of the Pilot Tone, antenna phase, RF and audio signal levels and battery conditions for both the receiver and the associated transmitter. It is also the access portal to menu selections for setting up the receiver and searching for clear frequency channels. (See Menu Selections from Main Window and Frequency Scan Mode.)

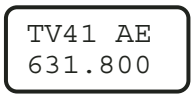
Icon	Description
	PILOT TONE INDICTOR A steady “P” icon will be displayed when a pilot tone from the transmitter is present. (The “P” will appear only in those compatibility modes which use pilot tone: 300 Series and the native 500 Series mode.) The icon will flash if no pilot tone is detected and will 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. Bypassing the pilot tone also disables the squelch, so the “pilot tone bypass” function has an effect even in those compatibility modes that do not use pilot tone.
	ANTENNA PHASE INDICATOR **T**his 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.
	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.
	BATTERY LEVELS The icon above the **Rx** symbol indicates the receiver battery condition and will flash when approximately one hour of operating time is remaining. When external power is being used, the Rx battery icon changes to look like a power plug. The area above the Tx symbol features either a transmitter battery status icon or the transmitter battery timer, depending on the TXBAT setting. The transmitter battery status icon is available only in compatibility modes supporting battery telemetry (500 and 300 Series). In such cases, the transmitter battery status icon appears 5 to 10 seconds after the transmitter signal is acquired. If selected in the TXBAT setup screen, the transmitter battery timer is available in any compatibility mode. It accumulates hours and minutes that the communications link is active, retaining the timing even when the receiver is off. To reset the battery timer, hold MENU and DOWN together for one second.

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



TVxx - which television broadcast channel this frequency falls within.

Transmitter switch settings (AE in the illustration) - these are the correct switch settings for the frequency switches on your transmitter - see your transmitter instructions.

Frequency - Press the SEL Up or Down buttons to change the frequency of the receiver.

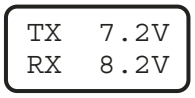
Note

Be certain to change the transmitter frequency select switches to match the settings shown in the upper right hand corner of the Frequency Window display.

When the TUNING mode is set to NORMAL, the SEL Up or Down buttons tune in single channel increments. In the group tuning modes, the UP and DOWN buttons move among the selected intermod-free frequencies.

Tuning short-cuts: In NORMAL tuning mode, MENU+Up and MENU+Down tune in 16 channel increments for faster tuning. In the group tuning modes, MENU+Up jumps to the first frequency in the group and MENU+Down jumps to the last one in the group.

BATTERY LEVEL WINDOW



This window shows the transmitter (TX) and receiver (RX) battery voltage. 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

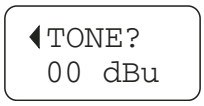
In the SETUP window, the SEL Up or Down buttons scroll through a list of eight possible destinations: EXIT,

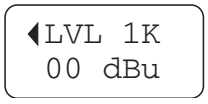
LEVEL, TONE, TXBAT, PHASE, SmtNR (in 500 Series mode only), TUNING and COMPAT. Each of these destinations allows a variety of settings to customize the receiver operating parameters. Press MENU at the screen shown here to return to the main window.

LEVEL

The **LEVEL** setup screen shows the audio output level of the receiver in dBu. Use the SEL Up or Down buttons to change the level. Range is from -50 to +5 dBu in 1 dB steps. Press MENU to leave this screen.

TONE





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 SEL Up or Down buttons. When the audio test tone is enabled, the received audio is muted and an internally generated 1 kHz 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 1% distortion and is intended for confirmation of output levels only. To exit the test tone screen and stop the tone press the MENU button.

TXBAT

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 adequate warning will be provided in advance of battery failure. Press MENU to leave this screen.

In native 500 Series mode as well as in the 300 Series compatibility mode, the TXBAT menu offers six choices:

9V ALK - Transmitter uses a 9V alkaline battery. Monitor voltage with battery icon in main window.

9V LTH - Transmitter uses a 9V lithium battery. Monitor voltage with battery icon in main window.

9V TIM - Transmitter uses a 9V battery. Display its voltage normally in the battery level window but monitor its status with the battery timer in the main window.

AA ALK - Transmitter uses a AA alkaline battery. Monitor voltage with battery icon in main window.

AA LTH - Transmitter uses a AA lithium battery. Monitor voltage with battery icon in main window.

AA TIM - Transmitter uses an AA battery. Display its voltage normally in the battery level window but monitor its status with the battery timer in the main window.

The 9V TIM and AA TIM settings are most useful for NiMH batteries as they do not exhibit reliably identifiable voltage drops as they discharge.

In compatibility modes other than 500 Series and 300 Series, no battery telemetry information is available so the TXBAT setup screen offers only two choices:

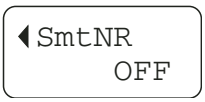
NOTIMER - Display no transmitter battery status in the main window.

TIMER - Monitor the transmitter battery status with the battery timer in the main window. To reset the timer, hold MENU and DOWN for one second.

PHASE

The output **PHASE** setup screen allows the audio output phase to be inverted. The SEL Up or Down buttons can be used to toggle between normal and inverted phase. Press MENU to leave this screen.

SmtNR



The **SmtNR** setup screen (available in 500 Series compatibility mode only) places the Smart Noise Reduction algorithm in one of three modes. In the OFF position, no noise reduction is applied, for complete transparency. In the NORMAL position (factory default setting), a moderate amount of noise reduction is applied, dramatically reducing hiss with virtually no discernible side effects. In the FULL position, the transparency is superior to the Lectrosonics noise reduction system used for many years in the 300 series systems. Try switching between the three modes to decide what setting is correct for your application. Refer to the Smart Noise Reduction section in the GENERAL TECHNICAL DESCRIPTION chapter for more detailed information about this feature.

TUNING

The Tuning Setup Screen allows selection of one of four factory set frequency groups (Groups A through D), two user programmable frequency groups (Groups U and V) or the choice to not use groups at all.

In the four factory set frequency groups, eight frequencies per group are preselected. These frequencies are chosen to be free of intermodulation products. (See Frequency Coordination.)

In the two user programmable frequency groups, up to 16 frequencies can be programmed per group.

Note
The Tuning Setup Screen only selects the tuning mode (NORMAL or Group Tuning) and not the operating frequency. Actual operating frequencies are chosen through the Frequency Window.

If NORMAL tuning mode is selected, the SEL Up and Down buttons select the operating frequency in single channel (100 kHz) increments and the MENU+Up and MENU+Down shortcuts tune in 16 channel (1.6 MHz) increments.

There are two group tuning modes: factory present groups (Grp A through D) and user programmable frequency groups (Grp U and V).

In these modes, the SEL Up and Down buttons navigate among the selected intermod-free frequencies in the group and the MENU+Up and MENU+Down shortcuts jump to the first and last frequencies in the group.

Also, a lower case a, b, c, d, u or v will be displayed to the immediate left of the transmitter switch settings in the Frequency Window. The letter identifies the selected factory or user tuning group.

Any time the currently tuned frequency is not in the current tuning group, the group tuning mode indicator will blink. Any time the currently tuned frequency is in the current turning group, the group tuning mode indicator will give a steady (non-blinking) indication.

If a factory tuning group has been selected, pressing either the SEL Up or Down button will select the nearest factory selected frequency in that group above or below the current frequency.

User Programmable Frequency Group Behavior

The user programmable frequency groups work very similar to the factory groups with a few exceptions. The most obvious difference is the ability to add or remove frequencies from the group. Less obvious is the behavior of a user programmable frequency group with only one, or no entries.

A user programmable frequency group with only one entry will only display that one frequency regardless of how many times the SEL Up or Down buttons are pressed (providing the MENU button is not pressed at the same time).

A user programmable frequency group with no entries reverts to non-group-mode behavior, i.e., access is allowed to all 256 available frequencies in the selected receiver module's frequency block. However, once a frequency has been added to the tuning group, this behavior changes to group-mode behavior where the MENU button must be pressed and held while either the SEL Up or Down buttons are pressed to access frequencies that are not part of the current tuning group.

Adding/Deleting User Programmable Frequency Group Entries

Note
Each User Programmable Frequency Group (“u” or “v”) has separate contents. It is suggested to review the section titled Frequency Coordination prior to adding frequencies inorder to minimize potential intermodulation problems.

1. Start from the Frequency Window and verify that a lower case “u” or “v” is present next to the transmitter switch settings.
2. While pressing and holding the MENU button press either the SEL Up or Down button to move to one of the 256 available frequencies in the block. Whenever the selection comes to rest on a frequency that is in the current group, the group tuning mode indicator (letter "u" or "v") will give a steady indication. On frequencies that are not in the group, the indicator will blink.
3. To add or remove the displayed frequency from the group, hold down the MENU button while pressing and holding the SEL Up button. The group tuning mode indicator will stop blinking to show that the frequency has been added to the group, or begin blinking to indicate that the frequency has been removed from the group.T

COMPAT

The **COMPAT** setup screen selects the type of transmitter used with the UCR511. The available modes are:

500 - Lectrosonics 500 Series. This is the default setting and should be used if your transmitter supports it. This mode offers the best audio quality.

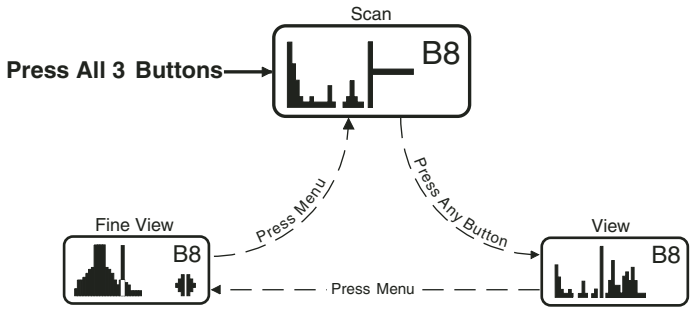
100 - Lectrosonics 110 Series compatibility mode.

300 - Lectrosonics 300 Series compatibility mode.

MODE 3 - Compatible with certain non-Lectrosonics transmitters.

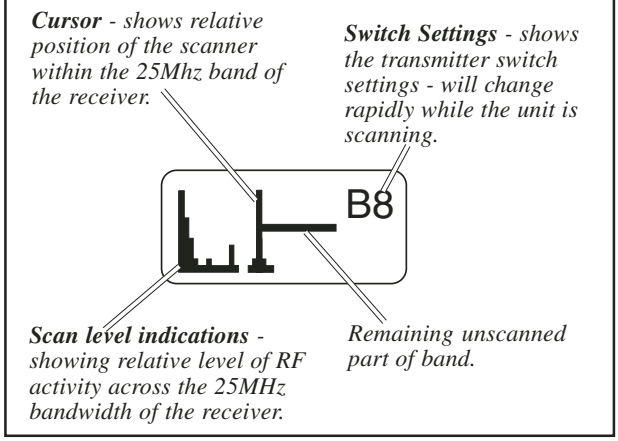
IFB - Compatible with Lectrosonics IFB transmitters.

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



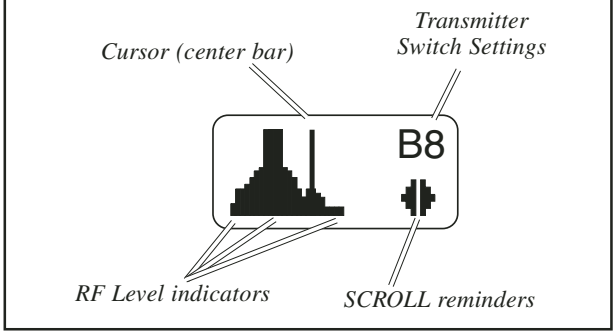
To stop scanning, press the MENU button once. The scanning will stop immediately, and the display will switch to the VIEW window. In this window, each vertical band of the display represents eight frequencies (800 kHz). Pressing the SEL Up or Down buttons will scroll the cursor coarsely across the tuning 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 UCR511 is capable of tuning. The upper right corner shows the transmitter switch settings for the frequency indicated by the cursor. 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 SEL Up or Down buttons.

Fine VIEW WINDOW Elements



Pressing the SEL Up button will make the display scroll left, showing higher frequencies. Pressing the SEL 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 SEL Up, SEL 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.

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 three or four 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.

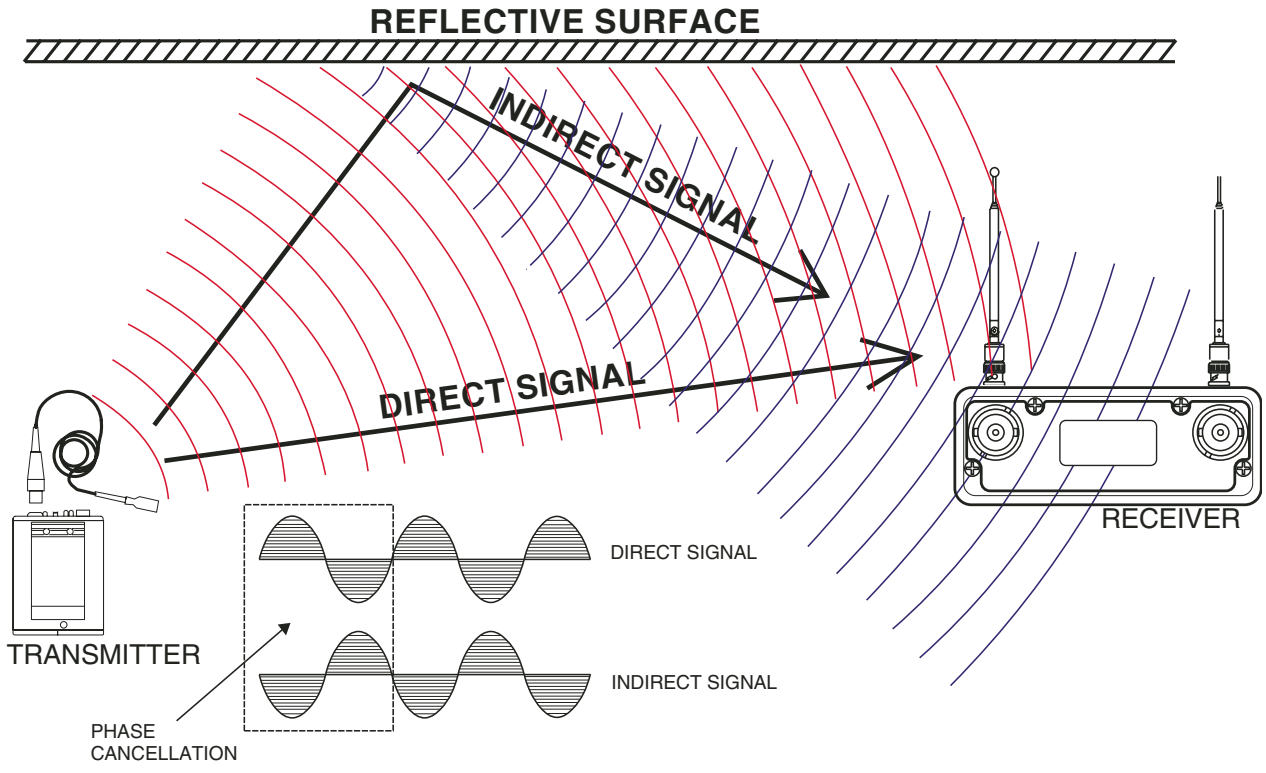
Note

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. A UHF dropout normally sounds like a very brief "hiss" or a "swishing" sound. Moving the transmitter (or the receiver's antennas) even a few inches will change the sound of the dropout, 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's antennas at least three or four feet from their original location. 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 if antennas are attached, or the receiver's antennas 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.



MULTI-PATH DROPOUT

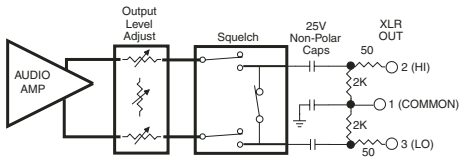
INSTALLATION AND OPERATING INSTRUCTIONS

1. Install a fresh battery or connect an external power source to the UCR511 and attaach the antennas.
2. Unless frequency settings have been previously assigned, scan for an open frequency and set both the receiver and transmitter to that frequency. (See Finding Clear Frequencies.)
3. Connect the audio cable to the Receiver Audio Out XLR jack.
4. Set the Power ON/OFF switch to ON and verify that the LCD panel activates.
5. Adjust the transmitter gain. ***THIS IS PERHAPS THE MOST IMPORTANT STEP IN THE SET UP PROCEDURE.*** Refer to your transmitter manual's 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 indicators on the receiver and transmitter to show full modulation on the loudest peak audio levels. Normal levels should cause the UCR511's audio level icon to fluctuate fully. This will result in the best possible signal to noise ratio for the system.

Note

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 to minimum 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.

6. Adjust the Audio Output according to the type of input on your equipment. Use the LEVEL menu and adjust the level with the SELECT Up and Down buttons The input levels of different cameras, VCRs, and PA equipment vary, which may require that you adjust the AUDIO OUT to 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. The UCR511 audio output is designed to drive any audio input device from microphone level to +10 dBu line level.



UCR411a Simplified Audio Output Circuit

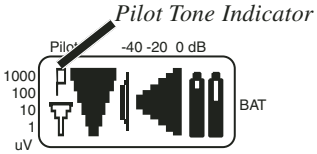
Note

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.

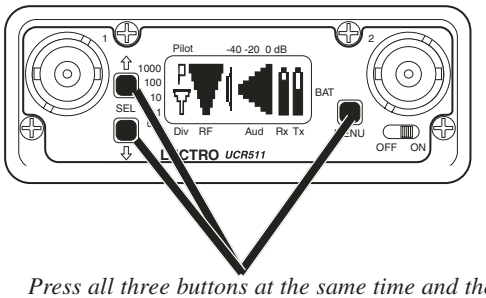
FINDING CLEAR FREQUENCIES

The folllowing procedure will help you identify RF signals in the area and find clear channels for operating the wireless system.

1. Ensure transmitter is turned off. Turn on the receiver and wait a few seconds until the Main Window appears on the LCD

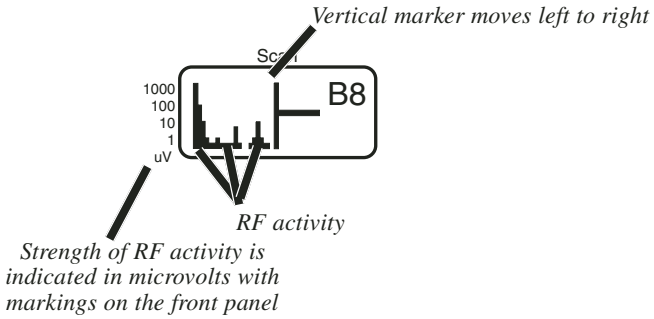


2. Ensure the receiver is not in PILOT TONE BYPASS mode. (A "P" will be blinking in the upper left corner of the Main Window.)



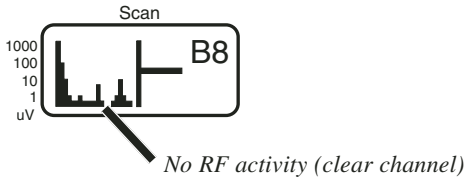
Press all three buttons at the same time and the receiver will start scanning.

3. Simultaneously press the MENU and SELECT Up and Down buttons to enter Scan Mode.
4. View the LCD while the receiver is scanning. The vertical marker will move across the

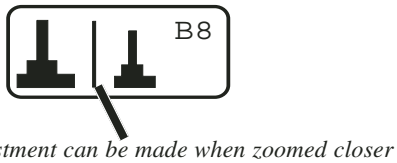


display from left to right. RF activity will be indicated by dark areas in the display.

5. RF signal strength is indicated by markings in microvolts on the front panel to the left of the LCD. Look for clear channels in the spectrum

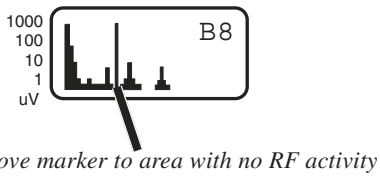


where there is no RF activity. Scanning will repeat and continue until a button is pressed.



6. If necessary, press the MENU button to zoom in for greater detail for fine adjustment.

8. Then press the SEL Up and Down arrows to move the marker to the middle of a clear area



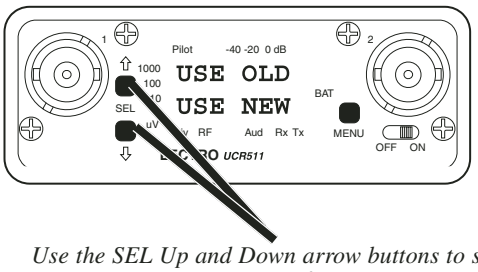
where there is no RF activity. If an area with no RF activity cannot be found anywhere in the spectrum, locate one with the least amount of RF activity.

9. Press all three buttons (SEL Up and Down and MENU) to move to the next screen. Two options will be shown.

   Press the SEL Down arrow button to select the USE NEW option and set the receiver to the new frequency just found in scanning.

   Press the SEL Up arrow button to select USE OLD and return to the frequency that was set before scanning.

LOCKING AND UNLOCKING THE UCR511 FRONT PANEL CONTROLS



Use the SEL Up and Down arrow buttons to select the old or new frequency.

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

To LOCK the UCR511 - Press and hold the MENU button until a bar tracks horizontally across the LCD 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 SEL Up/Down buttons are limited to “view only” and any attempts to change selections will result in a LCD screen displaying the word “LOCKED.” The unit cannot be used for RF scanning when it is set in the LOCKED state.

To UNLOCK the UCR511 - Press and hold the MENU button until a bar tracks horizontally across the screen and the word “UNLOCKED” is displayed on the LCD screen. When the unit is UNLOCKED, all settings can be altered.

The UCR511 can only be LOCKED or UNLOCKED from any of the main windows. (There are four of them.) Also, it cannot be switched between LOCKED and UNLOCKED modes when it is in a scanning mode or from other subordinate screens.

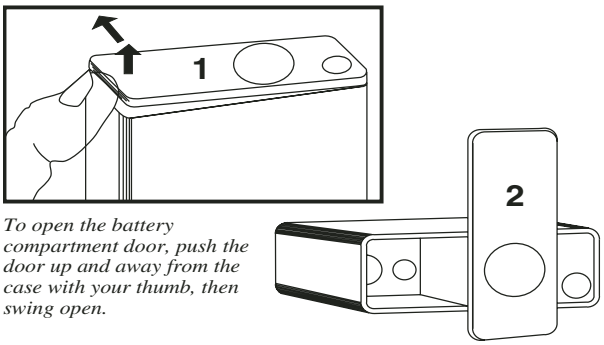
TO REPLACE THE BATTERIES

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.

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.



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

Frequency Coordination

Intermodulation interference is a problem constantly lurking in the background, especially when working in environments were multiple productions are taking place simultaneously in relative close proximity. In these cases, proper frequency coordination is a must. There are basically three methods coordinate frequencies:

Use the Compatible Frequency Chart
Scan for clear channels (See Frequency Scan Mode and Using The Scan Function)
Call Lectrosonics

Compatible Frequency Chart

The Compatible Frequency Chart was designed to assist in minimizing intermodulation problems for multiple channel wireless systems. It does this by identifying potential intermodulation problems and listing compatible frequencies and frequency groups. This chart can be used with all Digital Hybrid Wireless™ receivers.

The Compatible Frequency Chart divides the frequency blocks used in the North American market into Row 1 and Row 2, then further divides each row into two groups of eight frequencies each. These frequency groups are labeled A and B and C and D, and correspond to the factory set frequency groups (Groups A, B, C and D) described in the Tuning Setup Screen. (See Compatible Frequency Chart.)

Understanding and using the Compatible Frequency Chart is not as difficult as it first appears. There are a few basic rules to follow:

Note
Refer to the Compatibility Frequency Chart's Compatible and Incompatible frequency combinations. (Only frequency blocks 21 and 22 are shown for illustrative purposes.)

Rule No. 1

Row 1 and Row 2 live in two different worlds. The frequencies in Row 1 are not compatible with the frequencies in Row 2. If you are forced to use frequencies from Row 1 with frequencies from Row 2, be aware that intermodulation problems may exist.

Rule No. 2

Frequencies within an individual frequency block in the same row are compatible. For example, all 16 frequencies within Row 1, Block 21 are compatible, and all

Compatible Frequency Chart

ROW 1

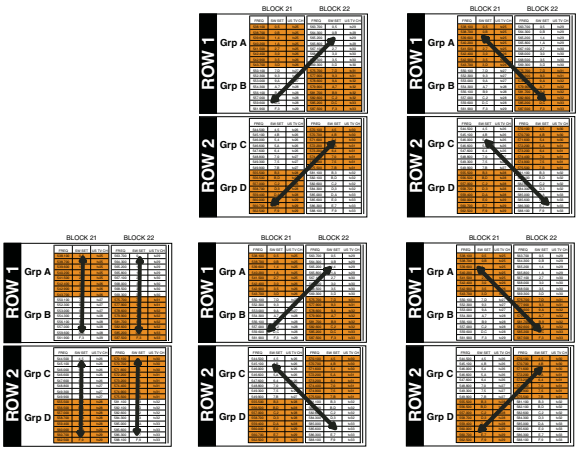
	BLOCK 21			BLOCK 22			BLOCK 23			BLOCK 24		
	FREQ	SW SET	US TV CH	FREQ	SW SET	US TV CH	FREQ	SW SET	US TV CH	FREQ	SW SET	US TV CH
Grp A	538.100	0,5	tv25	563.700	0,5	tv29	589.300	0,5	tv33	614.900	0,5	tv38
	538.700	0,B	tv25	564.300	0,B	tv29	589.900	0,B	tv33	615.500	0,B	tv38
	539.600	1,4	tv25	565.200	1,4	tv29	590.800	1,4	tv34	616.400	1,4	tv38
	540.200	1,A	tv25	565.800	1,A	tv29	591.400	1,A	tv34	617.000	1,A	tv38
	541.500	2,7	tv25	567.100	2,7	tv30	592.700	2,7	tv34	618.300	2,7	tv38
	542.400	3,0	tv26	568.000	3,0	tv30	593.600	3,0	tv34	619.200	3,0	tv38
	542.900	3,5	tv26	568.500	3,5	tv30	594.100	3,5	tv34	619.700	3,5	tv38
	543.700	3,D	tv26	569.300	3,D	tv30	594.900	3,D	tv34	620.500	3,D	tv39
Grp B	550.100	7,D	tv27	575.700	7,D	tv31	601.300	7,D	tv35	626.900	7,D	tv40
	552.300	9,3	tv27	577.900	9,3	tv31	603.500	9,3	tv36	629.100	9,3	tv40
	553.000	9,A	tv27	578.600	9,A	tv32	604.200	9,A	tv36	629.800	9,A	tv40
	554.300	A,7	tv28	579.900	A,7	tv32	605.500	A,7	tv36	631.100	A,7	tv40
	556.100	B,9	tv28	581.700	B,9	tv32	607.300	B,9	tv36	632.900	B,9	tv41
	557.000	C,2	tv28	582.600	C,2	tv32	NOT AVAILABLE			633.800	C,2	tv41
	559.600	D,C	tv28	585.200	D,C	tv33	NOT AVAILABLE			636.400	D,C	tv41
	561.900	F,3	tv29	587.500	F,3	tv33	NOT AVAILABLE			638.700	F,3	tv42

ROW 2

	FREQ	SW SET	US TV CH	FREQ	SW SET	US TV CH	FREQ	SW SET	US TV CH	FREQ	SW SET	US TV CH
Grp C	544.500	4,5	tv26	570.100	4,5	tv30	595.700	4,5	tv34	621.300	4,5	tv39
	545.100	4,B	tv26	570.700	4,B	tv30	596.300	4,B	tv35	621.900	4,B	tv39
	546.000	5,4	tv26	571.600	5,4	tv30	597.200	5,4	tv35	622.800	5,4	tv39
	546.600	5,A	tv26	572.200	5,A	tv31	597.800	5,A	tv35	623.400	5,A	tv39
	547.600	6,4	tv26	573.200	6,4	tv31	598.800	6,4	tv35	624.400	6,4	tv39
	548.800	7,0	tv27	574.400	7,0	tv31	600.000	7,0	tv35	625.600	7,0	tv39
	549.300	7,5	tv27	574.900	7,5	tv31	600.500	7,5	tv35	626.100	7,5	tv40
	549.900	7,B	tv27	575.500	7,B	tv31	601.100	7,B	tv35	626.700	7,B	tv40
Grp D	555.500	B,3	tv28	581.100	B,3	tv32	606.700	B,3	tv36	632.300	B,3	tv41
	556.500	B,D	tv28	582.100	B,D	tv32	607.700	B,D	tv36	633.300	B,D	tv41
	557.000	C,2	tv28	582.600	C,2	tv32	NOT AVAILABLE			633.800	C,2	tv41
	558.700	D,3	tv28	584.300	D,3	tv32	NOT AVAILABLE			635.500	D,3	tv41
	559.400	D,A	tv28	585.000	D,A	tv33	NOT AVAILABLE			636.200	D,A	tv41
	560.000	E,0	tv29	585.600	E,0	tv33	NOT AVAILABLE			636.800	E,0	tv41
	560.700	E,7	tv29	586.300	E,7	tv33	NOT AVAILABLE			637.500	E,7	tv41
	562.500	F,9	tv29	588.100	F,9	tv33	NOT AVAILABLE			639.300	F,9	tv42

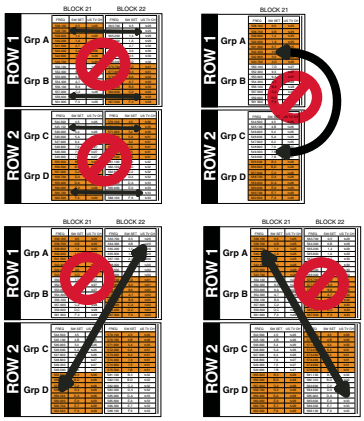
Compatible

The following frequency combinations have no intermodulation problems.



Incompatible

The following frequency combinations have intermodulation problems and should not be used.



Compatible Frequency Chart (cont.)

BLOCK 25

FREQ	SW SET	US TV CH
640.500	0,5	tv42
641.100	0,B	tv42
642.000	1,4	tv42
642.600	1,A	tv42
643.900	2,7	tv42
644.800	3,0	tv43
645.300	3,5	tv43
646.100	3,D	tv43
652.500	7,D	tv44
654.700	9,3	tv44
655.400	9,A	tv44
656.700	A,7	tv45
658.500	B,9	tv45
659.400	C,2	tv45
662.000	D,C	tv45/46
664.300	F,3	tv46

BLOCK 26

FREQ	SW SET	US TV CH
666.100	0,5	tv46
666.700	0,B	tv46
667.600	1,4	tv46
668.200	1,A	tv47
669.500	2,7	tv47
670.400	3,0	tv47
670.900	3,5	tv47
671.700	3,D	tv47
678.100	7,D	tv48
680.300	9,3	tv49
681.000	9,A	tv49
682.300	A,7	tv49
684.100	B,9	tv49
685.000	C,2	tv49
687.600	D,C	tv50
689.900	F,3	tv50

BLOCK 27

FREQ	SW SET	US TV CH
691.700	0,5	tv50
692.300	0,B	tv51
693.200	1,4	tv51
693.800	1,A	tv51
695.100	2,7	tv51
696.000	3,0	tv51
696.500	3,5	tv51
697.300	3,D	tv51
703.700	7,D	tv52
705.900	9,3	tv53
706.600	9,A	tv53
707.900	A,7	tv53
709.700	B,9	tv53
710.600	C,2	tv54
713.200	D,C	tv54
715.500	F,3	tv54

BLOCK 28

FREQ	SW SET	US TV CH
717.300	0,5	tv55
717.900	0,B	tv55
718.800	1,4	tv55
719.400	1,A	tv55
720.700	2,7	tv55
721.600	3,0	tv55
722.100	3,5	tv56
722.900	3,D	tv56
729.300	7,D	tv57
731.500	9,3	tv57
732.200	9,A	tv57
733.500	A,7	tv57
735.300	B,9	tv58
736.200	C,2	tv58
738.800	D,C	tv58
741.100	F,3	tv59

BLOCK 29

FREQ	SW SET	US TV CH
742.900	0,5	tv59
743.500	0,B	tv59
744.400	1,4	tv59
745.000	1,A	tv59
746.300	2,7	tv60
747.200	3,0	tv60
747.700	3,5	tv60
748.500	3,D	tv60
754.900	7,D	tv61
757.100	9,3	tv61
757.800	9,A	tv61
759.100	A,7	tv62
760.900	B,9	tv62
761.800	C,2	tv62
764.400	D,C	tv63
766.700	F,3	tv63

FREQ	SW SET	US TV CH
646.900	4,5	tv43
647.500	4,B	tv43
648.400	5,4	tv43
649.000	5,A	tv43
650.000	6,4	tv43/44
651.200	7,0	tv44
651.700	7,5	tv44
652.300	7,B	tv44
657.900	B,3	tv45
658.900	B,D	tv45
659.400	C,2	tv45
661.100	D,3	tv45
661.800	D,A	tv45
662.400	E,0	tv46
663.100	E,7	tv46
664.900	F,9	tv46

FREQ	SW SET	US TV CH
672.500	4,5	tv47
673.100	4,B	tv47
674.000	5,4	tv47/48
674.600	5,A	tv48
675.600	6,4	tv48
676.800	7,0	tv48
677.300	7,5	tv48
677.900	7,B	tv48
683.500	B,3	tv49
684.500	B,D	tv49
685.000	C,2	tv49
686.700	D,3	tv50
687.400	D,A	tv50
688.000	E,0	tv50
688.700	E,7	tv50
690.500	F,9	tv50

FREQ	SW SET	US TV CH
698.100	4,5	tv52
698.700	4,B	tv52
699.600	5,4	tv52
700.200	5,A	tv52
701.200	6,4	tv52
702.400	7,0	tv52
702.900	7,5	tv52
703.500	7,B	tv52
709.100	B,3	tv53
710.100	B,D	tv54
710.600	C,2	tv54
712.300	D,3	tv54
713.000	D,A	tv54
713.600	E,0	tv54
714.300	E,7	tv54
716.100	F,9	tv55

FREQ	SW SET	US TV CH
723.700	4,5	tv56
724.300	4,B	tv56
725.200	5,4	tv56
725.800	5,A	tv56
726.800	6,4	tv56
728.000	7,0	tv56/57
728.500	7,5	tv57
729.100	7,B	tv57
734.700	B,3	tv58
735.700	B,D	tv58
736.200	C,2	tv58
737.900	D,3	tv58
738.600	D,A	tv58
739.200	E,0	tv58
739.900	E,7	tv58
741.700	F,9	tv59

FREQ	SW SET	US TV CH
749.300	4,5	tv60
749.900	4,B	tv60
750.800	5,4	tv60
751.400	5,A	tv60
752.400	6,4	tv61
753.600	7,0	tv61
754.100	7,5	tv61
754.700	7,B	tv61
760.300	B,3	tv62
761.300	B,D	tv62
761.800	C,2	tv62
763.500	D,3	tv62
764.200	D,A	tv63
764.800	E,0	tv63
765.500	E,7	tv63
767.300	F,9	tv63

frequencies in Row 2 Block 21 are compatible. However, frequencies in Row 1, Block 21 are not compatible with the frequencies in Row 2, Block 21. If possible, it is highly recommeneded to choose frequencies that are in the same row and same group. For example, stick with frequencies in Row 1 Group A, or Row 2 Group D rather than choosing frequencies from Row 1 Groups A and B.

Rule No. 3

Some frequencies in adjacent blocks are compatible and some are not. Refer to the illustration to the left which shows compatible and incompatible frequency relationships.

By following the three rules, it is possible to locate a number of potential clear operating frequencies early in the production that are intermodulation free, then refine the list during system setup.

Using the Scan Function

Refer to the section titled "Frequency Scan Mode" for details on how to use the built-in spectrum scanner. Interference can result from a wide variety of sources including TV station signals and other wireless equipment in use nearby. The RF spectrum analyzer built into the UCR511 scans the frequency block to identify channels with little or no interference. After scanning and finding the needed number of clear channels, one final procedure is necessary to verify the compatibility of the chosen frequencies.

Turn on all transmitters and receivers used for the program and verify there is a strong RF signal for each receiver. Turn each transmitter off one at a time and observe the RF level indicator on the matching receiver. The RF level should disappear or drop to a very low level. If it does not, change frequency on that receiver and transmitter and try it again.

Any time a frequency is changed on any of the systems in use, you must start at the beginning and go through this procedure for all systems. This will test for higher order imtermodulation from all signal sources and avoid interference.

Call Lectrosonics

Lectrosonics uses a proprietary computer program to perform thousands of calculations and identify various interfering signals. Potential problems and trouble areas can be identified in advance, and proposed new frequencies or other solutions can be suggested. This service is offered to authorized Lectrosonics dealers and other customers who are using LECTRO™ or Lectrosonics® wireless microphone and wireless IFB systems.

UCR511 REPLACEMENT PARTS AND ACCESSORIES

Part No.	Description
32251	Velcro mounting strips
CCMINI	Zippered, padded vinyl system pouch
CH12E	AC power supply with US type 2-pin plug on housing, 110 VAC input; 12 VDC, 2.8 A output.
VSR1	Thin velcro loop for power cable strain relief.
A8U	UHF marine phosphor bronze antenna - straight connector, specify block.
A500RA	UHF flexible whip antenna with right angle BNC connector (470 - 608 MHz)
PS70	A/C power supply with US type 2-pin plug on housing, 110 VAC input; 12 VDC, 2.8 A output.
UM500	Belt-pack Digital Hybrid Wireless™ transmitter with over 50 mW power.
UMC200D	Rack-mount multicoupler combining antenna and power distribution for up to four Lectrosonics wireless microphone receivers. Includes built-in power supply.
SIXPACK	Portable multicoupler for field production combining antenna and power distribution for up to six Lectrosonics wireless microphone receivers. Includes built-in rechargeable battery pack for added mobility.
SNA600	Collapsible dipole antenna adjustable from 550 MHz to 800 MHz. Ideal for situations where a full 360 degree receiving pattern is required as opposed to a directional pattern.
ALP600	“Shark fin” Log Periodic Dipole Array (LPDA) provides useful directional pattern over 500 to 800 MHz range. Ideal for portable applications including temporary setups for field production. Not intended to be left outdoors permanently.
ALP700A	LPDA (Log Periodic Dipole Array) provides useful directional pattern over a broad frequency bandwidth (500 to 800 MHz).
ARG15-ARG100	Coaxial cables for remote antennas are available from Lectrosonics in a variety of lengths - from 2 to 100 ft. Cables include Velcro tie wraps.

TROUBLESHOOTING

Symptom	Possible Causes
INITIAL POWER ON	
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
Version message shows DSP or COM.	This indicates an internal error. Please contact the factory for assistance. Display indicates CHECK FREQ. This is a warning that a strong signal is present but it's far enough away from the center of the channel that the audio is likely to be distorted. Try relocating to unused frequencies. If this doesn't remove the warning mesasge, the transmitter or receiver may need repair.
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	Pilot tone detection can take several seconds. 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. Receiver compatibility mode does not match the trasmitter in use. (See Menu Selections from Main Window, COMPAT.)
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). Pilot indicator not present but audio is being received Receiver is set to a compatibility mode that doesn't use Pilot Tone. Check that receiver compatibility mode matches the transmitter in use as any sufficiently strong signal can unsquelch the receiver in this mode, compatible or not.

NOTE:

In the 500 Series and 300 Series compatibility modes, 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).

In the other compatibility modes, no pilot tone is used and the "P" is never displayed. Audio is present whenever the receiver detects a sufficiently strong signal.

Regardless of the compatibility mode, activating the "pilot bypass" function causes a lowercase "b" to appear in the pilot indicator position on the main window and forcibly unsquelches the audio.

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 or receiver. 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 UCR511 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 UCR511 and lowering the input gain on the device the UCR511 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 UCR511 is feeding. Lower the output level of the UCR511.
Bad frequency response or generally poor audio quality.	Ensure the receiver is set to the compatibility mode that matches the transmitter in use.

SPECIFICATIONS AND FEATURES

Operating Frequencies (MHz):

Block 525: 525.000 - 550.500

Block 21: 537.600 - 563.100
Block 22: 563.200 - 588.700
Block 23: 588.800 - 614.300

Block 24: 614.400 - 639.900
Block 25: 640.000 - 665.500
Block 26: 665.600 - 691.100
Block 27: 691.200 - 716.700
Block 28: 716.800 - 742.300
Block 29: 742.400 - 767.900
Block 30: 768.000 - 793.500
Block 31: 793.600 - 805.600
Block 32: 819.200 - 844.700
Block 31: 844.800 - 862.000

Frequency Adj. Range: 25.5 MHz in 100kHz steps

Receiver Type: Triple conversion, superheterodyne, 244 MHz, 10.7 MHz and 300 kHz

Frequency Stability: ±0.001 %

Front end bandwidth: ±5.5 MHz @ -3 dB

Sensitivity

- **20 dB Sinad:** 0.9 uV (-108 dBm), A weighted
- **60 dB Quieting:** 1.12 uV (-105 dBm), A weighted

Squelch quieting: Greater than 100 dB

AM rejection: Greater than 60 dB, 2 uV to 1 Volt (Undetectable after processing)

Modulation acceptance: 60 kHz

Image & spurious rejection: 85 dB

Third order intercept: +8 dBm

Diversity method: Phased antenna combining SmartDiversity™

FM Detector: Digital Pulse Counting Detector operating at 300 kHz

Antenna inputs: Dual BNC female, 50 Ohm impedance

Audio outputs

- **Rear Panel XLR:** Adjustable from -50 dBu to +5 dBu in 1 dB steps. Calibrated into a typical 10 k Ohm balanced load. Can drive 600 Ohm load.

Front Panel Controls and Indicators:

- **LCD control panel**
  - **Main window:** Pilot tone; antenna phase, receiver battery level; transmitter battery status; audio level, RF level
  - **Freq. window:** Frequency, TV channel Transmitter switch setting
  - **Audio output level adjustment:** -50 dBu to +5 dBu
  - **Batt. level tracking:** Receiver and transmitter (9 V batt.) in 1/10th volt steps, accuracy +/- 0.2 V.

    Transmitter (AA battery) x.xxV format, accuracy +/- 0.05 V.

    Timer option available when transmitter battery is set to NiMH.
  - **Scanning mode:** Coarse and fine modes for RF spectrum site scanning
  - **Audio test tone:** 1 kHz, -50 dBu to +5 dBu output, less than 1% THD
  - **Transmitter battery type selection:** 9 V alkaline, 9V lithium, AA alkaline, AA lithium, NiMH
  - **Phase invert:** Audio output phase normal or inverted
  - **SmartNR (noise reduction):** OFF, NORMAL, FULL modes *(available in 500 Series mode only)*

Audio Performance (overall system):

(These specs apply to 500 Series mode only.)

Frequency Response: 32 Hz to 20 kHz (+/- 1dB)

THD: 0.2% (typical)

SNR at receiver output (dB):

SmartNR	No Limiting	W/ Limiting
OFF	102.0	106.5
NORMAL	105.0	109.5
FULL	106.0	110.5

(Note: the dual envelope "soft" limiter provides exceptionally good handling of transients using variable attack and release time constants. The gradual onset of limiting in the design begins below full modulation, which reduces the measured figure for *SNR without limiting* by 4.5 dB)

Input Dynamic Range: 125 dB (with full Tx limiting)

Rear Panel Controls and features: XLR audio output jack; External DC input; Battery compartment access

Power Options:

- **Ext DC:** Minimum 10 Volts to maximum 18 VDC; 1.6 W, 180 mA at 12 VDC
- **Int Batt:** 9 Volt alkaline or lithium (165 mA @ 9 V, 240 mA @ 6 V)

Battery Life:

- **9V alkaline** 6 to 8 hours continuous, up to 12 hours intermittent
- **9V lithium** Up to 20 hours (continuous and intermittent usage are the same)

Weight: 14 oz. with batteries

Dimensions: 3.23" wide x 1.25" high x 4.64" deep

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**.

This product meets the CE Compliance Standards - ETS 300 489; 2002-08, I ETS 300 422; August 2002 and ENG 0950-1; 2001. A copy of the Declaration of Conformity may be requested from your dealer or by contacting the factory directly:

Lectrosonics, Inc.
Marketing Department
581 Laser Rd. NE, Rio Rancho, NM 87124 USA
tel: 505-892-4501 fax: 505-892-6243 e-mail: marketing@lectrosonics.com

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 liablility 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.

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October 22, 2004