INSTRUCTION MANUAL

LR
Compact Wireless Receiver

Quick Start Summary

1) Install receiver batteries (p.8).
2) Select frequency step size in the receiver (p.12).
3) Select the compatibility mode in the receiver (p.12).
4) Find a clear operating frequency (p.12,13).
5) Set up transmitter to match receiver (p.14).
6) Adjust transmitter input gain (p.14).
7) Adjust receiver audio output level for the connected device (p.15).

Digital Hybrid Wireless®

US Patent 7,225,135

Fill in for your records:

Serial Number:

Purchase Date:

LECTROSONICS®
Rio Rancho, NM, USA
www.lectrosonics.com

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FCC Notice

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. The equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

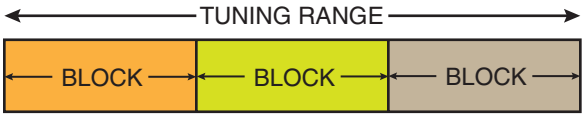
- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

Changes or modifications to this equipment not expressly approved by Lectrosonics, Inc. could void the user's authority to operate it.

Introduction

Three Block Tuning Range

The LR receiver tunes across a range of over 76 MHz. This tuning range covers three standard Lectrosonics frequency blocks. See page 9 for more information.



Four tuning ranges are available covering standard blocks as follows:

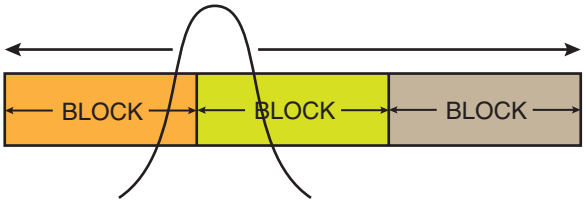
Range	Blocks Covered
A1	470, 19, 20
B1	21, 22 23
C1	24, 25, 26
D1	27, 28, 29

To simplify backward compatibility with earlier Digital Hybrid Wireless® equipment, block numbers are presented along with frequencies in LCD screens.

RF Front-End with Tracking Filter

A wide tuning range is helpful in finding clear frequencies for operation, however, it also allows a greater range of interfering frequencies to enter the receiver. The UHF frequency band, where almost all wireless microphone systems operate, is heavily populated by high power TV transmissions. The TV signals are immensely more powerful than a wireless microphone transmitter signal and will enter the receiver even when they are on significantly different frequencies than the wireless system. This powerful energy appears as noise to the receiver, and has the same effect as the noise that occurs with extreme operating range of the wireless system (noise bursts and dropouts). To alleviate this interference, front-end filters are needed in the receiver to suppress RF energy below and above the operating frequency.

The LR receiver employs a variable frequency, tracking filter in the front-end section (the first circuit stage following the antenna). As the operating frequency is changed, the filters re-tune to stay centered over the selected carrier frequency.



In the front-end circuitry, a tuned filter is followed by an amplifier and then another filter to provide the selectivity needed to suppress interference, yet provide a wide tuning range and retain the sensitivity needed for extended operating range.

IF Amplifiers and SAW Filters

The first IF stage employs two SAW (surface acoustic wave) filters. The use of two filters significantly increases the depth of filtering while preserving sharp skirts, constant group delay, and wide bandwidth. Though expensive, this special type of filter allows primary filtering as early as possible, at as high a frequency as possible, before high gain is applied, to deliver maximum image rejection. Since these filters are made of quartz, they are very temperature stable.

The signal is converted to 243.950 MHz in the first mixer stage, then passed through two SAW filters. After the SAW filter, the IF signal is converted to 250 kHz and then the majority of the gain is applied. Although these IF frequencies are unconventional in a wide deviation (±75 kHz) system, the design provides excellent image rejection.

Digital Pulse Counting Detector

Followign the IF section, the receiver uses an elegantly simple, yet highly effective digital pulse counting detector to demodulate the FM signal to generate the audio, rather than a conventional quadrature detector. This unusual design eliminates thermal drift, improves AM rejection, and provides very low audio distortion. The output of the detector is fed to the microprocessor where a window detector is employed as part of the squelch system.

DSP-Based Pilot Tone

The Digital Hybrid system design uses a DSP generated ultrasonic pilot tone to reliably mute the audio when no RF carrier is present. The pilot tone must be present in conjunction with a usable RF signal before the audio output will be enabled. 256 pilot tone frequencies are used across each 25.6 MHz block within the tuning range of the system. This alleviates erroneous squelch activity in multichannel systems where a pilot tone signal can appear in the wrong receiver via IM (intermodulation).

Pilot tones are also provided for legacy equipment and some models from other manufacturers.

Note: This description applies only to the Digital Hybrid mode. In Lectrosonics 200 Series, IFB and Mode 6 compatibility, only one pilot tone frequency is used on all frequencies, emulating the original crystal-based system. In other compatibility modes, no pilot tone is used.

SmartSquelch™

A DSP-based algorithm named SmartSquelch™ optimizes the receiver performance in very weak signal conditions. The RF level and supersonic noise in the audio are continuously monitored to determine the appropriate noise reduction needed and the point at which squelch (complete muting of the audio) is necessary.

As the RF level decreases and supersonic noise in the signal begins to increase, a variable knee, high frequency roll-off filter is applied to suppress high frequency noise. The filtering action moves in and out smoothly to avoid abrupt changes that could be audible. When the RF signal becomes so weak that the receiver can no longer deliver usable audio, the squelch will activate.

SmartDiversity™

Microprocessor controlled antenna phase combining is used for diversity reception. The firmware analyzes RF level, the rate of change of RF level and the audio content to determine the optimum timing for phase switching and the optimum antenna phase. The system also employs "opportunistic switching" to analyze and then latch the phase in the best position during brief squelch activity.

Turn On and Turn Off Delays

A brief delay is applied when the receiver is powered up or down to prevent audible noise such as a thump, pop, click or other transient noise.

Test Tone

To assist in matching the audio levels of equipment connected to the receiver, a 1 kHz audio test tone generator is provided, with an output level adjustable from -50 to +5 dBu in 1 dB increments.

The tone simulates the audio output with a steady signal at full modulation, making it easy to adjust the level to precisely match the optimal level for the connected device and maximize the signal to noise ratio of the system.

LCD Display

Setup and monitoring is done through the LCD display on the control panel. The LCD image can be inverted as desired for personal preference or maximum visibility in direct sunlight. The built-in backlight for viewing in dimly lit environments can be set to remain on for 30 seconds, 5 minutes or to remain on constantly.

Smart Noise Reduction (SmartNR™)

Note: The SmartNR setting is user selectable only in the Digital Hybrid compatibility 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.

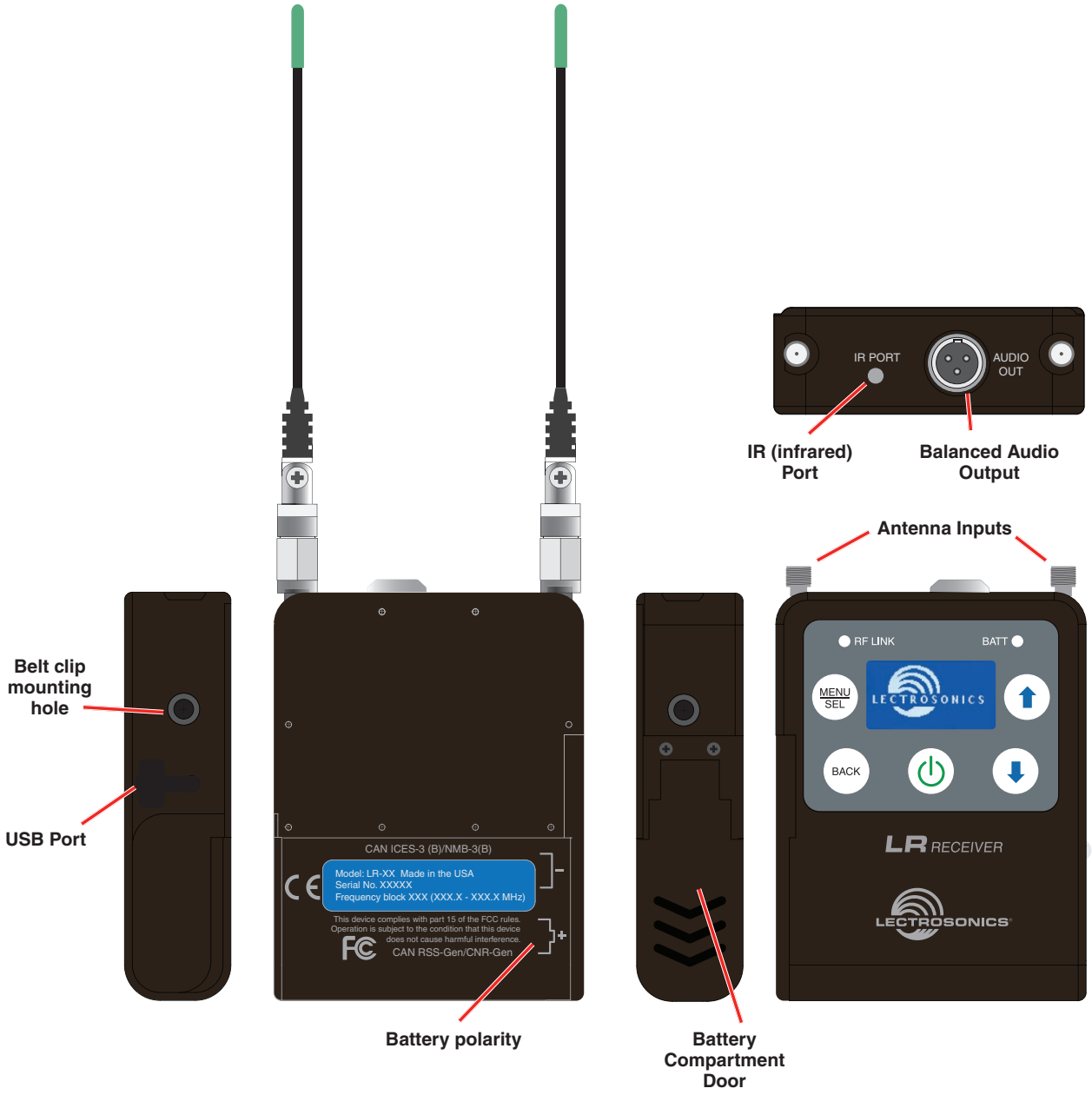
The wide dynamic range of digital hybrid technology, combined with flat response to 20 kHz, makes it possible to hear the -120 dBV noise floor in the mic preamp, or the (usually) greater noise from the microphone itself. To put this in perspective, the noise generated by the recommended 4k bias resistor of many electret lavaliere mics is –119 dBV and the noise level of the microphone's electronics is even higher. In order to reduce this noise the receiver is equipped with a "smart" noise reduction algorithm called SmartNR®, which removes hiss without sacrificing audio high frequency response.

SmartNR® works by attenuating only those portions of the audio signal that fit a statistical profile for randomness or "electronic hiss." Because it is much more than a sophisticated variable low pass filter, the transparency of the audio signal is preserved. Desired high frequency signals having some coherence are not affected, such as speech sibilance and tones.

The Smart Noise Reduction algorithm has three modes, selectable from a user setup screen. The optimal setting for each application is subjective and is normally selected while simply listening.

- **OFF** defeats noise reduction 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 output.
- **NORMAL** applies enough noise reduction to remove most of the hiss from the microphone preamp and some of the hiss from lavaliere microphones. The noise reduction benefit is significant in this position, yet the degree of transparency maintained is exceptional.
- **FULL** applies enough noise reduction to remove most of the hiss from nearly any signal source of reasonable quality and some high frequency environmental noise, assuming the input gain is set properly at the transmitter.

Panels and Features



IR (infrared) Port

Settings for compatibility mode and frequency can be transferred from the receiver via this port to an IR enabled transmitter to simplify setup. The receiver is used to scan for a clear frequency, and the new frequency can be sent to the transmitter via the IR ports.

Balanced Audio Output

Balanced or unbalanced audio from mic to line level is provided on the TA3 output jack; adjustable in 1 dB steps from -50 dBu to +5 dBu.

Antenna Inputs

Two standard 50 ohm SMA connectors can be used with whip antennas or coaxial cable connected to remote antennas.

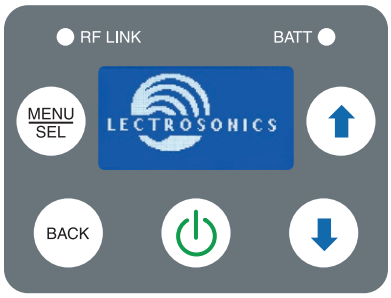
Battery Compartment

Two AA batteries are installed as marked on the rear panel of the receiver. The battery door is hinged and remains attached to the housing.

USB Port

Firmware updates are made easy with the USB port on the side panel.

Keypad and LCD Interface



RF LINK LED
Glows blue when a valid RF signal is being received.

BATT LED
Glows green when the batteries are good. As the batteries are drained, the LED will turn to a steady red at a mid-point during their life, then begin to blink red when only a few minutes of operation remain.

MENU/SEL Button
Pressing this button enters the menu and selects menu items to enter the setup screens.

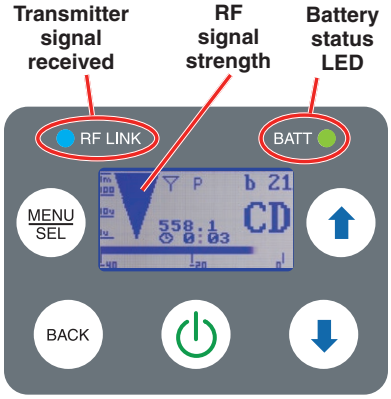
BACK Button
Pressing this button returns to the previous menu or screen.

Power Button
Turns the unit off and on and enters the power menu.

Arrow Buttons
Used to navigate the menus.

Battery Status and RF Link LED Indicators

Alkaline, lithium or rechargeable batteries can be used to power the receiver. For accurate battery status indications, select the type of batteries you will be using in the menu.



RF LINK LED
When a valid RF signal from a transmitter is received, this LED will light up blue. Depending upon the selected compatibility mode, a pilot tone may also be required to light up the LED and open the squelch on the receiver. If the necessary pilot tone is not present, but the RF signal is on the correct frequency, the RF level indicator on the LCD will display a signal presence, but the RF LINK LED will not light up.

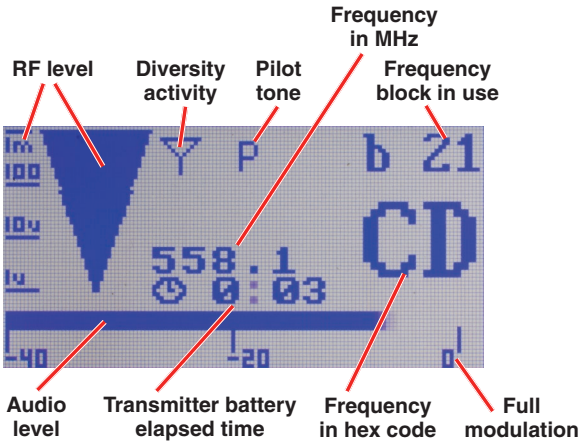
BATT LED
When the battery status LED on the keypad glows green the batteries are good. The color changes to red at a midpoint during the runtime. When the LED begins to ***blink*** red, only a few minutes remain.

The exact point at which the LED turns red will vary with battery brand and condition, temperature and power consumption. The LED is intended to simply catch your attention, not to be an exact indicator of remaining time.

A weak battery will sometimes cause the LED to glow green immediately after the transmitter is turned on, but it will soon discharge to the point where the LED will turn red or the unit will turn off completely.

Rechargeable batteries give little or no warning when they are depleted. If you wish to use these batteries in the receiver, you will need to manually keep track of the operating time to prevent interruptions caused by dead batteries.

LCD Main Window



RF level
The triangle graphic corresponds to the scale on the left side of the display. The scale indicates the incoming signal strength in microvolts, from 1 uV at the bottom to 1,000 uV (1 millivolt) at the top.

Diversity activity
This icon flips upside down and back as the SmartDiversity antenna phase combining circuitry operates.

Pilot tone
This icon will appear in compatibility modes where a supersonic pilot tone is used in squelch control. The icon will blink if a pilot is expected but not present on the incoming signal.

Frequency in MHz
The example here shows the frequency expressed in MHz (megahertz) when the StepSize is set to 100 kHz. When the StepSize is set to 25 kHz, the display will include three numerals to the right of the decimal point.

Frequency in hex code
The characters (**CD** in the above example) indicate the frequency expressed with hexadecimal numerals to simplify backward compatibility with older transmitters that use two rotary switches to set the operating frequency. See **About Frequency Blocks** on the next page for more information.

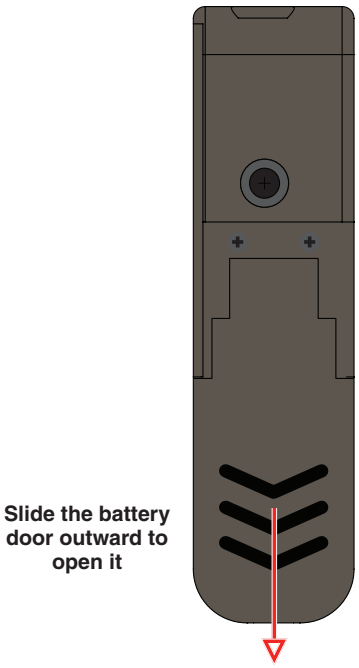
Frequency block in use
The tuning range of the receiver covers three standard frequency blocks. The hex code numbers are repeated in each block, so the block number must be associated with the hex code number to define a frequency.

Transmitter battery elapsed time
A timer is included to monitor the runtime of the transmitter, which is especially useful when using rechargeable batteries. The timer runs whenever a valid signal is being received from the transmitter, and stops when the signal is no longer being received. The display shows the accumulated runtime in hours and minutes.

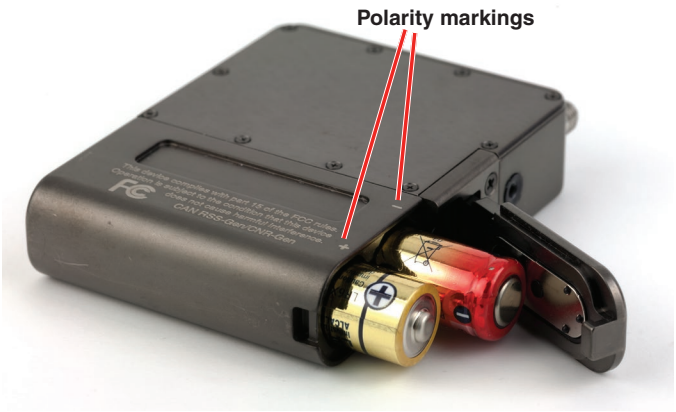
Audio level
This bar graph indicates the level of the audio entering the transmitter. The **"0"** at the right side of the graph indicates full modulation and the onset of limiting.

Installing Batteries

Power is provided by two AA batteries. Alkaline, lithium or NiMH types can be used. The batteries are connected in series by a plate in the battery door.

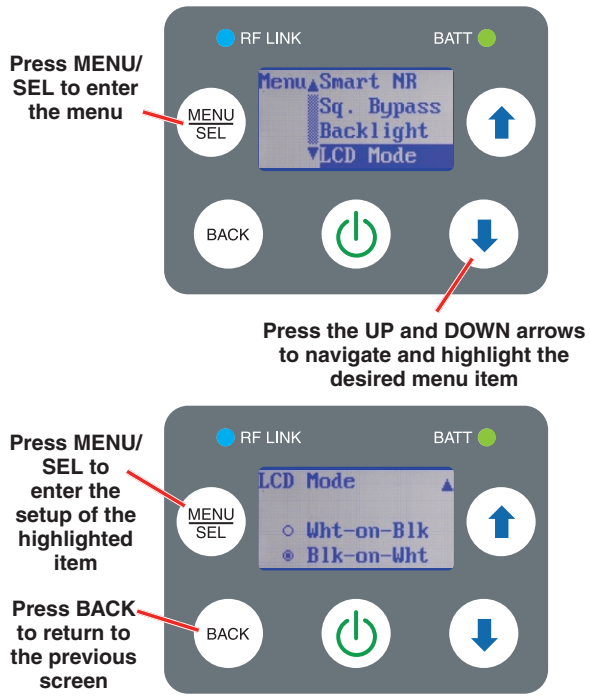


Polarity is marked on the rear panel.



Navigating the Menus

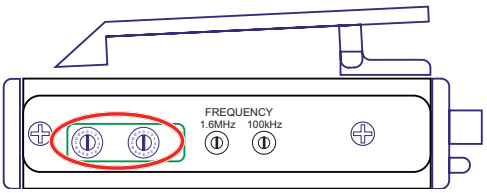
Menu setup items are arranged in a vertical list on the LCD. Press MENU/SEL to enter the menu, then navigate with the UP and DOWN arrows to highlight the desired setup item. Press MENU/SEL to enter the setup screen for that item. Refer to the menu map on the following page.



About Frequency Blocks

A 25.6 MHz band of frequencies, referred to as a **Block**, came about with the design of the first frequency tunable Lectrosonics wireless products. These products provided two 16-position rotary switches to select frequencies as shown in the illustration below. A logical method of identifying the switch positions was using 16 character hexadecimal numbering. This naming and numbering convention is still used today.

The 16 switch positions are numbered **0** (zero) through **F**, presented in a two-character designation such as B8, 5C, AD, 74, etc. The first character indicates the position of the left hand switch and the second character indicates the position of the right hand switch. This designator is commonly called a “hex code.”



On older transmitter models, the left hand switch makes steps in 1.6 MHz increments, the right hand switch in 100 kHz increments.

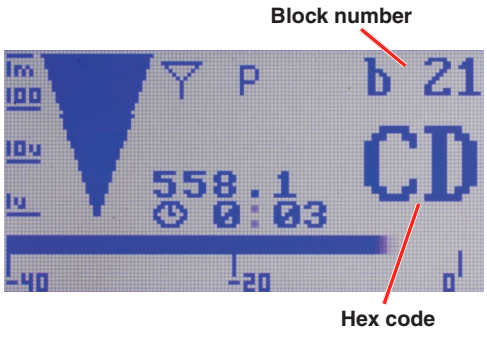
Each block spans a 25.6 MHz band. A simple formula is used to name the blocks according to the lowest frequency in each one. For example, the block starting at 512 MHz is named Block 20, since 25.6 times 20 equals 512.

As the available RF spectrum has changed, special blocks have been created to cover different bands than the simple formula described above. Block 470, for example, is named according to the lower end of the frequency range, expressed in MHz, rather than the formula described above.

The L-Series wireless products tune across a 3-block range, and can tune in either 100 kHz or 25 kHz steps, as shown in the table below. Letter prefixes and a numeral designate the tuning range of a transmitter and receiver. Special subsets of each tuning range may become necessary, and if so, will have names such as A2, A3, etc.

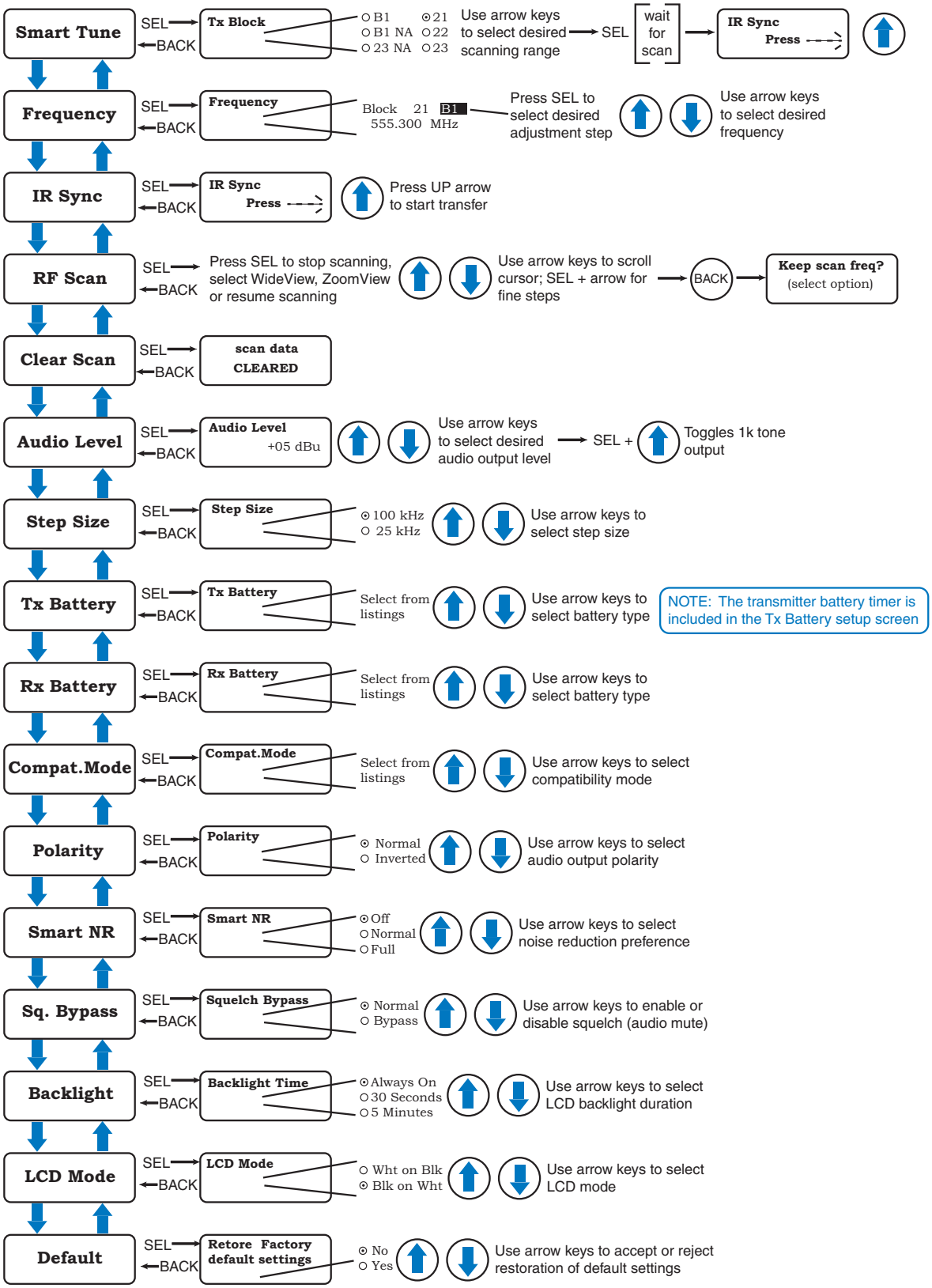
Range	Blocks covered	Freq. (MHz)
A1	470 thru 20	470.1 - 537.5
B1	21 thru 23	537.6 - 614.3
C1	24 thru 26	614.4 - 691.1
D1	27 thru 29	691.2 - 767.9

The hex code is repeated in each 25.6 MHz block, so it will appear up to 3 times across one tuning range. For this reason, the block that a selected frequency falls within is in the upper right corner of the LCD, just above the hex code.



LCD Menu Tree

The menus presented on the LCD are arranged in a straightforward manner, with those that are likely to be used more often located at the top of the tree.



Menu Item Descriptions

Smart Tune

An automatic scanning function that identifies a usable frequency and sets the receiver on it. After the scan is complete, an option will appear to transfer the settings to an IR enabled transmitter. The receiver will remain set on the newly discovered frequency whether or not the IR transfer option was used.

Frequency

Allows manual selection of the operating frequency.

IR Sync

Transfers frequency, step size and compatibility mode from the receiver to the associated transmitter.

RF Scan

Launches the manual spectrum scanning function.

Clear Scan

Erases scan results from memory.

Audio Level

Adjusts the audio output level of the receiver.

Step Size

Selects 100 kHz or 25 kHz steps in the frequency adjustments.

Tx Battery

Selects the type of battery being used in the associated transmitter for accurate battery status monitoring. The transmitter battery timer option is included in this setup screen.

Rx Battery

Selects the type of battery being used in the receiver for accurate battery status monitoring.

Compat. Mode

Selects the compatibility mode for use with a wide variety of Lectrosonics and other brands of transmitters.

Polarity

Selects the audio polarity (phase) of the receiver output to match other components and different microphone capsule wiring.

Smart NR

Selects the level of noise reduction applied to the audio signal.

Sq. Bypass

Defeats the audio muting (squelch) to allow audio output from the receiver regardless of the presence or lack of a matching transmitter. Used for diagnostic purposes.

Backlight

Selects the length of time the backlight on the LCD remains turned on.

LCD Mode

Selects the text/background appearance of the LCD.

Default

Returns all settings to the factory defaults:

Menu Item	Setting
Frequency	8,0 (middle of lowest frequency block)
Audio Level	0 dBu
Compat.Mode	NA Dig. Hybrid
Smart NR	Normal
Polarity	Normal (not inverted)
Step Size	100 kHz
LCD Mode	White characters on dark background
Tx Battery	AA alkaline
Rx Battery	Alkaline
Battery Timer	Reset to 0
Sq. Bypass	Normal (squelch operational)
Tone output	Off (in Audio Level setup screen)
Backlight	Always on
Keypad status	Not locked

The Power Menu

Pressing the power ⏻ button opens a menu with several options. Use the UP and DOWN arrows to select the option and press MENU/SEL to select the function or open a setup screen.

Resume
Returns to the previous screen and settings.

LockUnlock
Opens a setup screen with options to Lock or Unlock the buttons.

About
Displays the splash screen shown at bootup, which includes the firmware version.

Power Off
Turns the power off.

System Setup Procedures

Summary of Steps

1) Install receiver batteries and select the battery type in the setup screen.
2) Select frequency step size in the receiver.
3) Select the compatibility mode in the receiver.
4) Find a clear operating frequency with one of two different methods (use one or the other).
   a) Using Smart Tune™
   b) Manually
5) Set up transmitter to matching frequency and compatibility mode.
6) Adjust transmitter input gain.
7) Adjust receiver audio output level to match recorder, camera, mixer, etc.

1) Install Receiver Batteries

Install the batteries according to the diagram marked on the back of the housing and select the battery type in the menu. Check the BATT LED on the control panel to verify adequate power is present - the LED should glow green.

2) Select Frequency Step Size

Navigate to **Step Size** in the LCD menu and select 100 kHz or 25 kHz as needed to match the associated transmitter.

3) Select Receiver Compatibility Mode

Navigate to **Compat.Mode** on the menu and press MENU/SEL to enter the setup screen. The optional modes will appear one at a time. Use the UP and DOWN arrow buttons to scroll through the list. When the desired mode appears in the screen, press MENU/SEL or BACK to select the mode and return to the previous menu. Press BACK to return to the Main Window.

Transmitter Models	LCD menu item
US Digital Hybrid Wireless®	NA Dig. Hybrid
Mode 3*	Mode 3
200 Series	200 Series
100 Series	100 Series
Euro Digital Hybrid Wireless®	EU Dig. Hybrid
300 Series:	300 Series
Mode 7*	Mode 7
Mode 6*	Mode 6
IFB Series	IFB

NA Dig. Hybrid is the best mode to use when both transmitter and receiver are North American Digital Hybrid Wireless models (not Euro/E01 variants).

Mode 3 is a special compatibility mode for use with another brand of wireless. Contact the factory for details.

200 Series works with legacy Lectrosonics models such as all UM200, UH200 and UT200 Series transmitters.

100 Series works with Lectrosonics UM100 transmitters.

EU Dig. Hybrid works with Lectrosonics European Digital Hybrid transmitters with model numbers that end in "/E01." For example, the SMDB/E01 transmitter is in this group.

300 Series works with legacy Lectrosonics transmitters that were sold in Europe, such as the UM300B and UT300.

Mode 7 is a special compatibility mode for use with another brand of wireless. Contact the factory for details.

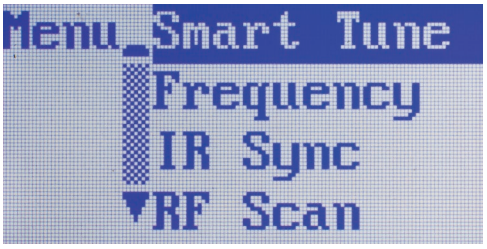
Mode 6 is a special compatibility mode for use with another brand of wireless. Contact the factory for details.

IFB works with Lectrosonics models such legacy analog models bearing "IFB" in the model number, or Digital Hybrid Wireless models that offer the IFB compatibility mode.

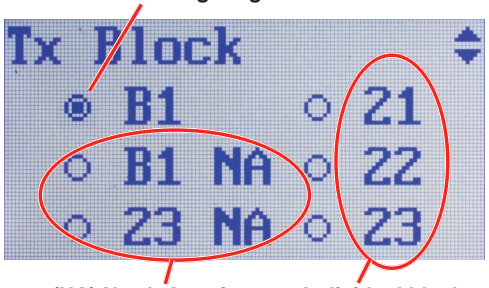
4a) Find a Clear Frequency with Smart Tune™

Optimum range will be realized if the system is set to a frequency where few or no other RF signals are present (a "clear" frequency). The receiver can select a clear frequency automatically with Smart Tune™.

Navigate to **Smart Tune** in the LCD menu and press MENU/SEL to start the process. Select the desired range to be scanned, then press MENU/SEL to start the scan.



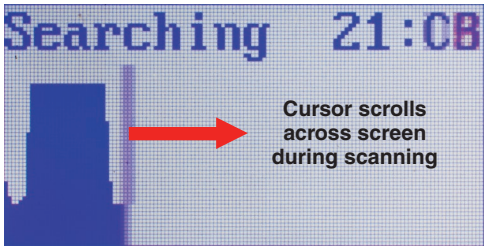
Entire tuning range



(NA) North American versions

Individual blocks

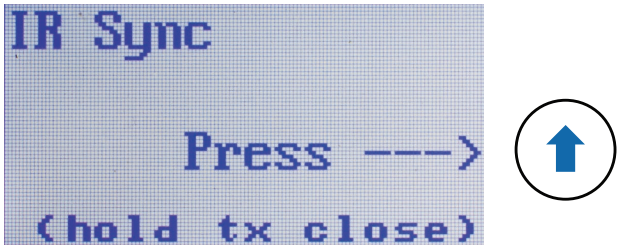
NOTE: "NA" next to the block numbers indicates the North American version which excludes the radio astronomy band from 608 to 614 MHz.



When the scan is complete a screen will appear briefly to display the frequency chosen by Smart Tune, and then it will change to **IR Sync**. If you are using a Lectrosonics transmitter that has an IR port, the settings can be transferred from the receiver to the transmitter in a few seconds with a single button.

As shown below, **IR Sync** will prompt you to place the receiver and transmitter close to one another and press the UP arrow button. Hold the units within two feet or so apart with the IR ports facing each other, then press the button. The transmitter LCD will display a message confirming the receipt of the settings.

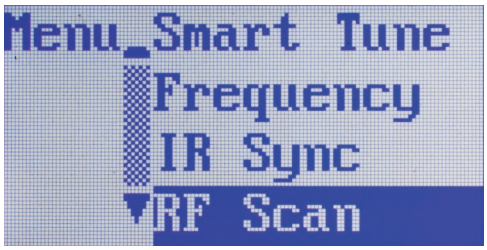
NOTE: IR sync transfers the settings for frequency, step size and compatibility mode.

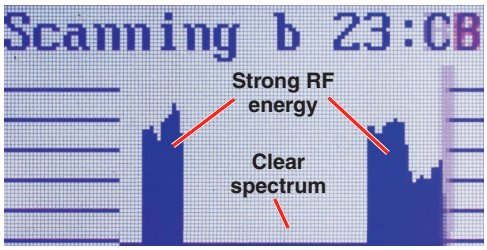


If you are not using a Lectrosonics transmitter with an IR port, simply return to the Main Window and observe the frequency that was chosen by Smart Tune. Make sure the compatibility mode selected in the receiver is correct for the transmitter in use. Then set the transmitter on the frequency chosen by Smart Tune.

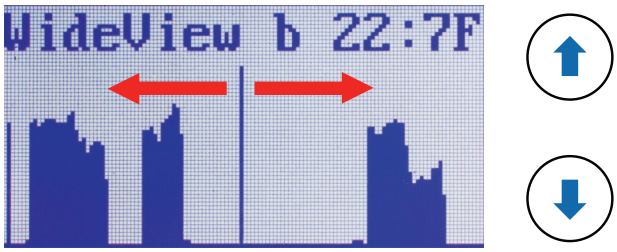
4b) Find a Clear Frequency Manually

Navigate to **RF Scan** on the menu and press MENU/SEL to start the scanning. The LCD will display a marker that travels across the screen as a graphical image of the RF energy appears. The marker will wrap back to the beginning and continue to repeat.





Press the MENU/SEL button to pause the scan. Use the UP and DOWN buttons to scroll the marker through the graphical image. Press MENU/SEL to increase the resolution while scrolling.

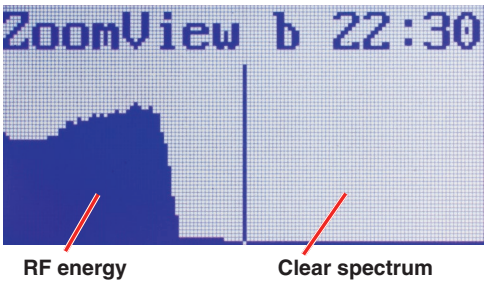


Use arrow buttons to scroll marker

MENU SEL

Press MENU/SEL to increase the resolution in scrolling.

Press MENU/SEL to zoom in on the image. Scroll using the buttons as described above.



After scrolling the marker to a spot in the clear spectrum in the display, press BACK to open a menu with three options.

Use the arrow keys to select the option, then press MENU/SEL to store the setting and return to the Main Window.

- **Keep** stores the new frequency and returns to the Main Window.
- **Keep + IRSync** stores the frequency, then moves to the IR Sync screen. Copy the frequency to the transmitter and then press BACK to return to the Main Window.
- **Revert** discards the new frequency and returns to the Main Window.
- Press BACK to return to scanning

5) Set Up Transmitter to Matching Frequency and Compatibility Mode

If you have not already set the frequency on the transmitter in the previous procedures, use IR Sync or complete the settings manually.

Lectrosonics transmitters with IR Sync:
On the LR receiver, navigate to **IR Sync** on the menu and press the MENU/SEL button. Hold the transmitter and receiver fairly close to each other (within two feet or so) and position them so the IR ports are facing one another. Press the UP arrow on the receiver to initiate the transfer of settings. The receiver will display a message when the settings have been received.

Other transmitters:
Frequency, input gain, etc, are set with the controls on the transmitter. The correct compatibility mode must also be selected on the receiver.

6) Adjust Transmitter Input Gain

NOTE: This adjustment is very important, since it will determine the signal to noise ratio and dynamic range that the system will deliver.

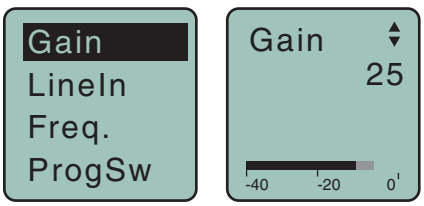
Lectrosonics transmitters with LCD interface:
The LEDs on the control panel provide an accurate indication of modulation level to assist in adjusting the input gain. The LEDs will glow either red or green to indicate modulation levels as shown in the following table. Full modulation is achieved at 0 dB, when the "-20" LED first turns red. The limiter can cleanly handle peaks up to 30 dB above this point.

Signal Level	-20 LED	-10 LED
Less than -20 dB	Off	Off
-20 dB to -10 dB	Green	Off
-10 dB to +0 dB	Green	Green
+0 dB to +10 dB	Red	Green
Greater than +10 dB	Red	Red

NOTE: It is best to go through the following procedure with the transmitter in the standby mode so that no audio will enter the sound system or recorder during adjustment.

1) With fresh batteries in the transmitter and power the unit on in the standby mode (a brief press on the power switch with L-Series transmitters).

2) Navigate to the **Gain** setup screen.



3) Prepare the signal source. Position a microphone the way it will be used in actual operation and have the user speak or sing at the loudest level that will occur during use, or set the output level of the instrument or audio device to the maximum level that will be used.

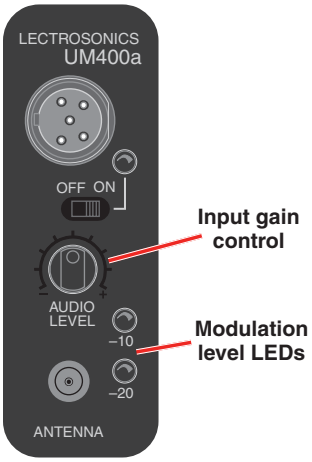
4) Use the ⇧ and ⇩ arrow buttons to adjust the gain until the **–10 dB** glows green and the **–20 dB** LED starts to flicker red during the loudest peaks in the audio.

5) Once the transmitter input gain has been set, the signal can be sent to the sound system or recorder for level adjustments, monitor settings, etc.

6) Do not use the transmitter input gain control to adjust the audio output level of the receiver.

Other Transmitters:
Earlier Lectrosonics transmitters provide LEDs to accurately indicate full modulation, with continuously variable gain controls for a precise adjustment. The LEDs operate in the same manner as those shown here for transmitters with an LCD interface.

The UM400A transmitter shown below is typical of many legacy Lectrosonics models.



Some transmitters from brands other than Lectrosonics can also be used if the appropriate compatibility mode set is set in the receiver. Observe the audio level meter on the LR receiver LCD as you adjust the input gain on the transmitter to see the modulation level. Some models may have limiters on the input to suppress overload distortion, and others may not. Monitor the audio, preferably with headphones, as you adjust the input gain to find the maximum level that can be set without audible limiting or overload distortion.

7) Set Receiver Audio Output Level

The audio output can be adjusted from -50 dBu (mic level) to +5 dBu (line level) in 1 dB steps. It is best to use an output level high enough to drive the connected device to an optimal level without the need for additional gain. If the receiver is set to full output and the level is still not sufficient to drive the connected device to an optimal level, then some gain will need to be applied by the connected device.

A built-in tone generator makes matching the output level to the connected device easy and accurate.

1) Navigate to **Audio Level** in the LR receiver menu and press MENU/SEL to enter the setup screen. Use the arrow keys to reduce the level to minimum (-50 dBu).
2) Turn on the 1k tone (MENU/SEL + UP arrow) in the **Audio Level** setup screen.
3) On the connected device, set the input to "line level" if available. Turn the input gain control (e.g. record level) all the way down.
4) Gradually increase the output level on the receiver while observing the input level meter on the connected device. Increase the level until the input level meter indicates 3 or 4 dB below maximum. This "optimal level" will protect against overloading the input with a very loud peak in the audio.
5) If this optimal level cannot be achieved, even with the receiver output turned all the way up, increase the input gain control on the connected device gradually until this level is achieved.

Once this level match has been set, leave these settings alone and make adjustments from one event to another with the input gain control on the transmitter.

Firmware Update

As of the date of this writing, the firmware update program runs only on a Windows operating system.

Updating the firmware is simply a matter of downloading a utility program and file from the web site and running the program with the receiver connected to a computer via the USB port.

Go to www.lectrosonics.com/US. Click on ***SUPPORT*** in the top bar, then click on ***L-Series*** in the categories list. Click on the link labeled ***Firmware Updates*** at the bottom of the screen. Download the ***Firmware Updater program*** zip file and extract it to a temporary folder on your computer. Then download and extract the firmware zip file (e.g. lrv1_16.zip) and extract it to a temporary folder on your computer.

Hold down the UP and DOWN arrow buttons on the receiver while powering it up. The receiver will display UPDATE to confirm it is in this mode. Plug in the USB cable and run the utility program. The program will automatically detect the receiver and prompt for the location of the firmware file. Point at the file and click on ***Start***. The process takes about 90 seconds.

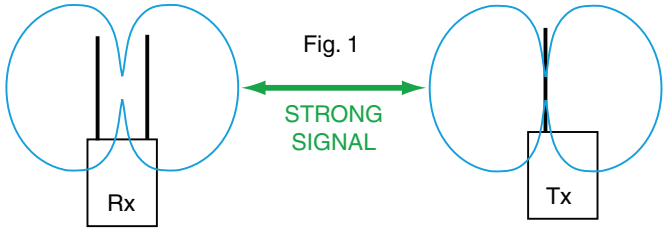
Antenna Orientation

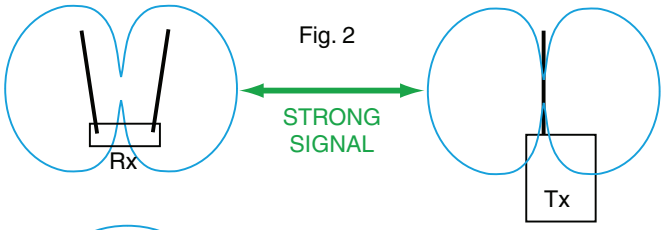
The antennas are most sensitive perpendicular to the axis of the whip. The pattern is a toroidal (donut) shape surrounding the antenna. A cross section of the pattern is depicted in the illustrations below.

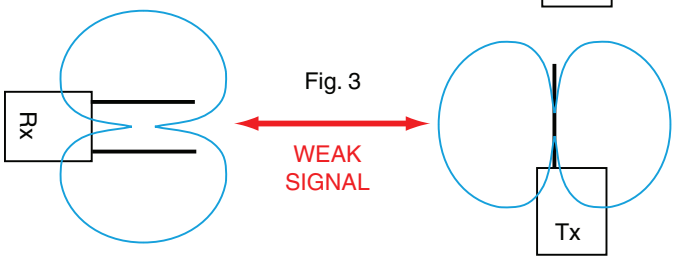
The best orientation is to keep the antenna whips elevated and oriented vertically to provide a circular pattern around the transmitter and receiver. The whips can point up or down.

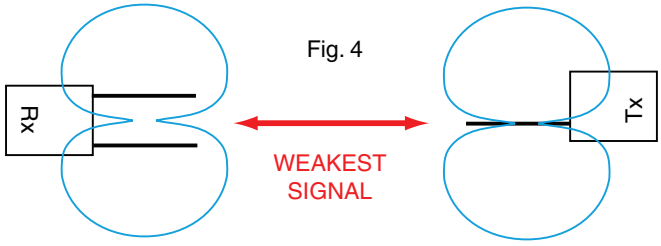
The receiver can be mounted horizontally and swiveling antennas can be adjusted to keep the whips in a vertical orientation, as shown in Fig. 2.

It is also good practice to keep the antennas away from metallic surfaces.









Accessories

MCLRTRS
Audio cable; LR output; TA3F to 3.5 mm TRS male; 20 inch length. Wired for mono output (tip and ring are combined).

MCSRTRS
Audio cable; dual LR output; two TA3F to one 3.5 mm male TRS; 11 inch length.

MCSRXLR
Audio cable; LR output; TA3F to XLR-M; 12 inch length.

LRSHOE
Accessory shoe mount; requires 26895 belt clip.

AMJ(xx) Rev. A
Whip antenna; swiveling. Specify frequency block.

AMM(xx)
Whip antenna; straight. Specify frequency block.

About Whip Antenna Frequencies:
Frequencies for whip antennas are specified by the block number. For example, AMM-25 is the straight whip model cut to the block 25 frequency.

L-Series transmitters and receivers tune across a range covering three blocks. The correct antenna for each of these tuning ranges is the block in the middle of the tuning range.

Range	Blocks covered	Ant. Freq.
A1	470 thru 20	Block 19
B1	21 thru 23	Block 22
C1	24 thru 26	Block 25
D1	27 thru 29	Block 28

26895
Wire belt clip.

Specifications

Operating Frequencies:

Tuning range A1:	470.100 - 537.575 MHz
Tuning range B1:	537.600 - 614.375 MHz*
Tuning range C1:	614.400 - 691.175 MHz
Tuning range D1:	691.200 - 767.975 MHz (export only)

*North American transmitter models exclude the radio astronomy band from 608 to 614 MHz.

Frequency selection steps:	Selectable; 100 kHz or 25 kHz
Receiver Type:	Dual conversion, superheterodyne
IF Frequencies:	243.950 MHz and 250.000 kHz
Frequency stability:	±0.001 %
Front end bandwidth:	20 MHz @ -3 dB
Sensitivity:	
20 dB SINAD:	1.0 uV (-107 dBm), A weighted
60 dB Quieting:	2.2 uV (-100 dBm), A weighted
Squelch quieting:	Greater than 100 dB typical
Modulation acceptance:	+/-100 kHz max.; varies with selected compatibility mode
Image and spurious rejection:	85 dB
Third order intercept:	0 dBm
Diversity method:	SmartDiversity™ phased antenna combining
FM detector:	Digital Pulse Counting Detector
RF spectrum analyzer:	Single and multiple block scanning modes with coarse and fine views of results
Antenna inputs:	50 Ohm; SMA female connectors
Audio output:	TA3 male (mini XLR) balanced output
Audio output level:	Adjustable -50 to +5 dBu in 1 dB steps (unbalanced output level is 6 dB lower)
Front panel controls and indicators:	• Sealed panel with membrane switches • LCD for setup menus and monitoring
Audio test tone:	1 kHz, -50 dBu to +5 dBu output (bal); .04% THD
Transmitter battery type selection:	• AA alkaline • AA lithium • Timer available for use with all types
Audio polarity selection:	Normal or inverted
Compatibility modes:	• Digital Hybrid (North American) • Digital Hybrid (European) • Lectrosonics 100 • Lectrosonics 200 • Lectrosonics 300 • Lectrosonics IFB • Non-Lectrosonics mode 3 • Non-Lectrosonics mode 6 • Non-Lectrosonics mode 7 (contact the factory for details)
SmartNR (noise reduction):	• OFF • NORMAL • FULL (available in Digital Hybrid modes only)
Audio Performance:	
Frequency Response:	32 Hz to 20 kHz (+/- 1 dB) receiver only (see transmitter documentation for overall system response)
THD:	< 0.4 (0.2% typical in Digital Hybrid mode)
Top panel features:	• TA3M audio output jack; • (2) SMA antenna jacks • IR (infrared) port
Battery types:	• AA alkaline • AA Lithium • AA NiMH rechargeable
Operating runtime:	4 hours, AA alkaline
Operating temperature:	-20° C to +50°C
Weight:	221 grams (7.1 ozs.) with two AA alkaline batteries and two AMJ-Rev. A antennas
Dimensions (housing):	3.21 x 2.45 x .84 in. (82 x 62 x 21 mm)

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 the interconnecting cables.

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

For timely service, please follow the steps below:

A. DO NOT return equipment to the factory for repair without first contacting us by e-mail 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 A.M. to 4 P.M. (U.S. 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 or FEDEX 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.

Lectrosonics USA:

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(877) 753-2876 Toll-free Canada
(877) 7LECTRO
Fax (416) 596-6648

E-mail:
Sales: colinb@lectrosonics.com
Service: joeb@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.

LECTROSONICS®
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17 June 2015