

# **SRa5P/E01 and SRa/E01**

## **Camera Slot Dual UHF Receiver**



## **Set up and Operation**

**CE1313 ⓘ**

**See Quick Start Summary on page 3**

Fill in for your records:

Serial Number:

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## Digital Hybrid Wireless®

The Lectrosonics Digital Hybrid Wireless® uses innovative technology to combine the advantages of digital audio with the 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 state-of-the-art 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 what 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. Since the audio is free of compandor artifacts, pumping and breathing problems are also greatly reduced.

U.S. Patent 7,225,135

## Quick Start Summary

The following checklist includes the minimum required settings to start using the receiver.

- Install either stand-alone or camera slot adapter kit, the antennas and position the receiver as it will be used (see pages 9-12).
- Connect power to the receiver (see pages 10,11).
- Set the COMPAT (compatibility) mode for the transmitters to be used (see pages 15,16).
- Find clear operating frequencies for one or both receivers (see pages 19-21).

**NOTE:** When operating in the 2-channel mode, always set Receiver 2 to a higher frequency than Receiver 1 by least 400 kHz (four standard steps on the switches).

- Set transmitters on the matching frequencies (see transmitter manual).
- Verify transmitters are set to the same compatibility mode as the receiver (see transmitter manual).
- Adjust transmitter/s input gain to match voice level and mic position (see transmitter manual).
- Adjust receiver output level as needed for the camera or mixer input level desired (see pages 15,16).

## Model Differences

In this manual you will see both the SRa5P and SRa pictured in various contexts. There is no functional difference between the two models other than the second output jack on the 5P version, so either receiver may be used as either is pictured.



### SRa5P/E01

The current version of the full-featured receiver. Detachable whip antennas and second audio output on left hand side of the front panel. Will also work with the OCTOPACK multicoupler.



### SRa/E01

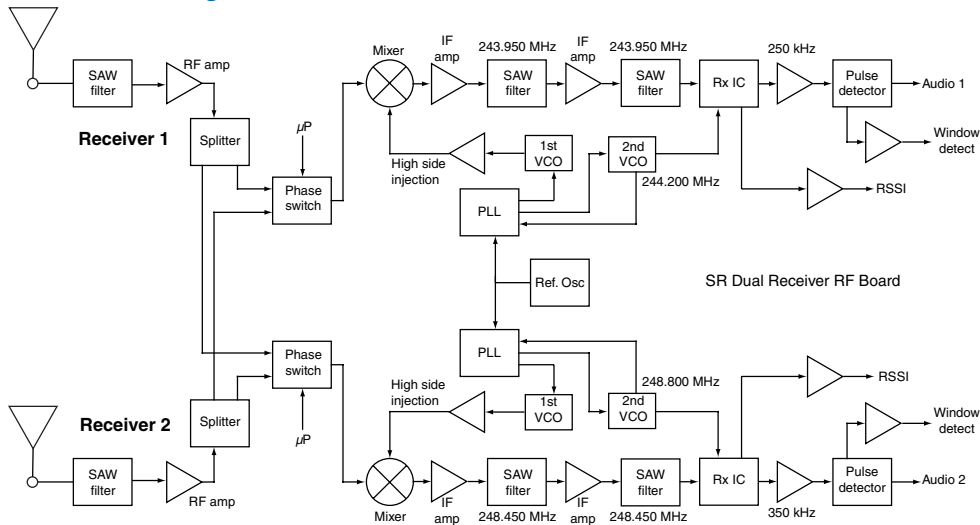
In response to demand for external antenna connections and the OCTOPACK multicoupler, this is the current version of the basic receiver with detachable whip antennas and the audio output on the rear panel only.

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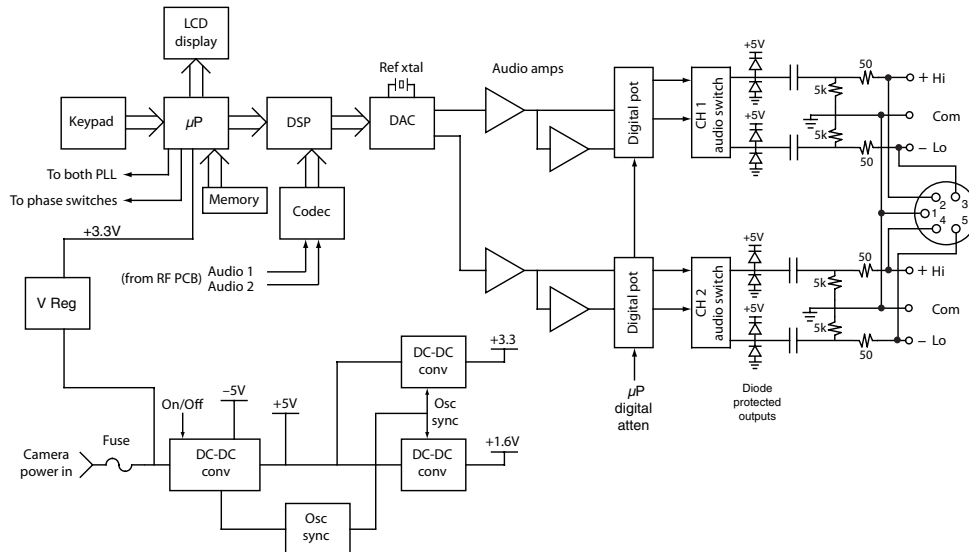
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# General Technical Description

## RF PCB Block Diagram



## Audio PCB Block Diagram



The SRa5P/E01 and SRa/E01 consists of two separate receivers built into a single, ultra compact housing with interchangeable adapters for video camera wireless receiver slots and stand-alone use. Digital Hybrid Wireless® technology provides superb, compandor-free audio quality and compatibility with other wireless systems. The RF performance is extremely stable over a very wide temperature range, making the receiver perfectly suited to the rough environmental conditions found in field production.

The front panel features a menu-driven LCD interface and four membrane switches used to view and alter the settings. Audio outputs are provided on the rear panel for camera slots or other audio devices, and in the case of the SRa5P, on the front panel through a 5-pin TA Series connector.

A built-in spectrum analyzer scans across the tuning range of the receiver to locate RF signals in the vicinity to simplify finding clear operating frequencies.

## SmartDiversity™

This allows each receiver to run independently to provide two separate audio channels. The algorithm analyzes both the incoming RF level and the rate of change in RF level 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.

## Ratio Diversity

Blends the audio outputs of both receivers in a seamless manner to produce a single audio output. A panning circuit blends more signal from the receiver with the stronger RF signal over a wide RF level range to anticipate and eliminate dropouts long before they occur. When a good RF signal is present at both receivers and the audio is blended equally, the signal to noise ratio is increased by 3 dB.

## RF Front-End and Mixer

Each antenna signal is first passed through a high quality SAW filter to reject high power RF signals above and below the operating frequency. A high current amplifier follows the SAW filters and passes the signal to an internal splitter so that both antenna signals are available to both receivers for SmartDiversity™ reception.

The mixer in each receiver takes the signal from the PLL to generate the first IF signal, with both PLL circuits fed from a common reference oscillator to maintain signal phase through the IF sections.

## Microcontroller, PLL and VCO Circuits

The 8-bit microprocessor is the “heart” of the SRa5P and SRa receivers. 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 transmitter battery status. Outputs from the microcontroller drive the LCD display and backlight, control the squelch and audio output attenuator, the PLL/VCO circuits and the antenna phase switch.

## IF Amplifiers and SAW Filters

The first IF stage at 244 MHz employs two state-of-the-art 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.

After the SAW filter, the 244 MHz IF signal is converted to 250 kHz in receiver 1 and 350 kHz in receiver 2. Only then is the majority of the gain applied, just before the signal is converted to audio with a pulse counting detector. Although these IF frequencies are unconventional in a wide deviation ( $\pm 75$  kHz) system, it offers outstanding AM rejection figure over a very wide range of signal strengths and produces an excellent noise improvement at low signal strengths.

## Digital Pulse Counting Detector

The 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

The Digital Hybrid system design uses a DSP generated ultrasonic pilot tone to control the receiver audio muting (squelch). Brief delays are applied to eliminate thumps, pops or other transients that can occur when the power 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 fragile crystals, allowing the receiver to survive shocks and mishandling much better than older analog-based pilot tone systems.

**Note:** This description applies only in 400 Series mode. In 200 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.

## SmartSquelch™

Any squelching system faces inevitable trade-offs: squelch too aggressively and valuable audio information may be lost. Squelch too little and excessive noise may be heard. Respond too rapidly and the audio will sound “choppy.” Respond too sluggishly and syllables or entire words can be cut off.

SmartSquelch™ 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 technique 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 SRa5P and SRa can deliver acceptable audio quality from otherwise unusable signals.

## Smart Noise Reduction (SmartNR™)

**Note:** The SmartNR setting is user Selectable only in 400 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 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 pre-amp, 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 lavalier 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, which removes hiss without sacrificing audio 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 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 selected while



simply listening.

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 - enough noise reduction is applied to remove most of the hiss from the microphone preamp and some of the hiss from lavalier microphones. The noise reduction benefit is significant 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 and some high frequency environmental noise, assuming levels are set properly at the transmitter.

## Supersonic Noise-Based Dynamic Filter and Squelch

In addition to SmartNR, all hybrid receivers are equipped with a supersonic noise-based dynamic filter and squelch system. The incoming audio is monitored for energy above 22 kHz, pilot tone excepted. Excessive high frequency energy indicates that the received signal is too weak to achieve an acceptable signal-to-noise ratio. Under marginal conditions, a variable low pass filter is rolled in dynamically, masking the noise while preserving as much of the transmitted signal as possible. When the channel is too noisy even for the filter, the audio is squelched.

This noise-based filter and squelch system replaces a more or less equivalent system used for many years, which based its operation on RF signal strength. Performance of the two systems is virtually identical, but the noise-based system requires no calibration and there is no better way to track the signal-to-noise ratio than to measure it directly.

## RF-Controlled Digital Noise Filter

In extremely weak signal conditions, an RF sensitive variable frequency filter is applied to reduce the high frequency response of the receiver. 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.

## Audio Output Level

A setup screen is provided for adjusting the audio output level in 1 dB increments from -50 to +5 dBu using the front panel UP and DOWN buttons.

## Test Tone

To assist in matching the audio levels of equipment connected to the SRa5P or SRa, 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 setup window.

## Power Supply

The SRa5P and SRa is operated from an external DC power source. The power supplies are protected from damage to the receiver that could occur if a positive ground power source is applied.

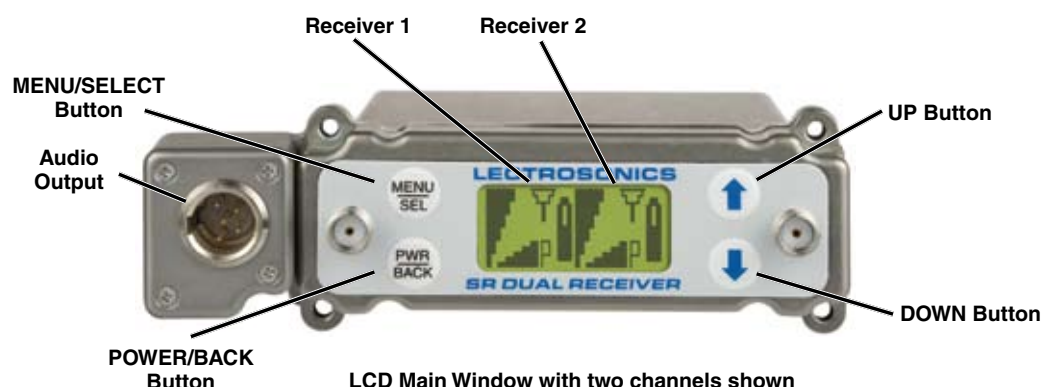
## LCD Display

The display has four primary windows. Pressing the Front Panel SEL button steps through each of these windows.

If the battery gets low on the transmitters, 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 when the power is turned off. After five minutes of no key activity, the LCD backlight goes off and the display reverts back to the main window.

# Front Panel Controls and Functions



## Audio Outputs

In addition to the audio outputs on the rear panel, the front panel of the receiver provides a second set of outputs through a 5-pin connector. For cameras with only one audio channel enabled in the slot, it allows both audio channels to be connected through external cables.

The TA5M connector provides two balanced outputs with the following pinouts:

Pin 1	Pin 2	Pin 3	Pin 4	Pin 5
Shields	CH1 +	CH1 -	CH2 +	CH2 -

## LCD Screen

A backlit, graphics-type Liquid Crystal Display is used to set up and monitor the receiver. The Main Window shown here is used during normal operation, to display RF and audio levels, transmitter battery status, pilot tone status and diversity activity for both receivers.

## MENU/SEL Button

This button is used to select menu items and enter setup screens during setup.

## PWR/BACK Button

Press the PWR/BACK switch to turn the power on. Press and hold it until the display goes blank to turn power off. It also functions as a “back” button while navigating the various menus and setup screens to return to the previous screen or menu item.

The firmware “remembers” whether the receiver was turned on or off after power is disconnected, and it returns to that state when power is restored. This allows the receiver to power up and down as the camera is turned on and off.

Press the PWR/BACK button from the Main Window to briefly display the external power voltage.

## UP/DOWN Arrow Buttons

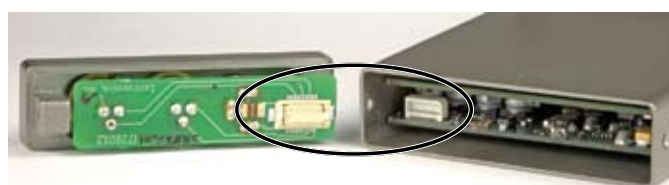
The UP and DOWN arrow buttons are used to select various options and adjust values in the setup screens, and provide secondary functions such as locking out the panel to guard against accidental changes.

## Rear Panel and Adapters

Several different panel adapters are available to configure the receiver for use with popular camera slots and for stand-alone use. The adapters are retained by two screws through the side panel of the housing, making them easy to install.



Power and audio connections are made through mating connectors on the adapter and receiver main circuit boards.



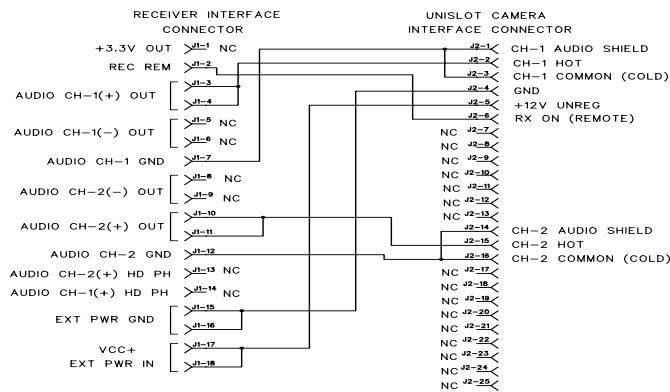


## Camera Slot Adapters

### SRUNI



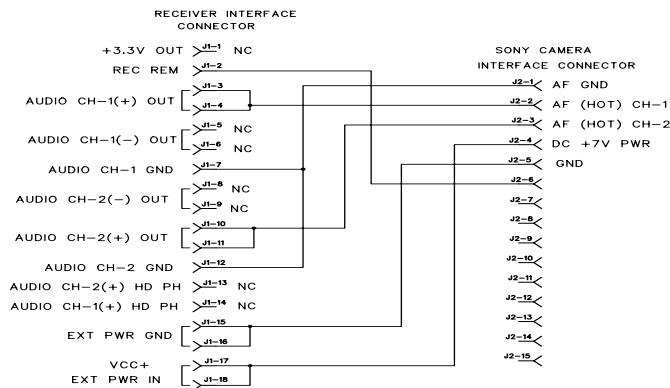
Adapter kit for Unislot® camera slots such as those provided on Ikegami® and Panasonic® cameras.\* Includes bezel, hardware and rear panel DB25 connector wired for power and audio connections.



### SRSNY



Adapter kit for Sony® camera slots,\* includes bezel, hardware and rear panel DB15 connector wired for power and audio connections.



## Installing Camera Slot Adapters

### SRUNI Adapter



Thread two short screws through the recessed tabs on the adapter and slide it onto the receiver housing. Thread two short screws through the tabs on the receiver flange as shown.



On the opposite side, thread two long screws through the tabs on the receiver flange, then align them with the tabs on the adapter.



Slide the adapter up and tighten the retaining screws to secure it to the receiver flange.

The four lower screws attach to the camera body.

### SRSNY Adapter

Two different types of screws are used to attach the receiver flange and the adapter.



Thread the smaller, thin head screws through the adapter and into the camera body.



Upper screws with thicker heads secure the receiver to the adapter.

Lower screws with thinner heads secure the adapter to the camera body.

UniSlot® is a trademark of Ikegami Tsushinki Co., Ltd.

Ikegami® is a registered trademark of Ikegami Tsushinki Co., Ltd.

Panasonic® is a registered trademark of Matsushita Electric Industrial Co., Ltd.

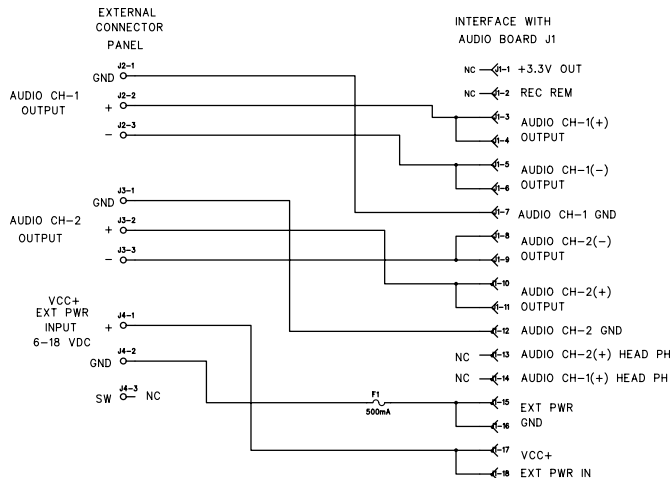
Sony® is a registered trademark of Sony Kabushiki Kaisha TA Sony Corporation.

## Adapters for Stand-alone Use

### SREXT

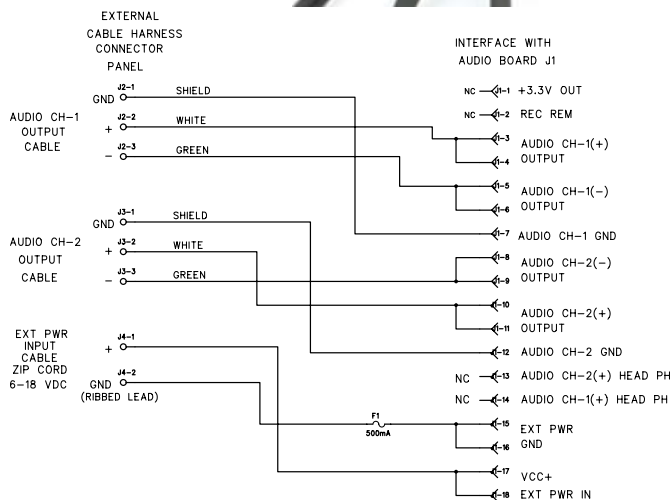


For stand-alone use, this kit includes a rear panel with two TA3 male jacks for the balanced outputs and a power jack with a locking connector. Trim the power cable to the desired length.



### SRHARNESS

Ideal for use in portable "bag systems." Two balanced output cables and the power cable are 6 feet long. Cut the cables to the desired length and terminate as needed.



## Installing Rear Panel Adapters

Installation of the rear panel output/power adapters is the same for all models.



Panels are held in place by two Phillips head screws on the sides of the housing.



Connections between the panel and main circuit board are made via miniature mating connectors.



Align the mating connectors and slide the panel straight into the housing until the screw holes align with the housing.

## Battery Adapter

The receiver can be powered with an optional "battery sled" adapter that attaches to the outside of the housing (Lectrosonics Model SRBATTSLD). The adapter includes an integrated connector plate and accepts L and M type video camera rechargeable batteries. The adapter sled does not include charging circuitry. Batteries must be recharged with their respective chargers.

The external power jack includes a switch that disconnects the battery when a plug is inserted.



The sled is available in a "top" or "bottom" version for mounting on top or underneath a camera.

## Audio Output Cables

### MCSR5PXL5P



Right angle TA5F plug to 5-pin XLR; balanced outputs; 25 inches long. For SRa5P/5P outputs.

### MCSR5PXL2



Right angle TA5F plug to two 3-pin XLR; balanced outputs; 20 inches long. For SRa5P/5P outputs.

### RATPAC Adapter Kit



Adapter kit to build either a 3-pin or 5-pin TA Series right angle connector. Includes standard 5-pin connector, modified 3-pin insert and backshell, aluminum right angle housing, strain relief tubing, set screws and wrenches.

### MCSRPT

12 inch long TA3 female to stripped and tinned wires for balanced output.



PIN 1: Shield  
PIN 2: Audio (+) white  
PIN 3: Audio (-) green

### MCSRXL2

12 inch long TA3 female to XLR male 3-pin for balanced output.



PIN 1: Shield  
PIN 2: Audio (+)  
PIN 3: Audio (-)

### MCSRTRS



Male 3.5 mm TRS plug to two female TA3 (mini XLR) connectors for dual channel use.

## External Power Cables

### 21747



Locking LZR style plug to stripped and tinned; 6 feet long.

### 21746



Locking LZR style plug to stripped and tinned; 12 inches long.

### PS200



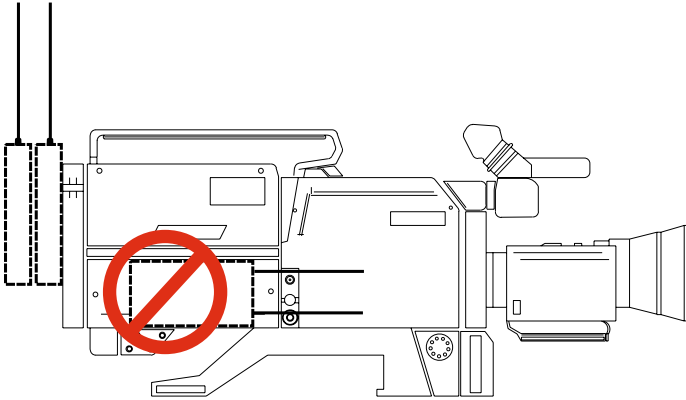
Hirose 7-4 pin to LZR type locking plug, 12" long.



## Mounting and Orientation

Installation into the slot on a video camera places the antennas in an optimal vertical position away from the camera body.

When used with non-slot cameras, as depicted in the diagram below, one or two receivers can be positioned in a variety of locations around the camera body using the Velcro and SRaSLEEVE mounting options.



*Mounting the receiver horizontally on the side of a camera can seriously reduce the operating range of the wireless system.*

For maximum operating range, the antennas should be vertical and above the camera body. While it may be convenient, mounting the receiver horizontally on the side of the camera can seriously reduce the operating range of the wireless system.



*The receiver provides stand-alone operation with the battery sled adapter and mounting sleeve. It can be mounted in any position with Velcro, or in horizontal and vertical positions using the mounting foot.*

### SRSLEEVE Mount

An optional mounting sleeve is available to simplify mounting the receiver on camera body, battery brackets and other locations. The sleeve is furnished with a hook/loop Velcro swatch for mounting on flat surfaces.



### SRHARDWARE Cold Foot Adapter

This hardware and adapter kit allows the SRSLEEVE to be mounted on a "cold shoe." A right angle bracket is included so the sleeve can be mounted in a horizontal or vertical position. Vertical mounting is generally preferred because the antennas will provide a circular, horizontal pattern. For indoor applications where multipath reflections are prevalent, the best antenna orientation can be discovered by simple walk test while observing the RF level indicators on the receiver LCD.



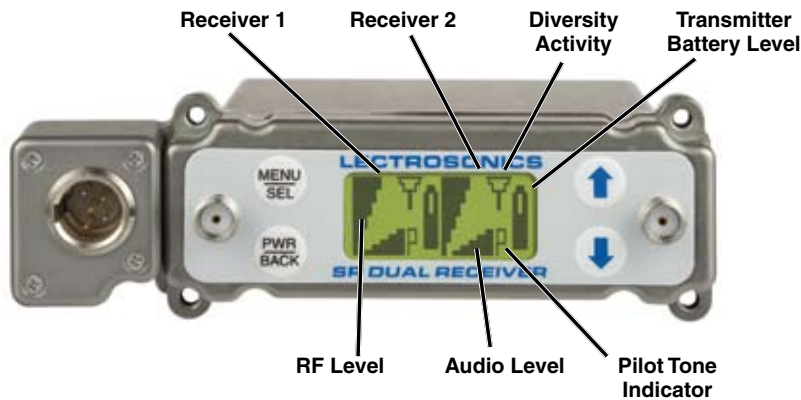
### RATPAC Connector

The 5-pin RATPAC right angle connector is designed for the front panel output jack. The 3-pin version is designed for the rear panel outputs on the receiver.

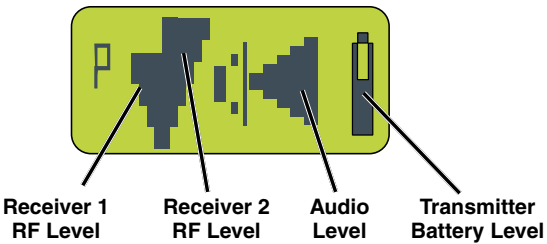


*The connector can be rotated during assembly to exit the cable in the desired direction. See instructions included with the RATPAC kit.*

# Main Window (LCD)



NOTE: When the RATIO DIVERSITY mode is selected, both receivers are combined to pick up the same transmitter, so the Main Window will display a single audio channel.



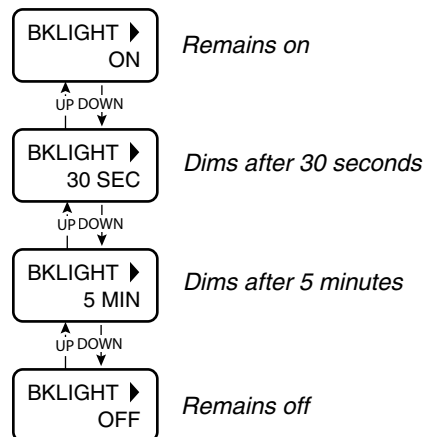
The Main Window displays information concerning the condition of the Pilot Tone, antenna phase, RF and audio signal levels and battery conditions for both the receiver and the associated transmitter.

Pressing the SEL/SEL button accesses the SEL selections for setting up the receiver and searching for clear frequency channels.

Icon	Description
	<p><b>Pilot Tone Indicator</b></p> <p>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, such as the native 400 Series. 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 or enable the pilot tone on Receiver 1, hold Sel and press the UP button briefly. To bypass or enable the pilot tone on Receiver 2, hold SEL and press the DOWN button briefly. Bypassing the pilot tone also disables the squelch, regardless of which compatibility mode has been selected.</p>
	<p><b>Antenna Phase Indicator</b></p> <p>This icon antenna is displayed when the SWITCHING DIVERSITY mode is selected. As the antenna phase is switched, the symbol will flip vertically.</p>
	<p><b>RF Level</b></p> <p>This icon changes in size vertically to indicate the strength of the incoming RF signal.</p>
	<p><b>Audio Levels</b></p> <p>One icon is used in the SWITCHED DIVERSITY mode and the other when RATIO DIVERSITY is selected. The 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.</p>
	<p><b>Battery Levels</b></p> <p>When the COMPAT mode is set for a compatibility mode that supports battery telemetry (400 and), a battery icon is displayed on the LCD to indicate the transmitter battery condition. The receiver will periodically check the battery voltage and update the icon in a “fuel guage” manner. In the example at left, the icon indicates about “half full.” When another COMPAT mode is selected, this area of the LCD will be blank.</p> <p>If selected in the TXBAT setup screen, a transmitter battery timer is available for any compatibility mode. It accumulates hours and minutes whenever the transmitter is turned on, and retains the accumulated time even when the receiver is off. The icon represents a digital clock readout (rotated 90 degrees) and in this example is indicating 4 minutes. <b>To reset the battery timer, change the Selection in TXBAT to something other than a timer mode (NOT AAT or 9VT).</b></p>

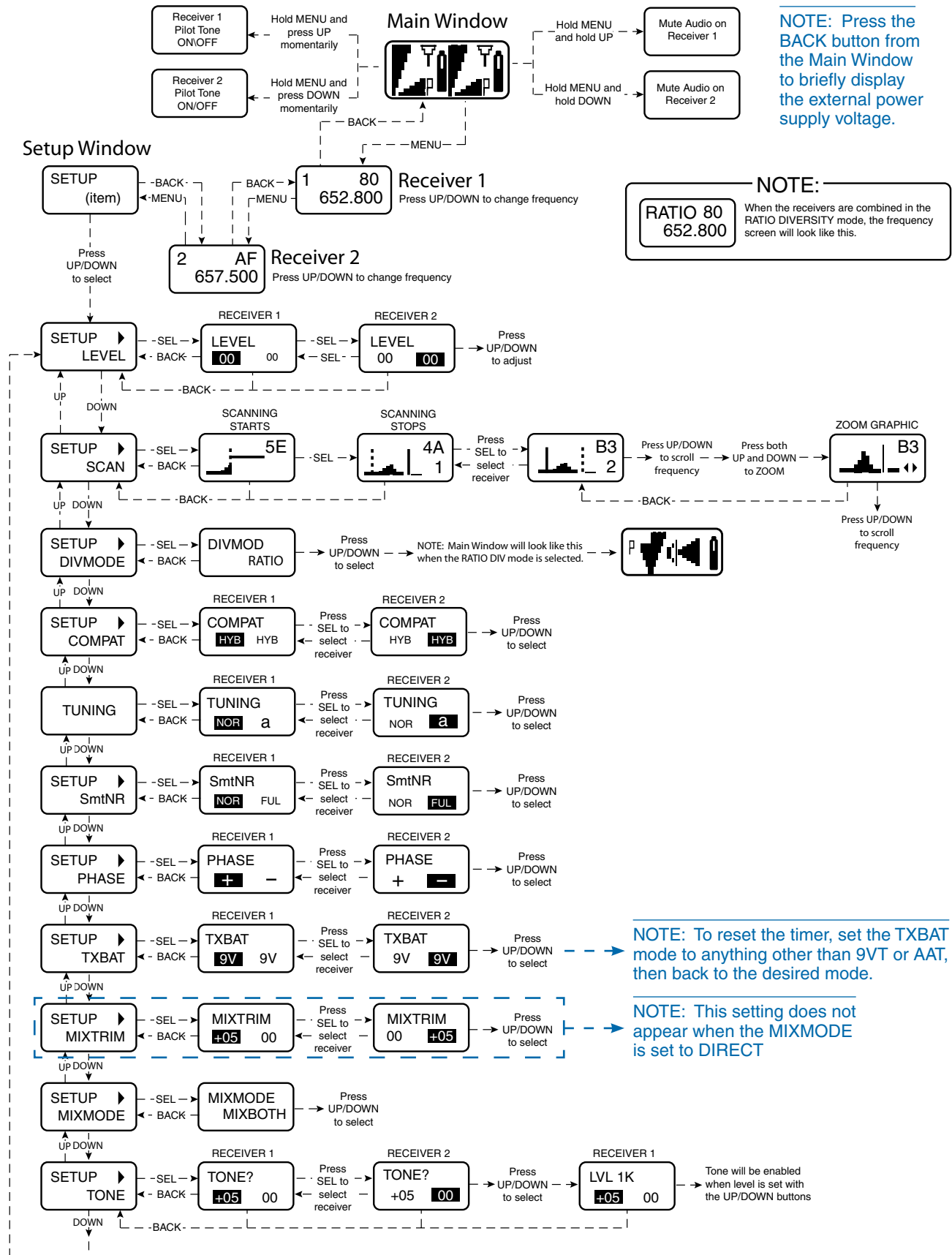
## LCD Backlight Setup

Hold the UP arrow and turn on the power. The unit will boot up then display the Backlight Options screen. Use the UP and DOWN arrows to select the desired backlight operating mode.





# Navigating the LCD



## Main Window

The appearance of the LCD Main Window will change according to which diversity mode selected. When set to SWITCH, the screen will be split to show both receivers at the same time.



With the DIV MODE set to SWITCHED, two audio channels will be displayed.

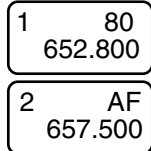
When set to RATIO, a single audio channel is displayed since the receiver are combined to pick up the same transmitter.



With the DIV MODE set to RATIO, a single audio channel will be displayed.

## Frequency Screen

Press SEL from the Main Window once for Receiver 1 and twice for Receiver 2. The selected receiver is denoted in the upper left corner of the screen.



Press BACK to move from Receiver 2 back to Receiver 1

In this example, the upper screen denotes that receiver 1 is set at 652.800 MHz, requiring that the corresponding transmitter hex switches be set at 80 for this frequency. Lectrosonics transmitters with LCD interfaces allow frequency to be set in MHz or hex settings.

Press the Up and Down buttons to change the frequency of the receiver. When the TUNING mode is set to NORMAL, the SEL Up and Down buttons tune in single channel increments. In the group tuning modes, the Up and Down buttons step through the pre-coordinated frequencies.

**NOTE:** When operating in the 2-channel mode, best operation is achieved by always setting Channel 2 to a higher frequency than Channel 1 by at least 600 kHz (six 100 kHz steps on the Receiver display and the transmitter switches.)

**FREQ. WARNING** will flash on the Receiver display whenever Channel 2 frequency is set lower than Channel 1 frequency by 4.5 MHz (4.3 - 4.7 MHz) Whenever this occurs, move ONE of the Channel frequencies at least 600 kHz (six 100 kHz steps) either higher or lower.



## Setup Screens

From the Main Window, press SEL three times to enter the setup SEL. Press UP and/or DOWN to scroll through the available SEL items. Press SEL to enter the setup screen for the selected SEL item. For those SEL items that allow separate settings for each receiver, press SEL repeatedly to toggle back and forth between Receiver 1 and Receiver 2, then press the UP and DOWN buttons to select the value or option. Press BACK to return to the setup SEL to Select the next item.

### LEVEL

This setup screen displays 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 the SEL button to leave this screen.

The output levels at the two jacks may be set independently, regardless of the diversity mode setting.

### SCAN

This function provides a fast and reliable method of finding clear channels for each receiver. Press SEL to start the scanning. Follow the procedure outlined in the navigation map on the previous page and on the page entitled Scanning for Clear Frequencies for instructions on using the scanner to find clear channels.

### DIVMODE

The SWITCH diversity mode allows the two internal receivers to operate independently on different frequencies and settings with two different transmitters. When this mode is Selected, the setup screens will prompt you to select the receiver to be adjusted.

The RATIO mode combines the two internal receivers to pick up the same transmitter and mix their audio outputs for ratio diversity reception. In this mode, the setup screens will prompt you for a single value which will automatically be set for both receivers.

### COMPAT

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

- **HYB** is used with Lectrosonics Digital Hybrid transmitters. This is the default setting and should be used if your transmitter supports it. This mode offers the best audio quality.
- **IFB** for Lectrosonics IFB transmitters.

### TUNING

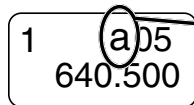
In addition to the NORMAL mode, this screen also allows selection of one of four factory pre-selected frequency groups (Groups A through D) or two user programmable frequency groups (Groups U and V).

- **NOR** allows selection of all 256 frequencies that the receiver will tune. Each press of the UP or DOWN button will step in 100 kHz increments to the next frequency.

- **a, b, c, d** sets the receiver to tune only factory preselected frequencies, up to eight in each group. Each press of the UP or DOWN button will step to the next frequency in the group.
- **u, v** allow up to 16 user-selected frequencies to be stored in each group. Each press of the UP or DOWN button will step to the next stored frequency in the group.

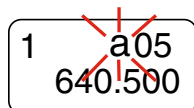
Note: The Tuning Setup Screen only Selects the tuning mode (NORMAL or Group Tuning) and not the operating frequency. Actual operating frequencies are chosen through the Frequency Screens.

In Group tuning modes, the UP and DOWN buttons navigate among the selected frequencies in the group.



When a tuning group is Selected, a letter will appear next to the hex switch settings.

Holding the SEL button while pressing the UP or DOWN button will step to the next frequency in 100 kHz steps, which will select a frequency that is not stored in the group. In this case, the group letter in the display will blink to indicate that the Selected frequency is not included in the group.



The letter will blink when a frequency outside of the tuning group is Selected.

When no frequencies are stored in groups u and v, the UP and DOWN buttons will function the same as in the NORMAL mode (each press moves up or down in 100kHz steps).

When only one frequency is stored in group u or v, the UP and DOWN buttons will not change the frequency. In this case, hold the SEL button in and then press UP or DOWN to scroll to the desired frequency.

To add a frequency to tuning either group u or v, select the desired frequency as in the previous paragraph, then hold the SEL button in, then hold the UP or DOWN button in until the letter stops blinking.

To delete a stored frequency, select it with the UP and DOWN buttons, then hold the SEL button in, then hold the UP or DOWN button in until the letter starts blinking.

**SHORTCUT:** Hold the MENU button in while pressing the UP or DOWN arrow to jump in 16 channel increments (1.6 MHz steps). If the TUNING mode is set to a group, it will still step up or down in the same 16 channel increment, which will likely tune to a frequency that is not included in the group (letter will blink in this case).

## SmtNR

This setup screen is available only in the 400 Series COMPAT (compatibility) mode. Select the desired mode while listening to the audio to of one of three choices:

- **OFF** provides no noise reduction for complete transparency, which is useful in controlled environments with very little high frequency noise such as an indoor motion picture production set.
- **NORMAL** applies a moderate amount of noise reduction to noticeably reduce hiss from subtle sources such as electret microphones.
- **FULL** is very similar to the Lectrosonics noise reduction system used for many years in the analog systems. Hiss from electret microphones and some environmental HF noise are suppressed.

## PHASE

This setup screen allows the audio output phase to be inverted to compensate for situations such as phase inversion caused by microphone wiring.

## TXBAT

This setup screen allows you to select the exact battery being used in the transmitter to provide more accurate battery level monitoring.

When the COMPAT mode is set to HYB (hybrid) the SEL choices are:

- **9V** - Transmitter uses a 9V alkaline battery.
- **9VL** - Transmitter uses a 9V lithium battery (not rechargeable).
- **9VT** - Transmitter uses a 9V battery of any type. Monitor its status with the timer in the LCD Main Window. This is the best choice when using a rechargeable battery in the transmitter.
- **AA** - Transmitter uses a AA alkaline battery.
- **AAL** - Transmitter uses a AA lithium battery (not rechargeable).
- **AAT** - Transmitter uses an AA battery. This is the best choice when using a rechargeable battery in the transmitter.

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

In compatibility modes other than 400 Series, no battery telemetry information is available, so the TXBAT setup screen offers only two choices:

- **---** (no timer) - Display no transmitter battery status in the main window.
- **TIM** - Monitor the transmitter battery status with the battery timer in the LCD Main Window.

**NOTE:** To reset the timer, set the TXBAT mode to anything other than 9VT or AAT, then back to the desired mode.

## MIXTRIM and MIXMODE

Since this is a dual receiver that can be used with cameras that offer only a single input in the slot, special options are available to allow the audio from the receivers to be mixed to either one or both audio output channels.

The **MIXMODE** setting determines which audio signal appears at which output channel:

- **MIXBOTH** mixes the audio and delivers the mix to both output channels.
- **MIXTO 1** mixes the audio and delivers the mix to output channel 1.
- **MIXTO 2** mixes the audio and delivers the mix to output channel 2.
- **DIRECT** keeps the audio separated and delivers receiver 1 audio to output channel 1, and receiver 2 audio to output channel 2.

The **MIXTRIM** setting applies attenuation up to 20dB in 1 dB steps to adjust the ratio of the two audio signals in the mix. This adjustment takes effect only when a mix mode is selected (it is ignored when the mix mode is set to **DIRECT**).

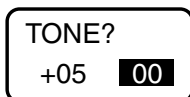
**IMPORTANT:** The **LEVEL** setting in the other setup screen (see previous page) is hardware-based and affects the output level regardless of which mix mode is selected. **MIXTRIM** then applies attenuation to that level setting resulting in the final level delivered to the output channel. It is good practice to set the **LEVEL** of both receivers to the same value when using a mix mode.

When a **MIXMODE** is selected, each audio signal is automatically attenuated by 6 dB prior to the mixing. This is done to avoid overload and potential distortion since mixing increases the level by 6 dB. The same input gain on the camera or mixer can generally be used regardless of whether or not a mix mode is being used in the receiver.

## 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 or DOWN button to enable the tone at the receiver output.

RECEIVER 2



The first screen prompts you to press the UP or DOWN button to start the tone.

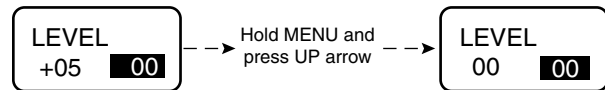
Once the button is pressed, a 1 kHz tone is enabled, and its level can be adjusted with additional presses on the UP or DOWN buttons.

The level set here will be retained in the regular operating 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 **BACK** button.

## Front Panel Shortcuts

A convenient shortcut is available from any setup screen that displays the receiver selection option (switching diversity mode with two separate receivers). Once the value has been set on one receiver, the same value can be copied to the other receiver with a simple button push combination.

For example, in the Setup Levels screen, holding the **MENU** button and pressing the UP arrow will copy the value from Receiver 2 to Receiver 1. The arrow key determines the “destination” of the value setting. UP sets the value on Receiver 1, and DOWN sets the value on Receiver 2.



To copy the value from Receiver 1 to Receiver 2, hold the **MENU** button and then press the DOWN arrow.

**NOTE:** It does not matter which receiver is selected (highlighted).

## Locking and Unlocking the Front Panel Controls

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

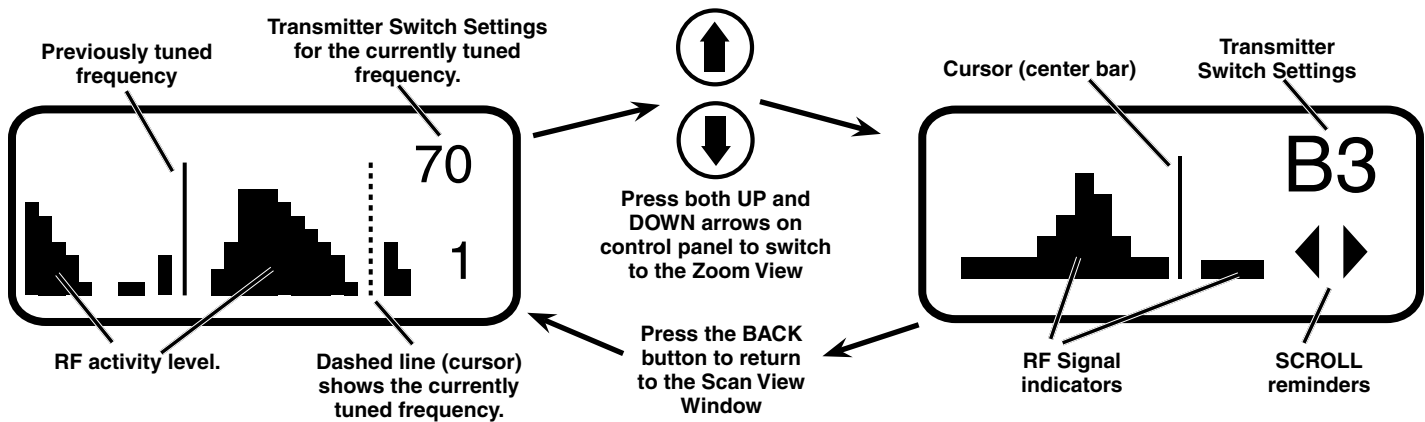
**Note:** Whether locked or unlocked, the setting persists when the unit is off and even when the power is turned off.

From the Main Window, press and hold the UP and DOWN arrows at the same time and observe the display. The current state is displayed as **LOCKED** or **UNLOCKED**, and numerals appear as a “3, 2, 1” countdown takes place. When the countdown is complete the state is reversed and the new state is displayed as **LOCKED** or **UNLOCKED**.

# Scanning for Clear Frequencies

## Scan View Window

## Zoom View Window



Spectrum scanning with the receiver itself is the best way to find clear operating frequencies, since it will reveal all RF signals present in the receiver, including those generated by IM (intermodulation).

Navigate to the Setup Scan screen and press the SEL button to start the scanner. The display will switch to the SCAN WINDOW and start scanning immediately. Allow the receiver to scan.

Scroll through the screen and find a frequency where no RF signals (or in the worst case, only very weak RF signals) are present. With the cursor on this frequency, simultaneously press the SEL Up, Down and SEL buttons to leave the scan mode.

Data gathered during a scan is stored until it is intentionally 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.

To stop scanning, press the SEL button once. The scanning will stop immediately, and the display will switch to the VIEW window. Pressing the UP or DOWN buttons will scroll the cursor coarsely across the tuning range. The transmitter switch settings matching the frequency indicated by the cursor are shown in the upper right corner of the screen.

Press both the UP and DOWN buttons at the same time to switch to the Zoom View. In this view, the cursor remains fixed in the center of the screen and the background scrolls behind it. The frequency can be stepped up and down in 100 kHz increments using the UP and DOWN arrow buttons.

To clear the scan memory and screens, press the back button repeatedly to return to the Main Window, then press and hold the PWR button briefly. As soon as "Powering off..." appears on the display, release the button. The receiver will remain turned on, and the scan data will be erased.

Set your transmitter switches to the same settings as shown on the display, turn the transmitter on and verify that a strong RF signal is present.

**NOTE:** When operating in the 2-channel mode, best operation is achieved by always setting Channel 2 to a higher frequency than Channel 1 by at least 600 kHz (six 100 kHz steps on the Receiver display and the transmitter switches.)

**FREQ. WARNING will flash on the Receiver display whenever Channel 2 frequency is set lower than Channel 1 frequency by 4.5 MHz (4.3 - 4.7 MHz) Whenever this occurs, move ONE of the Channel frequencies at least 600 kHz (six 100 kHz steps) either higher or lower.**

**FREQ  
Warning**



# Pre-coordinated Frequencies

Interference from IM (intermodulation) is a potential problem in all multi-channel wireless systems, so proper frequency coordination is always required to avoid noise, range and dropout problems. Your options to accomplish this include:

- Using the pre-coordinated frequency groups
- Performing a system checkout  
(See Multi-channel System Checkout)
- Calling Lectrosonics for assistance

## Compatible Frequency Table

Groupings of compatible frequencies have been created to minimize intermodulation problems in multiple channel wireless systems. The frequencies can be used with Digital Hybrid and analog Lectrosonics wireless equipment. Compatibility with other brands is likely, but not guaranteed by Lectrosonics.

The table provides two different sets of pre-coordinated frequencies for frequency blocks 470 through 33. The table is constructed to create a visual pattern of compatible frequencies to make it easier to use. The frequencies are stored in memory in various products and included in the receiver firmware.

Pre-coordinated frequencies are arranged in four groups as shown at right.

The uppermost eight frequencies comprise Grp a, the eight just below them comprise Grp b, and so on.

BLOCK 22

FREQ	SW SET	US TV CH
563.700	0,5	tv29
564.300	0,8	tv29
565.200	1,4	tv29
565.800	1,A	tv29
567.100	2,7	tv30
568.000	3,0	tv30
568.500	3,5	tv30
569.300	3,D	tv30
575.700	7,D	tv31
577.900	9,3	tv31
578.600	9,A	tv32
579.900	A,7	tv32
581.700	B,9	tv32
582.600	C,2	tv32
585.200	D,C	tv33
587.500	F,3	tv33

Grp a

Grp b

Grp c

Grp d

Displayed as "GROUP a" through "GROUP d" in the LCD

BLOCK 22

FREQ	SW SET	US TV CH
570.100	4,5	tv30
570.700	4,B	tv30
571.600	5,4	tv30
572.200	5,A	tv31
573.200	6,4	tv31
574.400	7,0	tv31
574.900	7,5	tv31
575.500	7,B	tv31
581.100	B,3	tv32
582.100	B,D	tv32
582.600	C,2	tv32
584.300	D,3	tv32
585.000	D,A	tv32
585.600	E,0	tv32
586.300	E,7	tv32
588.100	F,9	tv32

BLOCK 470	BLOCK 19	BLOCK 20	BLOCK 21	BLOCK 22	BLOCK 23	BLOCK 24	BLOCK 25
Grp A	Grp A	Grp A	Grp A	Grp A	Grp A	Grp A	Grp A
NOT AVAILABLE	486.900	512.500	538.100	563.700	589.300	614.900	640.500
NOT AVAILABLE	487.500	513.100	538.700	564.300	589.900	615.500	641.100
NOT AVAILABLE	488.400	514.000	539.600	565.200	590.800	616.400	642.000
NOT AVAILABLE	489.000	514.600	540.200	565.800	591.400	617.000	642.600
NOT AVAILABLE	490.300	515.900	541.500	567.100	592.700	618.300	643.900
NOT AVAILABLE	491.200	516.800	542.400	568.000	593.600	619.200	644.800
NOT AVAILABLE	491.700	517.300	542.900	568.500	594.100	619.700	645.300
NOT AVAILABLE	492.500	518.100	543.700	569.300	594.900	620.500	646.100
473.300	498.900	524.500	550.100	575.700	601.300	626.900	652.500
475.500	501.100	526.700	552.300	577.900	603.500	629.100	654.700
476.200	501.800	527.400	553.000	578.600	604.200	629.800	655.400
477.500	503.100	528.700	554.300	579.900	605.500	631.100	656.700
479.300	504.900	530.500	556.100	581.700	607.300	632.900	658.500
480.200	505.800	531.400	557.000	582.600	NOT AVAILABLE	633.800	659.400
482.800	508.400	534.000	559.600	585.200	NOT AVAILABLE	636.400	662.000
485.100	510.700	536.300	561.900	587.500	NOT AVAILABLE	638.700	664.300

BLOCK 470	BLOCK 19	BLOCK 20	BLOCK 21	BLOCK 22	BLOCK 23	BLOCK 24	BLOCK 25
Grp C	Grp C	Grp C	Grp C	Grp C	Grp C	Grp C	Grp C
NOT AVAILABLE	493.300	518.900	544.500	570.100	595.700	621.300	646.900
NOT AVAILABLE	493.900	519.500	545.100	570.700	596.300	621.900	647.500
NOT AVAILABLE	494.800	520.400	546.000	571.600	597.200	622.800	648.400
NOT AVAILABLE	495.400	521.000	546.600	572.200	597.800	623.400	649.000
NOT AVAILABLE	496.400	522.000	547.600	573.200	598.800	624.400	650.000
NOT AVAILABLE	497.600	523.200	548.800	574.400	600.000	625.600	651.200
NOT AVAILABLE	498.100	523.700	549.300	574.900	600.500	626.100	651.700
NOT AVAILABLE	498.700	524.300	549.900	575.500	601.100	626.700	652.300
478.700	504.300	529.900	555.500	581.100	606.700	632.300	657.900
479.700	505.300	530.900	556.500	582.100	607.700	633.300	658.900
480.200	505.800	531.400	557.000	582.600	NOT AVAILABLE	633.800	659.400
481.900	507.500	533.100	558.700	584.300	NOT AVAILABLE	635.500	661.100
482.600	508.200	533.800	559.400	585.000	NOT AVAILABLE	636.200	661.800
483.200	508.800	534.400	560.000	585.600	NOT AVAILABLE	636.800	662.400
483.900	509.500	535.100	560.700	586.300	NOT AVAILABLE	637.500	663.100
485.700	511.300	536.900	562.500	588.100	NOT AVAILABLE	639.300	664.900

**\* NOTE: These frequencies can also be manually tuned with block 470 modules**



## Compatibility Diagram

Compatibility follows the pattern illustrated in the diagram at right.

**Grp a** and **Grp b** contain the 16 frequencies shown in the table below (upper orange/white set).

**Grp c** and **Grp d** contain the 16 frequencies shown in the table below (lower blue/white set).

**NOTE:** There is no assurance that frequencies are compatible between the upper orange/white set and the lower blue/white set. Combined use of frequencies from both sets requires testing with the procedures outlined in the following section entitled **Diagnostics - Multi-channel System Checkout**

These frequencies share RF spectrum with TV channels. The upper orange/white set and the lower blue/white set of frequencies provide two different lists of TV channels. Use the set with fewer active TV stations in the area where you are operating. Active TV station signals can be discovered by scanning with the Venue receiver.

All 16 within the same block are compatible

The upper eight are compatible with the lower eight in the adjacent blocks.

The lower eight are compatible with the upper eight in the adjacent blocks.

BLOCK 24				BLOCK 25			
FREQ	SW SET	US TV CH		FREQ	SW SET	US TV CH	
621.300	4.5	n/39		646.900	4.5	n/43	
621.900	4.8	n/39		647.500	4.8	n/43	
622.800	5.4	n/39		648.400	5.4	n/43	
623.400	5.8	n/39		649.000	5.8	n/43	
624.400	6.4	n/39		650.000	6.4	n/43	
625.600	7.0	n/39		651.200	7.0	n/44	
626.100	7.5	n/40		651.700	7.5	n/44	
626.700	7.8	n/40		652.300	7.8	n/44	
632.300	8.3	n/41		657.900	8.3	n/45	
633.300	8.0	n/41		658.900	8.0	n/45	
633.800	8.2	n/41		659.400	8.2	n/45	
635.500	8.3	n/41		661.100	8.3	n/45	
636.200	8.4	n/41		661.800	8.4	n/45	
636.800	8.0	n/41		662.400	8.0	n/46	
637.500	8.7	n/41		663.100	8.7	n/46	
639.300	8.9	n/42		664.900	8.9	n/46	

BLOCK 24				BLOCK 25			
FREQ	SW SET	US TV CH		FREQ	SW SET	US TV CH	
621.300	4.5	n/39		646.900	4.5	n/43	
621.900	4.8	n/39		647.500	4.8	n/43	
622.800	5.4	n/39		648.400	5.4	n/43	
623.400	5.8	n/39		649.000	5.8	n/43	
624.400	6.4	n/39		650.000	6.4	n/43	
625.600	7.0	n/39		651.200	7.0	n/44	
626.100	7.5	n/40		651.700	7.5	n/44	
626.700	7.8	n/40		652.300	7.8	n/44	
632.300	8.3	n/41		657.900	8.3	n/45	
633.300	8.0	n/41		658.900	8.0	n/45	
633.800	8.2	n/41		659.400	8.2	n/45	
635.500	8.3	n/41		661.100	8.3	n/45	
636.200	8.4	n/41		661.800	8.4	n/45	
636.800	8.0	n/41		662.400	8.0	n/46	
637.500	8.7	n/41		663.100	8.7	n/46	
639.300	8.9	n/42		664.900	8.9	n/46	

BLOCK 24				BLOCK 25			
FREQ	SW SET	US TV CH		FREQ	SW SET	US TV CH	
621.300	4.5	n/39		646.900	4.5	n/43	
621.900	4.8	n/39		647.500	4.8	n/43	
622.800	5.4	n/39		648.400	5.4	n/43	
623.400	5.8	n/39		649.000	5.8	n/43	
624.400	6.4	n/39		650.000	6.4	n/43	
625.600	7.0	n/39		651.200	7.0	n/44	
626.100	7.5	n/40		651.700	7.5	n/44	
626.700	7.8	n/40		652.300	7.8	n/44	
632.300	8.3	n/41		657.900	8.3	n/45	
633.300	8.0	n/41		658.900	8.0	n/45	
633.800	8.2	n/41		659.400	8.2	n/45	
635.500	8.3	n/41		661.100	8.3	n/45	
636.200	8.4	n/41		661.800	8.4	n/45	
636.800	8.0	n/41		662.400	8.0	n/46	
637.500	8.7	n/41		663.100	8.7	n/46	
639.300	8.9	n/42		664.900	8.9	n/46	

BLOCK 26		BLOCK 27		BLOCK 28		BLOCK 29		BLOCK 30		BLOCK 31		BLOCK 32		BLOCK 33	
FREQ	SW SET	FREQ	SW SET	FREQ	SW SET	FREQ	SW SET	FREQ	SW SET	FREQ	SW SET	FREQ	SW SET	FREQ	SW SET
666.100	0.5	691.700	0.5	717.300	0.5	742.900	0.5	768.500	0.5	794.100	0.5	819.700	0.5	845.300	0.5
666.700	0.8	692.300	0.8	717.900	0.8	743.500	0.8	769.100	0.8	794.700	0.8	820.300	0.8	845.900	0.8
667.600	1.4	693.200	1.4	718.800	1.4	744.400	1.4	770.000	1.4	795.600	1.4	821.200	1.4	846.800	1.4
668.200	1.8	693.800	1.8	719.400	1.8	745.000	1.8	770.600	1.8	796.200	1.8	821.800	1.8	847.400	1.8
669.500	2.7	695.100	2.7	720.700	2.7	746.300	2.7	771.900	2.7	797.500	2.7	823.100	2.7	848.700	2.7
670.400	3.0	696.000	3.0	721.600	3.0	747.200	3.0	772.800	3.0	798.400	3.0	824.000	3.0	849.600	3.0
670.900	3.5	696.500	3.5	722.100	3.5	747.700	3.5	773.300	3.5	798.900	3.5	824.500	3.5	850.100	3.5
671.700	3.0	697.300	3.0	722.900	3.0	748.500	3.0	774.100	3.0	799.700	3.0	825.300	3.0	850.900	3.0
678.100	7.0	703.700	7.0	729.300	7.0	754.900	7.0	780.500	7.0	806.100	7.0	831.700	7.0	857.300	7.0
680.300	9.3	705.900	9.3	731.500	9.3	757.100	9.3	782.700	9.3	808.300	9.3	833.900	9.3	859.500	9.3
681.000	9.8	706.600	9.8	732.200	9.8	757.800	9.8	783.400	9.8	809.000	9.8	834.600	9.8	860.200	9.8
682.300	A.7	707.900	A.7	733.500	A.7	759.100	A.7	784.700	A.7	810.300	A.7	835.900	A.7	861.500	A.7
684.100	B.9	709.700	B.9	735.300	B.9	760.900	B.9	786.500	B.9	812.100	B.9	837.700	B.9	NOT AVAILABLE	
685.000	C.2	710.600	C.2	736.200	C.2	761.800	C.2	787.400	C.2	813.000	C.2	838.600	C.2	NOT AVAILABLE	
687.600	D.C	713.200	D.C	738.800	D.C	764.400	D.C	790.000	D.C	815.600	D.C	841.200	D.C	NOT AVAILABLE	
689.900	F.3	715.500	F.3	741.100	F.3	766.700	F.3	792.300	F.3	817.900	F.3	843.500	F.3	NOT AVAILABLE	

BLOCK 26		BLOCK 27		BLOCK 28		BLOCK 29		BLOCK 30		BLOCK 31		BLOCK 32		BLOCK 33	
FREQ	SW SET	FREQ	SW SET	FREQ	SW SET	FREQ	SW SET	FREQ	SW SET	FREQ	SW SET	FREQ	SW SET	FREQ	SW SET
672.500	4.5	698.100	4.5	723.700	4.5	749.300	4.5	774.900	4.5	800.500	4.5	826.100	4.5	851.700	4.5
673.100	4.8	698.700	4.8	724.300	4.8	749.900	4.8	775.500	4.8	801.100	4.8	826.700	4.8	852.300	4.8
674.000	5.4	699.600	5.4	725.200	5.4	750.800	5.4	776.400	5.4	802.000	5.4	827.600	5.4	853.200	5.4
674.600	5.8	700.200	5.8	725.800	5.8	751.400	5.8	777.000	5.8	802.600	5.8	828.200	5.8	853.800	5.8
675.600	6.4	701.200	6.4	726.800	6.4	752.400	6.4	778.000	6.4	803.600	6.4	829.200	6.4	854.800	6.4
676.800	7.0	702.400	7.0	728.000	7.0	753.600	7.0	779.200	7.0	804.800	7.0	830.400	7.0	856.000	7.0
677.300	7.5	702.900	7.5	728.500	7.5	754.100	7.5	779.700	7.5	805.300	7.5	830.900	7.5	856.500	7.5
677.900	7.8	703.500	7.8	729.100	7.8	754.700	7.8	780.300	7.8	805.900	7.8	831.500	7.8	857.100	7.8
683.500	B.3	709.100	B.3	734.700	B.3	760.300	B.3	785.900	B.3	811.500	B.3	837.100	B.3	NOT AVAILABLE	
684.500	B.D	710.100	B.D	735.700	B.D	761.300	B.D	786.900	B.D	812.500	B.D	838.100	B.D	NOT AVAILABLE	
685.000	C.2	710.600	C.2	736.200	C.2	761.800	C.2	787.400	C.2	813.000	C.2	838.600	C.2	NOT AVAILABLE	
686.700	D.3	712.300	D.3	737.900	D.3	763.500	D.3	789.100	D.3	814.700	D.3	840.300	D.3	NOT AVAILABLE	
687.400	D.A	713.000	D.A	738.600	D.A	764.200	D.A	789.800	D.A	815.400	D.A	841.000	D.A	NOT AVAILABLE	
688.000	E.0	713.600	E.0	739.200	E.0	764.800	E.0	790.400	E.0	816.000	E.0	841.600	E.0	NOT AVAILABLE	
688.700	E.7	714.300	E.7	739.900	E.7	765.500	E.7	791.100	E.7	816.700	E.7	842.300	E.7	NOT AVAILABLE	
690.500	F.9	716.100	F.9	741.700	F.9	767.300	F.9	792.900	F.9	818.500	F.9	844.100	F.9	NOT AVAILABLE	

## Frequency Coordination

IM (intermodulation) is a process of two or more RF signals mixing in any stage in the transmitter or receiver that generates another RF signal. If this new signal happens to land on a carrier, IF or oscillator frequency you may have interference problems that affect range or audio quality. The possible combinations also include odd and even order harmonics of the carriers.

Feel free to contact the factory if you need help in coordinating frequencies. A specialized computer program is used 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 Lectrosonics® wireless microphone and wireless IFB systems.

Even with thorough analysis, interference can still be present from local sources that cannot be predicted in advance. This makes it mandatory to check out a multi-channel system before the production or use begins.

## Multi-channel System Checkout

Interference can result from a wide variety of sources including TV station signals, other wireless equipment in use nearby, or from intermodulation within a multi-channel wireless system itself.

The pre-coordinated frequencies on the chart on the previous pages address in-system compatibility, but obviously do not take into account RF signals from external sources that may be present in the location where the system will be operating.

Using the scanning process with the RF spectrum analyzer will identify external RF signals, but it does not address the compatibility of the selected frequencies.

It is always good practice, therefore, to go through the following steps to make sure the frequencies that are chosen are compatible within themselves and also free from external interference.

1. **Set up the system for testing.** Place antennas in the position they will be used and connect to the receivers. Place transmitters about 3 to 5 feet apart, about 25 to 30 feet from the receiver antennas. If possible, have all other equipment on the set, stage or location turned on as well, especially any mixing or recording equipment that will be used with the wireless system.
2. **Set all receivers on clear channels.** Turn on all receivers, but leave the transmitters off. Look at the RF level display on each receiver. If an indication is present, change the frequency to a clear channel where no signal is indicated. If a completely clear channel cannot be found, set it for the one with the lowest RF level indication. Once all receivers are on clear channels, go to the next step.
3. **Turn each transmitter on one at a time.** Leave the other transmitters turned off. Then, as you turn on each one, look at the matching receiver to verify a strong RF signal is received. Then, look at the other receivers and see if one of them is also picking up the signal. Only the matching receiver should indicate a signal. Change frequencies on either system slightly until it will pass this test, then check again to see that all receivers are still on clear channels as in Step 2.
4. **Turn each transmitter off one at a time.** With all transmitters and receivers turned on, turn each transmitter off one at a time and look at the RF level indicator on the matching receiver. It should “fall silent” and 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.

**IMPORTANT:** Any time a frequency is changed on any of the systems in use, you must start at the beginning and go through this procedure again for all systems. With a little practice, you will be able to do this quickly and save yourself some grief.

# Troubleshooting

## Symptom

## Possible Cause

### INITIAL POWER ON

**LCD display not active or lit**

External power supply disconnected or inadequate.

Wrong polarity power source. The external power input jack requires POSITIVE (+) to be on the center pin. Battery gets warm and doesn't work.

Battery may be low. Try fresh batteries.

**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 RF signal is present that is not centered on the channel, and the audio is likely to be distorted.

There are three principal causes:

- 1) The transmitter is set to the wrong channel, but close to the correct channel. Check frequency setting of transmitter.
- 2) A foreign signal is causing the condition, such as from a local TV station or from intermodulation from another transmitter. Retune the receiver and transmitter to a clear frequency.
- 3) The transmitter carrier frequency is not correct (rare occurrence). Contact factory for repair.

If any of these solutions don't remove the warning message, the transmitter or receiver may need repair.

**Display indicates CHECK FREQ**

This is a warning that Channel 2 frequency is set 4.3 to 4.7 MHz below Channel 1 frequency. Solution is to move ONE of the Channel frequencies at least 600 khz (six 100khz steps) either higher or lower.

### PILOT TONE SQUELCH

**Pilot Tone indicator (P) present, but no sound (Check audio meter first)**

Audio output cable bad or disconnected.

Audio Output level too low. Use the built-in test tone to verify levels.

**Pilot Tone Indicator (P) keeps flashing when transmitter 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 transmitter in use. (See SEL selections from Main Window, COMPAT Window.)

**Noise on audio and Pilot Tone Indicator is "b"**

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

## Symptom

## Possible Cause

### Pilot Tone Indicator not present but receiving audio

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 400 Series, the PILOT indicator on the LCD 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 tone bypass" causes a lowercase "b" to appear on the LCD main window and forcing the squelch to open and deliver audio. When no matching transmitter is turned on, loud noise will be present at the receiver output.

## ANTENNAS AND RF SIGNAL STRENGTH

### RF Level is weak

Receiver may need to be moved or reoriented.

Antenna on transmitter or receiver may be defective or poorly connected - double check antennas.

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 SRa5P 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 SRa5P and lowering the input gain on the device the SRa5P 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 SRa5P is feeding. Lower the output level of the SRa5P.

### 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 470	470.100 - 495.600
Block 19	486.400 - 511.900
Block 20	512.000 - 537.500
Block 21	537.600 - 563.100
Block 22	563.200 - 588.700
Block 23	588.800 - 607.900 and 614.100 - 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 - 819.100
Block 32	819.200 - 844.700
Block 33	844.800 - 861.900

(Frequency usage varies by country)

Frequency Adjustment Range:	25.5 MHz in 100kHz steps
Channel Separation:	100 kHz
Receiver Type:	Dual conversion, superheterodyne
IF Frequencies:	Ch. 1: 243.950 MHz and 250.000 kHz Ch. 2: 248.450 MHz and 350.000 kHz
Frequency Stability:	±0.001 %
Front end bandwidth:	26 MHz @ -3 dB
Sensitivity	
20 dB SINAD:	2 µV (-101 dBm), A weighted
60 dB Quieting:	4 µV (-95 dBm), A weighted
(Single antenna measurement)	
Squelch quieting:	Greater than 100 dB typical
AM rejection:	Greater than 60 dB, 4 µV to 1 Volt
Modulation acceptance:	85 kHz
Image and spurious rejection:	85 dB
Third order intercept:	0 dBm
Diversity method:	SmartDiversity™ phased antenna combining or Ratio Diversity using both receivers for a single audio channel
FM Detector:	Digital Pulse Counting Detector operating at 250 and 350 kHz

## RF spectrum analyzer:

## Antenna inputs:

## Audio outputs connectors:

## Audio output level:

## Audio channel crosstalk:

## Front Panel Controls and Indicators:

## Audio test tone:

## Transmitter battery type Selection:

## Phase invert:

## SmartNR (noise reduction):

## Audio Performance (overall system):

### Frequency Response:

### THD:

### Signal to Noise Ratio (dB):

### Total Harmonic Distortion:

### Input Dynamic Range:

## Rear Panel Controls and features:

## Powering Options (external DC):

## Transmitter battery level tracking:

## Operating temperature:

## LCD visible temperature range:

## Weight:

## Dimensions:

Coarse and fine scanning modes for RF spectrum site survey

## SMA jacks

- Interchangeable D connector plates; nominal 1k ohm unbalanced
- Dual TA3 male (mini XLR) balanced output adapter
- Balanced output adapter with fixed cables
- Front panel TA5M with two balanced outputs
- Adjustable -50 to +5 dBu in 1 dB steps; unbalanced output is 6 dB lower

-80 dB or better

- Sealed panel with membrane switches
- LCD monitors pilot tone; antenna phase, receiver battery level; transmitter battery status; audio level, RF level

1 kHz, -50 dBu to +5 dBu output (bal); 1% THD

9V alkaline, 9V lithium, AA alkaline, AA lithium, NiMH

Audio output phase normal or inverted

OFF, NORMAL, FULL modes

(available in 400 Series mode only)

(These specs apply to hybrid mode only)

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

0.3% (system) typical in 400 mode

95 dB or better (overall system, 400 Series mode)

0.2% typical (400 Series mode)

95 dB (with full Tx limiting)

XLR audio output jack;

External DC input;

Battery compartment access

Min. 6 V to max. 18 Volts DC; 1.4 W

80 mA at 18 VDC

115 mA at 12 VDC

180 mA at 7.2 VDC

200 mA at 6 VDC

LCD display with "bottle" icon and timer readout

-40° C to +75° C

-25° C to +75° C

195 grams (7 ozs.) with SRaEXT adapter

2.68" wide x .72" high x 3.52" deep  
(68 mm x 18 mm x 89 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 and then go through the **Troubleshooting** section in this manual.

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

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

### Returning Units for Repair

For timely service, please follow the steps below:

- A.** DO NOT return equipment to the factory for repair without first contacting us by email 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:

##### Mailing address:

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

##### Shipping address:

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

##### Telephone:

(505) 892-4501  
(800) 821-1121 Toll-free  
(505) 892-6243 Fax

##### Web:

www.lectrosonics.com

##### E-mail:

sales@lectrosonics.com

#### Lectrosonics Canada:

##### Mailing Address:

49 Spadina Avenue,  
Suite 303A  
Toronto, Ontario M5V 2J1

##### Telephone:

(416) 596-2202  
(877) 753-2876 Toll-free  
(877-7LECTRO)  
(416) 596-6648 Fax

##### E-mail:

Sales: colinb@lectrosonics.com  
Service: joeb@lectrosonics.com



**BACL**  
Bay Area Compliance Laboratories Corp.

Opinion Number: R0903029

**DIRECTIVE 1999/5/EC  
NOTIFIED BODY STATEMENT OF OPINION**  
Bay Area Compliance Laboratories Corp.

Date of Issue:	2009-05-31
Applicant Details:	Lectrosonics, Inc. 581 Laser Road, Rio Rancho, NM 87124, USA
Model:	SRA5P/E01 and SRA/E01
Equipment Type:	UHF Camera Mount Slot Dual Receiver
Serial Number:	R0941 (For model SRA5P/E01 assigned by BACL)
Network Interface:	N/A
Frequency Range:	470.1 - 475.0 MHz 665.0 - 691.1 MHz 844.8 - 862.0 MHz
RF Output Power:	N/A
Modulation Type:	FM
Antenna Type:	Dipole Antenna Antenna Gain < 2.15 dBi
Notified Body ID:	Bay Area Compliance Laboratories Corp. 1274 Anselwood Ave. Sunnyvale, CA 94089, USA Tel: 1-408/732-9162 Fax: 1-408/732-9164 www.baclcorp.com

Essential Requirements	Specifications / Standards	TCF Identification	Results
Radio Spectrum, Article 3.2	EN 300 422-2 v1.2.2 (2008-01)	R0903029-422	Compliant
EMC, Article 3.1(b)	EN 301 489-9 v1.4.1 (2007-11)	R0903029-12	Compliant
Safety, Article 3.1(a)	EN 60950-1:2001+A11.1:2004	R0903029-3	Compliant

Our opinion in accordance with Annex IV of Council Directive 1999/5/EC on radio equipment and telecommunications equipment and the mutual recognition of their conformity is that the apparatus identified above **complies** with the requirements of that directive stated above.

Marking: It is recommended that the product bear the CE mark, the notified body number(s) as depicted to the right, only when all the essential requirements have been met, and a Manufacturer's Declaration of Conformity (EN 45001) has been filed with the European Commission.  
Number of Annexes to this statement: 1

CE 1313 01

Authorized by:   
John Chan, Technical Expert

Bay Area Compliance Laboratories Corp. 1274 Anselwood Ave, Sunnyvale, CA 94089, U.S.A.  
Tel: (408)732-9162 Fax: (408)732-9164



### EU Declaration of Conformity

LECTROSONICS, INC.  
581 Laser Road  
Rio Rancho, NM 87124 USA

Declare under our sole responsibility that the following products,

SRA5P/E01 and SRA/E01 Receiver

to which this Declaration relates, are in conformity with the following requirements:

Radio Spectrum R&TTE 1999/5/EEC, Article 3.2  
Standard: EN 300 422 v1.2.2 (2008-03)  
BACL test reports: R0903029-422

EMC Directive 89/336/EEC, Article 3.1(b)  
Standard: EN 301 489-9 v1.4.1 (2007-11)  
BACL reports: R0903029-12

Safety/Low Voltage Directive 1999/5/EC, Article 3.1(a)  
Standard: EN 60950-1:2001+A11.1:2004  
BACL reports: R0903029-3

Signed:  Date: 12 June 2009

Name: ROBERT CUNNINGHAM

Title: V.P. Engineering

Postal address:

LECTROSONICS, INC., PO Box 15900, Rio Rancho, NM 87174 USA

## LIMITED ONE YEAR WARRANTY

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

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

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

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

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

