INSTRUCTION MANUAL

SRb5P & SRb

Camera Slot Dual UHF Receiver



Featuring

Digital Hybrid Wireless® Technology

U.S. Patent 7,225,135

See Quick Start Summary on page 2

Follow Us On:

Fill in for your records:

Serial Number:

Purchase Date:

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

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 DIVMODE for single or dual channel operation (see page 15,16).
- 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).
- 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 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).

IMPORTANT:

FREQ. WARNING

Performance will be degraded if Receiver 2 is set 4.2 to 4.8 MHz higher than Receiver 1. The LCD will also flash this message periodically.

Table of Contents

Digital Hybrid Wireless® 4
Model Differences 4
SRb 4
SRb5P 4
General Technical Description 5
RF Front-End and Mixer 6
Microcontroller, PLL and VCO Circuits 6
IF Amplifiers and SAW Filters 6
Digital Pulse Counting Detector 6
DSP-Based Pilot Tone 6
SmartSquelch™ 6
Smart Noise Reduction (SmartNR™) 6
Supersonic Noise-Based Dynamic Filter and Squelch 7
Talkback Function 7
Turn On and Turn Off Delays 7
Audio Output Level 7
Test Tone 7
Power Supply 7
LCD Display 7
Front Panel Controls and Functions 8
Audio Outputs 8
LCD Screen 8
MENU/SEL Button 8
PWR/BACK Button 8
UP/DOWN Arrow Buttons 8
Rear Panel and Adapters 8
Camera Slot Adapters 9
Installing Camera Slot Adapters 9
Adapters for Stand-Alone Use 10
Installing Rear Panel Adapters 10
Replacement Screw Kits 10
Battery Adapter 10
Audio Output Cables 11
External Power Cables 11
Mounting and Orientation 12
AMJ Rev. A Jointed Antenna 13
LCD Main Window 14
Navigating the LCD 15
Main Window 16
Frequency Screen 16
Setup Screens 16
Menu Items 16
Front Panel Shortcuts 18
Locking and Unlocking the Front Panel Controls 18
LCD Backlight Setup 18
Scanning for Clear Frequencies 19
Scan Window 19
Zoom View Window 19
Pre-coordinated Frequencies 20
Frequency Coordination 21
Multi-channel System Checkout 21
Troubleshooting 22
Specifications and Features 25
Service and Repair 26
Returning Units for Repair 26

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. The result delivers 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.

Model Differences



SRb

This is the basic receiver with audio outputs on the rear panel only.

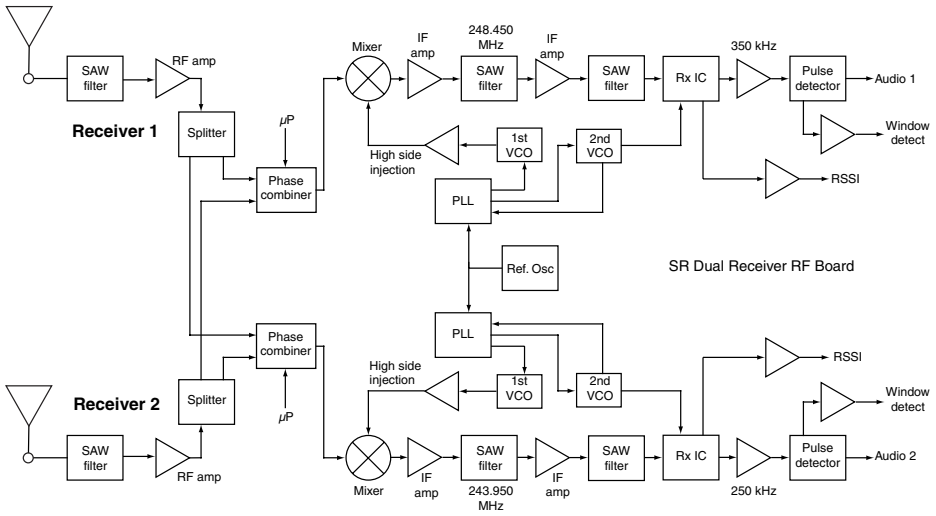


SRb5P

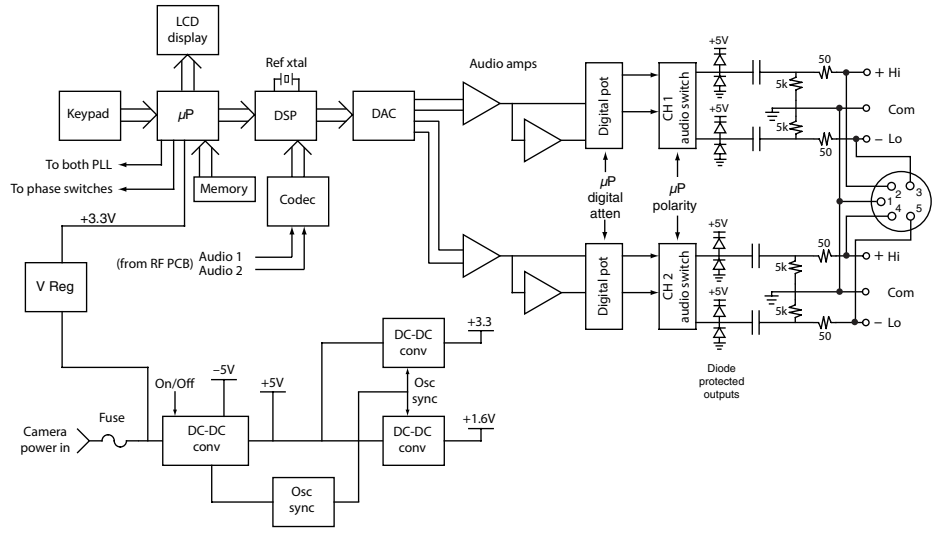
An additional audio output is provided next to the front panel for use with cameras that have only one audio input in the mounting slot. When the receiver is used outside of a camera, this extra audio output can be used to feed a recorder or IFB transmitter while the rear panel audio outputs feed a mixer or camera.

General Technical Description

RF PCB Block Diagram



Audio PCB Block Diagram



The design 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 settings. Audio outputs are provided on the rear panel for camera slots or other audio devices, and in the case of the SRb5P, also 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 simplify finding clear operating frequencies.

SmartDiversity™ 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 SRb5P and SRb 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, and control the squelch, the audio output attenuator, the PLL/VCO circuits and the antenna phase switch.

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.

After the SAW filter, the IF signal is converted to 350 kHz in receiver 1 and 250 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 (±75 kHz) system, it offers outstanding AM rejection over a very wide range of signal strengths and improved noise performance.

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). 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 to the Digital Hybrid mode. In 200 Series, IFB and Mode 6 compatibility, 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 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, 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 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 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 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.

Talkback Function

The ***Talkback*** function works with the HH hand held transmitter to use one of the output channels for communication with staff and crew. One of the audio outputs is connected to the mixer, recorder or house feed. The other output is connected to a "com" channel.

When the talkback button on the transmitter is pressed, the audio output on the receiver is switched to the opposite output jack. When the button is released, the audio output toggles back to the original output jack.

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 or other transient noise.

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 SRb5P or SRb, 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 SRb5P and SRb 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.

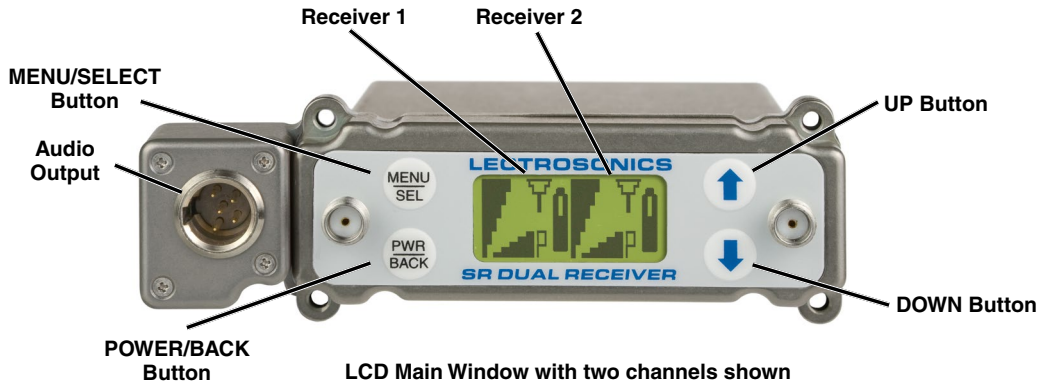
LCD Display

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

If a battery gets low on one of 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.

Front Panel Controls and Functions



LCD Main Window with two channels shown

Audio Outputs

A second set of audio outputs is provided next to the front panel for use with cameras that have only one audio channel enabled in the slot. One channel can feed the connector in the camera slot, and the second channel can be connected to the external audio jack on the camera with a cable. When the receiver is used outside of a camera, the front panel jack can be used to feed audio to a recorder, IFB transmitter or camera while the rear panel outputs feed the main production mixer.

The front panel 5-pin connector (TA5M type) 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 or external supply 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

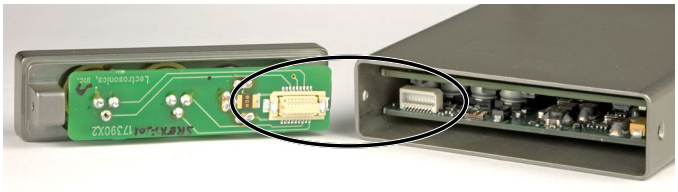
The UP and DOWN arrow buttons are used to select various options and adjust values in the setup screens, and provide secondary functions such as locking out the panel to guard against accidental changes.

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.

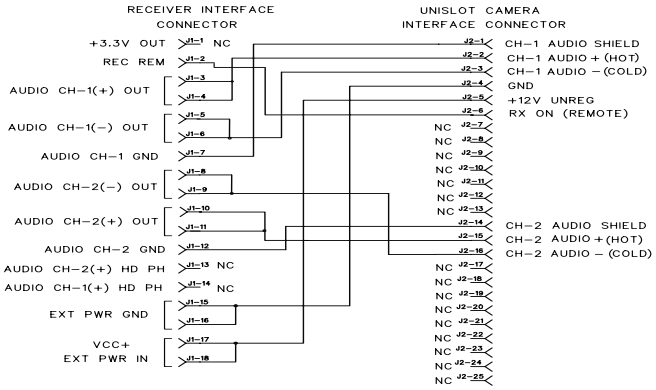


Camera Slot Adapters

SRSUPER



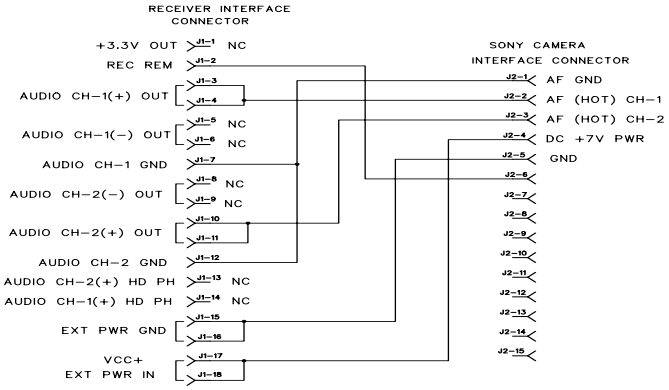
Adapter kit for Unislot® camera slots such as those provided on Ikegami® and Panasonic® cameras.* Includes bezel, hardware and rear panel DB25 connector wired for power and audio connections.



SRSNY



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



** 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.

Installing Camera Slot Adapters

SRSUPER 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.

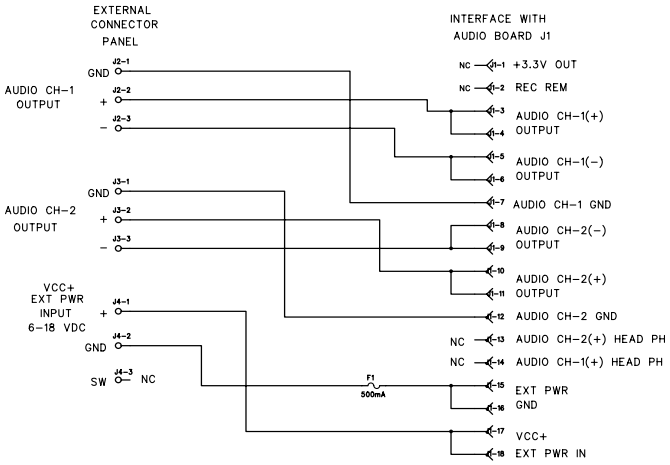
NOTE: If you are having difficulty inserting the receiver into the camera slot, try mounting the blue adapter plate to the camera first, then inserting the receiver.

Adapters for Stand-Alone Use

SREXT



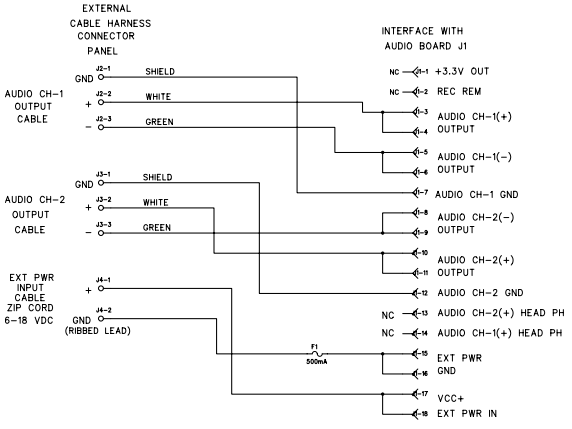
For stand-alone use, this kit includes a rear panel with two TA3 male jacks for the balanced outputs and a power jack with a locking connector. Trim the power cable to the desired length.



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.



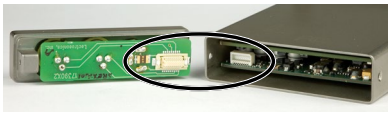


Installing Rear Panel Adapters

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.

Replacement Screw Kits



SRSNYSCREWKIT

Contains:
5 - #28863 (smaller mid-length)
5 - #28864 (larger mid-length)
5 - #28869 (shortest)*
* For Housing



SRSUPERSCREWKIT

Contains:
3 - #28862 (longest)
5 - #28864 (mid-length)
3 - #28869 (shortest)*
* For Housing

Battery Adapter



The receiver can be powered with an optional "battery sled" adapter that attaches to the top or bottom outside of the housing (Lectrosonics Model SRBATT-SLED). 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 unit has an integral circuit that automatically selects between the battery or the external source, whichever delivers the highest voltage.

Audio Output Cables

MCSR5PXLR5P



Right angle TA5F plug to 5-pin XLR; balanced outputs; 25 inches long. For TA5M output jacks.

MCSR5PXLR2



Right angle TA5F plug to two 3-pin XLR; balanced outputs; 20 inches long. For TA5M output jacks.

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

MCSRXLR



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 Supply



DCR12/A5U

AC power supply for IFBT4 transmitters; 100-240 V, 50/60 Hz, 0.3 A input, 12 VDC regulated output; 7-foot cord with LZR threaded locking plug and interchangeable blades/posts for use in Europe, UK, Australia and USA (sold separately).

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

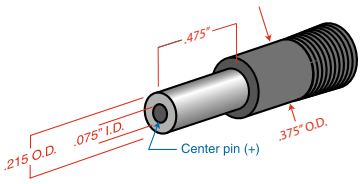


Hirose 7-4 pin to LZR type locking plug, 12" long.

21425

6 ft. long power cord; coaxial to stripped & tinned leads. Coaxial plug: ID-.080"; OD-.218"; Depth- .5".

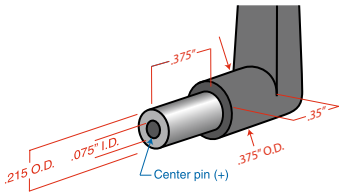




21472

6 ft. long power cord; coaxial to stripped & tinned leads. Right angle coaxial plug: ID-.075"; OD-.218"; Depth-.375"

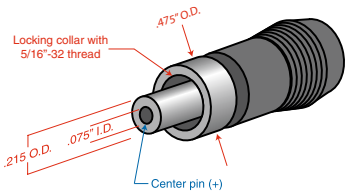




21586

DC16A Pigtail power cable, LZR stripped & tinned. Thread lock collar.

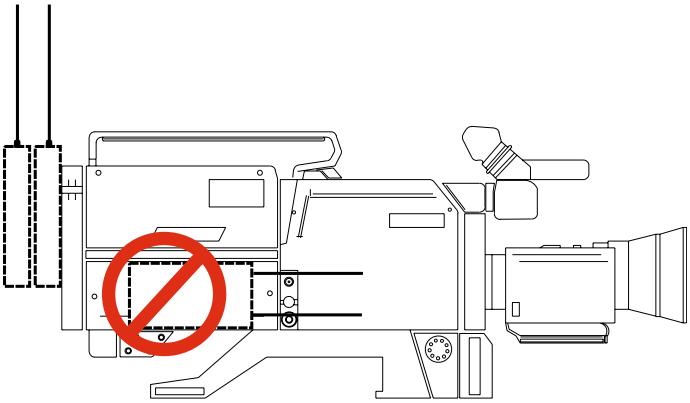




Mounting and Orientation

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 SRSLEEVE 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.

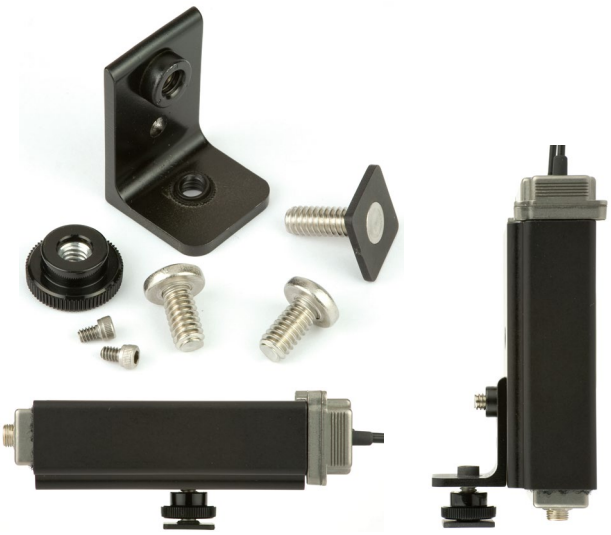
SRSLEEVE Mount

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 Shoe 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.

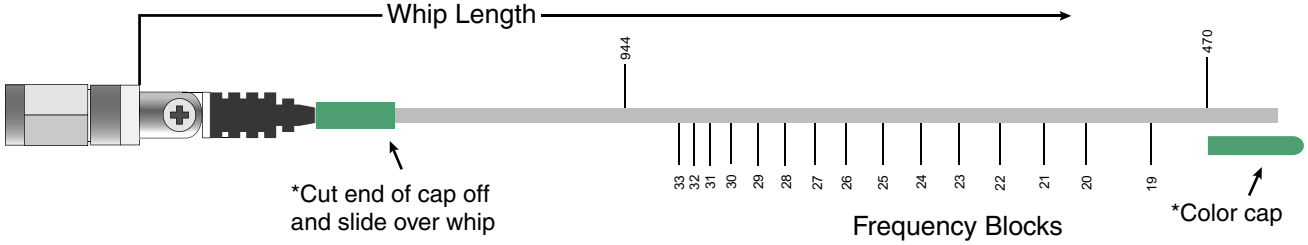
AMJ Rev. A Jointed Antenna

The AMJ antenna is a general purpose design for any Lectrosonics receiver or transmitter with a standard SMA connector. The hinged joint pivots in both directions for positioning the whip at any desired angle.



AMJ KIT CUTTING TEMPLATE

Lay uncut antenna on this template and cut to length for the desired frequency block



Trim the end of the color cap and slide the remaining sleeve over the whip - OR - Glue color cap onto the end

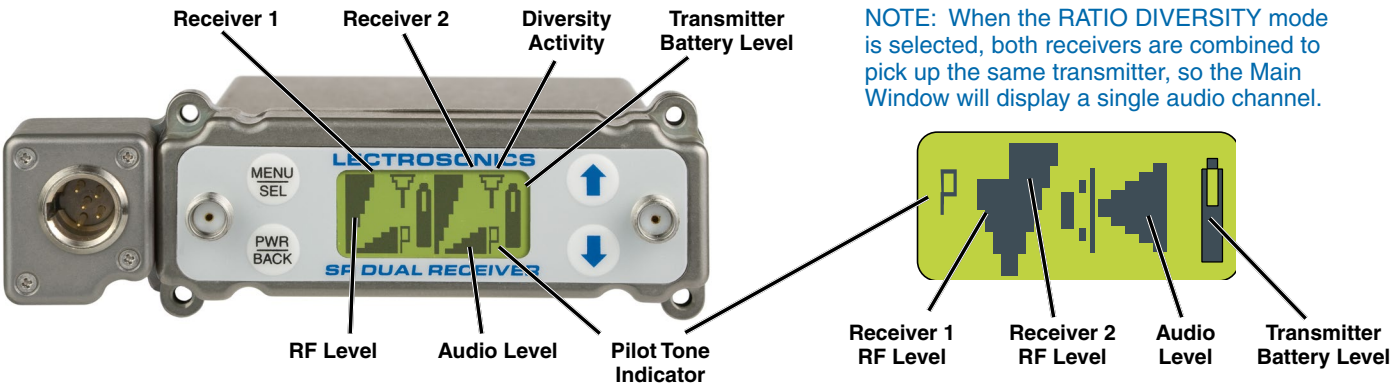
Note: Check the scale of your printout. This line should be 6.00 inches long (152.4 mm).

BLOCK	FREQUENCY RANGE	CAP/SLEEVE COLOR	ANTENNA WHIP LENGTH	
470	470.100 - 495.600	Black w/ Label	5.56”	141.2 mm
19	486.400 - 511.900	Black w/ Label	5.27”	133.9 mm
20	512.000 - 537.500	Black w/ Label	4.93”	125.2 mm
21	537.600 - 563.100	Brown w/ Label	4.71”	119.6 mm
22	563.200 - 588.700	Red w/ Label	4.48”	113.8 mm
23	588.800 - 614.300	Orange w/ Label	4.27”	108.5 mm
24	614.400 - 639.900	Yellow w/ Label	4.07”	103.4 mm
25	640.000 - 665.500	Green w/ Label	3.87”	98.3 mm
26	665.600 - 691.100	Blue w/ Label	3.68”	93.5 mm
27	691.200 - 716.700	Violet (Pink) w/ Label	3.52”	89.4 mm
28	716.800 - 742.300	Grey w/ Label	3.36”	85.3 mm
29	742.400 - 767.900	White w/ Label	3.22”	81.8 mm
30	768.000 - 793.500	Black-w/Label	3.08”	78.2 mm
31	793.600 - 819.100	Black-w/Label	2.97”	75.4 mm
32	819.200 - 844.700	Black-w/Label	2.89”	73.4 mm
33	844.800 - 865.000	Black-w/Label	2.81”	71.4 mm
944	944.100 - 951.900	Black-w/Label	2.53”	64.3 mm



The hinged joint pivots in both directions

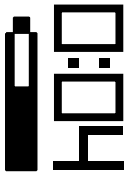
LCD Main Window



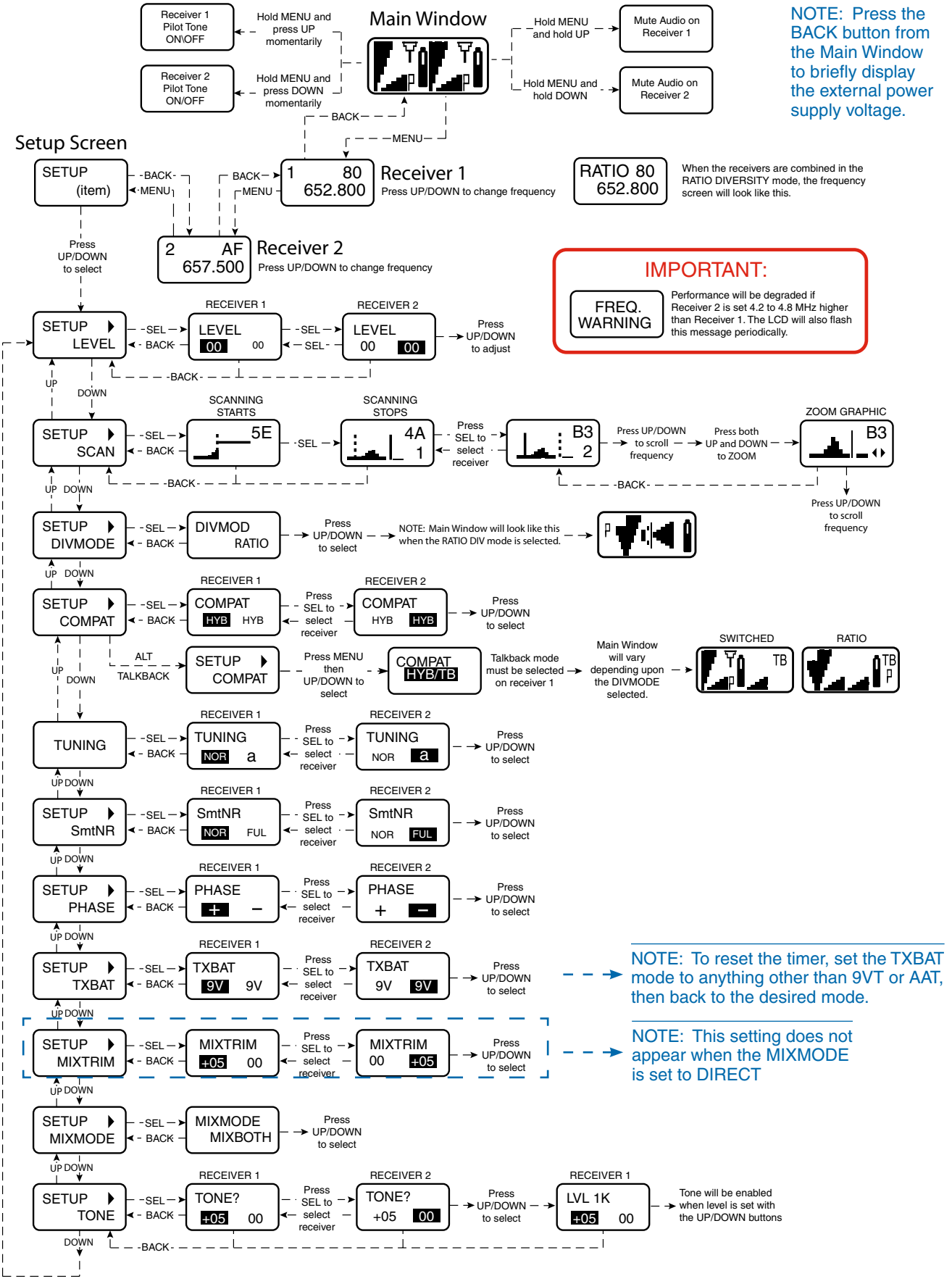
NOTE: When the RATIO DIVERSITY mode is selected, both receivers are combined to pick up the same transmitter, so the Main Window will display a single audio channel.

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 MENU/SEL button accesses the menus and screens for setting up the receiver and searching for clear frequency channels.

Icon	Description
	**Pilot Tone Indicator** 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 Digital Hybrid, 200 Series, IFB modes and Mode 6. 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 MENU/SEL button and press the UP button briefly. To bypass or enable the pilot tone on Receiver 2, hold MENU/SEL and press the DOWN button briefly. Bypassing the pilot tone also disables the squelch, regardless of which compatibility mode has been selected.
	**Channel Mute** The audio output can be muted on Receiver 1 by holding the MENU/SEL button and holding the UP button for about a second or more. Receiver 2 can be muted by holding MENU/SEL and then holding the DOWN button. The same buttons toggle the mute status off. An "M" will appear on the screen when a channel is muted. In ratio diversity mode, the UP button is used and a signal M appears.
	**Antenna Phase Indicator** This antenna icon is displayed when the SWITCHING DIVERSITY mode is selected. As the antenna phase is switched, the symbol will flip vertically.
	**RF Level** This icon changes in size vertically to indicate the strength of the incoming RF signal.
	**Audio Levels** 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.
	**Battery Levels** When the COMPAT mode is set for a compatibility mode that supports battery telemetry (Digital Hybrid and 200 Series), 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 other COMPAT modes are selected, this area of the LCD will be blank. 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 clockwise) and in this example is indicating 4 minutes. **To reset the battery timer, change the selection in TXBAT to something other than a timer mode (NOT AAT or 9VT).**

Navigating the LCD



NOTE: Press the BACK button from the Main Window to briefly display the external power supply voltage.

Main Window

The appearance of the LCD Main Window will change according to which diversity mode is selected:

- **SWITCH** (2-channel mode) splits the screen to indicate activity and levels on both receivers and transmitters.
- **RATIO** combines the audio outputs of both receivers to deliver a single audio channel.



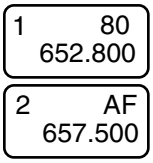
With the DIV MODE set to SWITCH, two audio channels will be displayed.



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

Frequency Screen

Press MENU/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, and again to return to the Main Window

In this example, the upper screen denotes that receiver ***1*** is set at ***652.800*** MHz, requiring that any transmitter with 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 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. (see the section on the next page entitled Using the Group Tuning Modes)

Setup Screens

From the Main Window, press MENU/SEL three times to enter the setup screens. Press UP and/or DOWN to scroll through the available items and press MENU/SEL to enter the desired screen. For those items that allow separate settings for each receiver, press MENU/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, then press BACK to return to the previous screen.

SHORTCUT: Hold the MENU/SEL button in while pressing the UP or DOWN arrow to jump in 16 channel increments (1.6 MHz steps).

Menu Items

LEVEL

This setup screen displays the audio output level of the receiver in dBu when the transmitter is fully modulated. Press the MENU/SEL button to toggle between receiver 1 and receiver 2. Use the UP or DOWN buttons to change the level. Range is from -50 to +5 dBu in 1 dB steps. Press the BACK 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 (dual channel mode) allows the two internal receivers to operate independently on different frequencies and settings with two different transmitters. Diversity reception uses an antenna phase switching technique on each receiver. 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. Diversity reception mixes the audio outputs in a ratio panning mode. In this mode, the setup screens will prompt you for a single value which will automatically be set for both receivers.

COMPAT (includes Talkback mode)

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.
- **100** for Lectrosonics 100 Series transmitters.
- **200** for Lectrosonics 200 Series transmitters.
- **IFB** for Lectrosonics IFB transmitters.
- **M.3**, **M.6** and **M.7** are compatible with certain non-Lectrosonics transmitters. Contact the factory for details.
- **HYB/TB** selects the ***Talkback*** mode where the audio is switched to channel 2 when the talkback button on the transmitter is pushed.

NOTE: Firmware v5.4 adds compatibility modes NU Hybrid, EU Hybrid and 300.

When the ***Talkback*** mode is selected, the receiver is configured so that the program audio output is on channel 1 and the talkback output is on channel 2.

The ***Talkback*** mode is used only with a matching transmitter such as the HH hand held model that includes this feature. See transmitter manual for details.

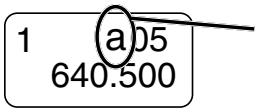
TUNING (modes)

In addition to the NOR (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.
- **FIN** (or Fine Tuning) allows the selection of 25 or 100 kHz steps (version 1.6 and later)

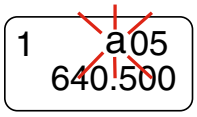
USING THE GROUP TUNING MODES

Press MENU to select receiver 1 or 2.



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

Holding the MENU/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 MENU/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, then hold the MENU/SEL button in and 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 MENU/SEL button in, then hold the UP ***or*** DOWN button in until the letter starts blinking.

SmtNR

This setup screen is available only in the Digital Hybrid 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 195 and 200 Series 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 reversal 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 (Digital Hybrid) or the 200 Series mode, the 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 alkaline, lithium or rechargeable AA battery. This is the best choice when using a rechargeable battery in the transmitter.

In compatibility modes other than Digital Hybrid and 200 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

When set to the SWITCHED (dual channel mode), 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).

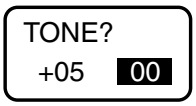
IMPORTANT: The output level of each receiver is adjusted with the LEVEL setup screen, which is hardware-based, so it affects the output level regardless of which mix mode is selected. MIXTRIM then applies attenuation to that level setting resulting in the final level delivered to the output channel. It is good practice to ***set the output 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. Press MENU/SEL to toggle between receivers.

RECEIVER 2



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

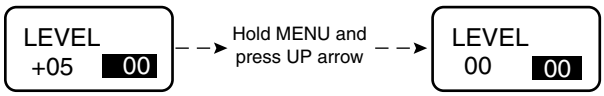
Once the button is pressed, a 1 kHz tone is enabled, and its level can be adjusted with additional presses on the UP or DOWN buttons.

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, dual channel mode). 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 LEVEL Setup screen, holding the MENU/SEL button and pressing the UP arrow will copy the value set on receiver 1 to receiver 2 . Pressing the DOWN button will copy the value set on receiver 2 to receiver 1.



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

Locking and Unlocking the Front Panel Controls

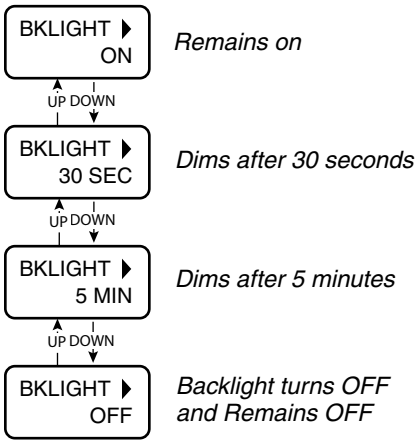
The front panel controls can be ***LOCKED*** to prevent accidental changes being made during operation and handling.

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.

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.



Remains on

Dims after 30 seconds

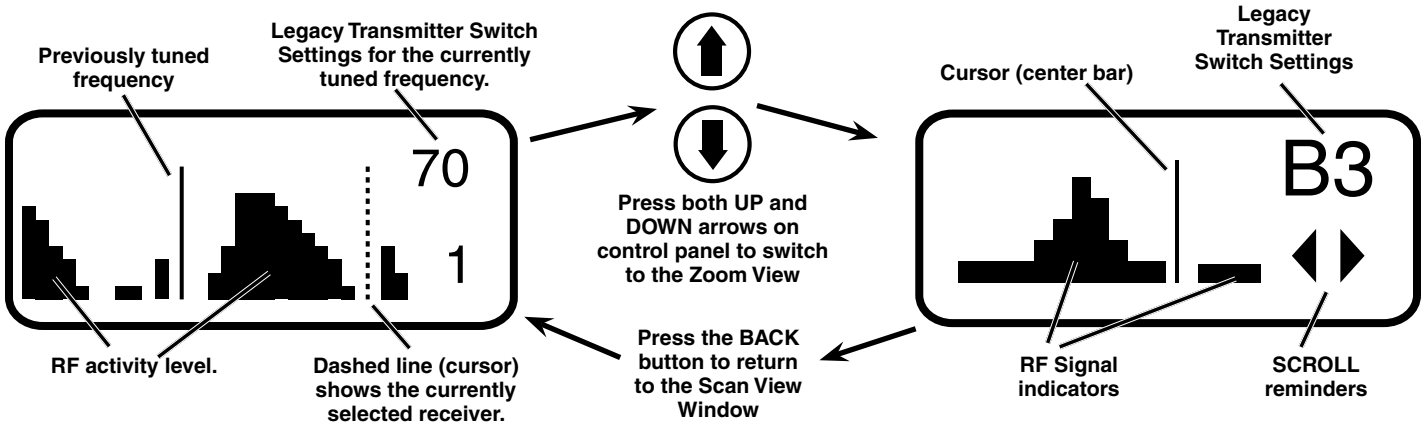
Dims after 5 minutes

Backlight turns OFF and Remains OFF

Scanning for Clear Frequencies

Scan 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).

First, ***turn off all of the transmitters*** you intend to use with the receiver.

Navigate to the SETUP/SCAN screen and press the MENU/SEL button to start the scanner. The display will switch to the ***Scan Window*** (see illustration above) and start scanning immediately. Allow the receiver to scan across the entire tuning range at least once, then press the MENU/SEL button to stop the scanning.

Scroll through the screen with the UP and DOWN buttons and find a frequency where no RF signals (or in the worst case, only very weak RF signals) are present. Press the PWR/BACK button to set the receiver to this new frequency.

Press both the UP and DOWN buttons at the same time to switch to the ***Zoom View Window*** (see illustration above). 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.

When the receiver is configured for SWITCHED diversity (dual channel mode), two cursors will appear when the scanning is stopped. Press MENU/SEL to toggle between the two receivers. The cursor for the selected receiver will be a dashed rather than solid line. Select each receiver and use the UP and DOWN buttons to locate a frequency with no (or very weak) RF activity.

Keep the frequencies of the two receivers at least 700 kHz apart to minimize de-sensing (short range) issues. This spacing is a “worst case” approximation assuming the transmitters are about 25 feet from the receiver antennas.

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 clear the scan memory and screens, press the back button several times to return to the Main Window, then press and hold the PWR/BACK 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 to the same frequency as shown on the receiver display, turn the transmitter on and verify that a strong RF signal is present.

It is always good practice to go through the Multi-channel Checkout Procedure detailed on page 22.

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)
- Contacting Lectrosonics for assistance

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.

These frequencies have been calculated to minimize IM between these frequencies only. RF signals from outside sources can still interfere with operation, so even if only these pre-coordinated frequencies are being used, a Multi-channel System Checkout is still necessary. See the procedure on the next page.

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.

Displayed as "GROUP a" through "GROUP d" in the LCD and as "Grp a" through "Grp d" in VRpanel

BLOCK 22

FREQ	SW SET	US TV CH	
563.700	0,5	tv29	
564.300	0,B	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	**Grp a**
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	**Grp b**
581.700	B,9	tv32	
582.600	C,2	tv32	
585.200	D,C	tv33	
587.500	F,3	tv33	

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	**Grp c**
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	**Grp d**
586.300	E,7	tv32	
588.100	F,9	tv32	

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 Multi-channel System Checkout

These frequencies share RF spectrum with TV channels. TV station broadcast signals are much more powerful than a wireless microphone transmitter, and can easily mix with the signals from the wireless system to produce a variety of interference problems. Even if these pre-coordinated frequencies are being used, it is always a good idea to go through the checkout procedure on the following page.

Active TV station and other external signals can be discovered by scanning with the 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

FREQ	SW SET	US TV CH
621.300	4,5	tv39
621.900	4,B	tv39
622.800	5,4	tv39
623.400	5,A	tv39
624.400	6,4	tv39
625.600	7,0	tv39
626.100	7,5	tv40
626.700	7,B	tv40
632.300	B,3	tv41
633.300	B,D	tv41
633.800	C,2	tv41
635.500	D,3	tv41
636.200	D,A	tv41
636.800	E,0	tv41
637.500	E,7	tv41
639.300	F,9	tv42

BLOCK 25

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

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

Intermodulation (IM) and crosstalk ***increases*** as the distance between transmitters and receiver ***decreases***. In order to conduct a valid checkout of multi-channel compatibility using the procedure shown here, it is best to adhere to the following guidelines:

- 4 to 5 feet between transmitters
- 20 to 25 feet between transmitters and receiver antennas
- Receiver antennas not touching one another

If the distances are ***less*** than this, IM will be exaggerated and not likely to be realistic. If the distances are ***greater*** than this, IM products that could occur during actual use that may not show up in the checkout procedure.

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 in the tables 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.

The scanning process will identify external RF signals, but it does not address the compatibility of the selected frequencies. Always 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 4 to 5 feet apart and about 20 to 25 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. **Turn on all receivers. Leave 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. **Start with all transmitters turned off.** Then turn on one transmitter at a time. 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. Repeat this procedure for each transmitter, one at a time.
4. **With all transmitters and receivers turned on, turn each transmitter OFF one at a time.** Look at the RF level indicator on the receiver that matches the transmitter that is turned off. It should “fall silent” and the RF level should disappear or drop to a very low level. If it does not, change the 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.
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 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.
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 Selections from Main Window, COMPAT Window.)
Noise on audio and Pilot Tone Indicator is "b"	The pilot tone bypass has been activated. Navigate to the Main Window. Hold SEL and press the UP arrow to reset channel 1. Hold SEL and press the DOWN arrow to reset channel 2. (only from the Main Window)
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 Digital Hybrid, 200 Series, IFB Mode and Mode 6 compatibility modes, 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.

Symptom	Possible Cause
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 receiver 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 receiver and lowering the input gain on the device the receiver 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 receiver is feeding. Lower the output level of the receiver.
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 - 614.300
Block 24	614.400 - 639.900
Block 25	640.000 - 665.500
Block 26	665.600 - 691.100
Frequency Selection:	256 frequencies in 100 kHz steps
Channel Separation:	100 kHz
Receiver Type:	Dual conversion, superheterodyne
IF Frequencies:	Ch.1: 248.450 MHz and 350.000 kHz Ch. 2: 243.950 MHz and 250.000 kHz
Frequency Stability:	±0.001 %
Front end bandwidth:	26 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
AM rejection:	Greater than 60 dB, 4 uV to 1 Volt
Modulation acceptance:	85 kHz
Image and spurious rejection:	85 dB
Third order intercept:	0 dBm
Diversity method:	SmartDiversityTM 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:	Coarse and fine scanning modes for RF spectrum site survey
Antenna inputs:	50 Ohm; SMA female connectors
Audio outputs connectors:	• Interchangeable D connector adapters for camera slot interfaces • Dual TA3 male (mini XLR) balanced output adapter • Balanced output adapter with fixed cables
Front panel audio output:	Front panel TA5M with two balanced outputs
Audio output level:	Adjustable -50 to +5 dBu in 1 dB steps; unbalanced output is 6 dB lower
Audio channel crosstalk:	-80 dB or better

Front Panel Controls and Indicators:	• Sealed panel with membrane switches • LCD monitors pilot tone; antenna phase, receiver battery level; transmitter battery status; audio level, RF level
Audio test tone:	1 kHz, -50 dBu to +5 dBu output (bal); 1% THD
Transmitter battery type Selection:	9V alkaline, 9V lithium, AA alkaline, AA lithium, NiMH
Phase invert:	Audio output phase normal or inverted
SmartNR (noise reduction):	OFF, NORMAL, FULL modes (available in Digital Hybrid mode only)
Audio Performance (overall system):	
Frequency Response:	32 Hz to 20 kHz (+/- 1dB)
THD:	0.3% (system) typical in Digital Hybrid mode
Signal-to-Noise Ratio (dB):	95 dB or better (overall system, Digital Hybrid mode)
Total Harmonic Distortion:	0.2% typical (400 Series mode)
Input Dynamic Range:	95 dB (with full Tx limiting)
Rear Panel Controls and features:	• XLR audio output jack; • External DC input; • Battery compartment access
Powering and current consumption:	Min. 6 V to max. 18 Volts DC; 1.5 W • 90 mA at 18 VDC • 120 mA at 12 VDC • 195 mA at 7.2 VDC • 210 mA at 6 VDC
Runtime with SRBATTSLED adapter:	7.2V, 2200mA “L” style battery will typically provide about 11 hours of operation
Transmitter battery level tracking:	LCD display with “bottle” icon and timer readout
Operating temperature:	-20° C to +50°C
Weight:	195 grams (7 ozs.) with SRaEXT adapter
Dimensions:	2.68” wide x .72” high x 3.52” deep (68 mm x 18 mm x 89 mm)

Specifications subject to change without notice

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.

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 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:

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:
720 Spadina Avenue,
Suite 600
Toronto, Ontario M5S 2T9

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

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®

581 Laser Road NE • Rio Rancho, NM 87124 USA • www.lectrosonics.com

(505) 892-4501 • (800) 821-1121 • fax (505) 892-6243 • sales@lectrosonics.com

12 June 2019