SRb5P and SRb
Camera Slot UHF Receiver

• Camera slot and stand-alone adapters
• Dual receiver design for two channel or single channel ratio diversity operation
• LCD with RF spectrum scanner
• SmartSquelch™ for noiseless muting
• 256 selectable UHF frequencies

The SRb5P and SRb consists of two separate receivers built into a single, ultra compact housing with adapters for video camera receiver slots and for 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.

A DSP compatibility mode allows the receiver to be used with a variety of Lectrosonics and other brands of wireless systems and with Lectrosonics IFB transmitters.

Digital Hybrid Wireless® is a revolutionary design that combines digital audio with an analog FM radio link to provide both outstanding audio quality and exemplary, noise-free RF performance.

Using a patented algorithm to encode 24-bit digital audio information in the transmitter into an analog format, the encoded signal is then transmitted over an analog FM wireless link.

At the receiver, the signal is then decoded to restore the original digital audio. This process eliminates compandor artifacts and produces an audio frequency response flat to 20 kHz.

(US Patent 7,225,135)

• Dual channel SmartDiversity™ reception
• Single channel Ratio Diversity reception
• Automatic Power State Restoration
• DSP-based pilot tone squelch
• Rear Panel and Front Panel Audio Outputs
• Supports HH transmitter talkback feature

The front panel features a menu-driven LCD interface and four membrane switches which are used to view and alter settings. The main LCD window displays the pilot tone indicator, diversity activity, RF level, audio level and transmitter battery status for both receivers. To find clear operating frequencies, a built-in spectrum analyzer scans across the tuning range of the receiver and displays a histogram of RF activity within the tuning range. Areas of little or no RF activity are easily recognizable.

The two internal receivers can be operated separately, each using switching, antenna combining diversity, or in tandem with ratio diversity reception. The audio outputs of the receivers can be mixed internally, or left separated for discrete recording tracks or external mixing.

A variety of output adapters and mounting options are available for camera slot operation. On the SRb5P, a 5-pin connector next to the control panel provides audio output from both channels in addition to the camera slot outputs. The unit is powered from an external 6 to 18 volt DC source.
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.

IF Amplifiers and SAW Filters
The first IF stage at 244 MHz employs two state-of-the-art SAW (surface acoustic wave) filters which 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 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. 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 produces an excellent noise improvement at low signal strengths.

Digital Pulse Counting Detector
The SRb Series receivers use an elegantly simple, yet highly effective digital pulse counting detector to demodulate the FM signal rather than a conventional quadrature detector. This eliminates thermal drift, improves AM rejection, and provides very low audio distortion.

DSP-Based Pilot Tone
The system uses a DSP generated ultrasonic pilot tone to control the receiver audio muting at turn on and turn off, with brief delays applied to eliminate thumps, pops or other transients that can occur. 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 crystal-based pilot tone systems.

Smart Squelch™
After the pilot tone opens the audio output, several techniques are used to remove 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 SR can deliver acceptable audio quality from otherwise unusable signals.

Smart Noise Reduction (SmartNR™)
The wide dynamic range of digital hybrid technology with a 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 a Smart Noise Reduction algorithm is used to remove 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 to the audio.

Supersonic Noise-Based Dynamic Filter and Squelch Control
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.

There is no better way to track the signal-to-noise ratio than to measure it directly, and this noise-based system requires no calibration.

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.

Automatic Power State Restoration
The firmware “remembers” whether it was turned on or off when power is disconnected and returns to that state when power is restored.
Front Panel Controls and Functions

The control panel is a rugged, dust and water resistant design with membrane switches for the control interface. A backlit, graphics-type LCD is used to set up and monitor the receiver. Navigation through the menus is straightforward with text prompts for value and mode selections. The Main Window shown here is used during operation to display RF and audio levels, transmitter battery status, pilot tone status and diversity activity for both receivers.

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

The 5P version of the SRb receiver is intended for use with cameras that do not have both audio channels enabled in the camera slot. In addition to the audio outputs on the rear panel, a second set of outputs are also provided through a 5-pin connector on an adapter next to the control panel.

A standard TA5M connector provides two balanced outputs with the following pinouts:

<table>
<thead>
<tr>
<th>Pin 1</th>
<th>Pin 2</th>
<th>Pin 3</th>
<th>Pin 4</th>
<th>Pin 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shields</td>
<td>CH1 +</td>
<td>CH1 –</td>
<td>CH2 +</td>
<td>CH2 –</td>
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Rear Panel and Slot Adapter Kits

Several different rear panel adapters are available to configure the receiver for popular camera slots and for stand-alone use. The rear panels are held in place by two screws and are easily changed. Camera slot adapter kits include top panel bezels with hardware for a secure fit into the camera body.

Battery Adapter

The SRb can be powered with an optional battery “sled” adapter that attaches to the SRb unit (Lectrosonics Model SRBATTSL E D). The adapter includes an integrated SREXT plate, and accepts L and M type rechargeable batteries.

Typical runtime with a 7.2 V, 2200 mA “L” style battery is approximately 11 hours.
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 and 614.100 - 614.300
- Block 24: 614.400 - 639.900
- Block 25: 640.000 - 665.500
- Block 26: 665.600 - 691.100

Frequency Adjustment Range: 25.5 MHz in 100kHz 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: 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: 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
Compatibility modes:
- HYB native Digital Hybrid mode
- M.3 non-Lectrosonics (call factory)
- 200 Lectrosonics 200 Series
- 100 Lectrosonics 100 Series
- HYB/TB Digital Hybrid w/ Talkback
- M.7 non-Lectrosonics (call factory)
- M.6 non-Lectrosonics (call factory)
- IFB Lectrosonics IFB
SmartNR (noise reduction): OFF, NORMAL, FULL modes

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; 1.4 W
- 90 mA at 18 VDC
- 120 mA at 12 VDC
- 195 mA at 7.2 VDC
- 210 mA at 6 VDC

Runtime with SRBATTLED 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