

Venue Receiver

Digital Hybrid Wireless™

TECHNICAL DATA



- Digital Hybrid Wireless™ system
- Six-channel modular configuration
- Ratio, Antenna Phase or Frequency diversity reception
- 256 synthesized UHF frequencies per receiver module
- DSP based pilot tone
- DSP emulation modes for compatibility with analog wireless systems in addition to the Digital Hybrid mode
- LCD interface for setup and monitoring
- USB and RS-232 computer interface

An industry first, Lectrosonics Digital Hybrid Wireless™ (patent-pending) uses a proprietary algorithm to encode the digital audio information into an analog format which can be transmitted in a robust manner over an analog FM wireless link. At the receiver, the encoded signal is captured and decoded back to the original digital audio. This combination offers the superb audio quality of a pure digital system and the outstanding operating range of the finest FM wireless systems. The digital audio chain eliminates a compander and its artifacts, and provides audio frequency response flat to 20 kHz. The RF link takes advantage of the spectral efficiency characteristics of a highly optimized FM radio system.

The Venue Receiver system is a modular UHF design that operates with Digital Hybrid Wireless™ transmitters, and a variety of analog transmitters. It consists of a Venue Receiver Master (VRM) and one to six plug-in receiver modules. The VRM includes an antenna multi-coupler, computer communications interface and the mechanical rack mounting for the receiver modules.

The VR's design offers a tremendous degree of flexibility. For example, each of the three pairs of receivers can be combined and used for ratio diversity or frequency diversity reception. Each individual receiver can be used by itself for phase switched diversity reception and both models can be mixed in a single VRM assembly.

SmartDiversity™

A microprocessor controlled antenna phase switching in 180 degree increments to minimize dropouts caused by multi-path reflections. Each receiver outputs a single audio channel, so the overall system can provide up to six channels per Venue Receiver.

OptiBlend™ Diversity

A ratio diversity audio combining process that mixes the audio outputs from two adjacent modules in a ratio controlled by the relative RF signal levels at the receivers.

Frequency Diversity

An automated redundancy process that pairs two transmitters and two adjacent receiver modules, with each transmitter/receiver pair tuned to a different frequency. In this mode the microphones are positioned very close to each other to avoid comb filtering. The outputs of the receivers are mixed together in the same manner as the OptiBlend™ process, with the mix ratio controlled by comparing the RF levels in the two receivers. The purpose of this mode is to eliminate interruptions caused by dropouts and failed batteries. Common applications include redundant lavalier microphones for on-air talent in live broadcasts.

The shared resources of a common DSP and antenna system lowers the cost of each receiver without sacrificing quality and performance. The Venue presents an outstanding value, with RF and audio quality surpassing higher cost systems using analog technology.



This innovative technology was recognized by the Cinema Audio Society in 2005 with their first Technical Achievement Award.

Receiver Modules

Two different receiver modules are available. Both are triple conversion, frequency synthesized UHF receivers controlled by the DSP in the host assembly.



VRS (Standard) - fixed bandwidth front-end design that is an excellent value and well suited to all but the most congested RF environments.



VRT (Tracking) - same as the VRS module but with the addition of advanced frequency tracking front-end filters. Excellent for congested and hostile RF environments.



The mechanical design allows quick change out of modules to customize the configuration for specific applications. Sturdy clips lock in the modules to prevent movement during transport.

DSP-Based Pilot Tone

The 400 Series system design uses a DSP generated ultrasonic pilot tone to control the receiver audio muting (squelch). Brief delays at turn-on and turn-off eliminate thumps, pops or other transients that can occur when the power is switched on or off. The pilot tone frequency is different for each of the 256 frequencies in the tuning range of a system (frequency block). This eliminates squelch problems in multichannel systems where a pilot tone signal can appear in the wrong receiver via intermodulation products. The DSP generated pilot tone also eliminates the need for fragile crystals which allows the receiver to survive shocks and mishandling much better than older crystal-based pilot tone systems.

Note: The above describes a system configured for Digital Hybrid Wireless™ compatibility mode. Older analog transmitters (or transmitters from other manufacturers) either use one pilot tone frequency, or none at all.

Built-in Antenna Multicoupler

A single pair of antennas can feed up to three Venue assemblies within a 50 MHz frequency range to simplify the antenna and cabling. The 7-way splitter delivers six outputs for the internal receivers and one output for an additional Venue assembly. The second receiver in a stack can then pass the signals along to a third unit. The multicoupler design uses high current RF amplifiers and a Wilkinson type splitter for even signal distribution and high isolation between receiver modules.



50 Ohm BNC multicoupler output jacks provide zero-gain antenna "loop-throughs" for an additional receiver, allowing convenient expansion without the need for an external RF multi-coupler.

DSP Compatibility Modes

While the Venue Receiver sounds best when used in the Digital Hybrid Wireless™ mode, it also offers backward compatibility with earlier technologies, including the Lectrosonics 100 Series, 200 Series and IFB, and analog wireless transmitters from other manufacturers (contact Lectrosonics for details). The compatibility mode is selected with the LCD interface or computer software.

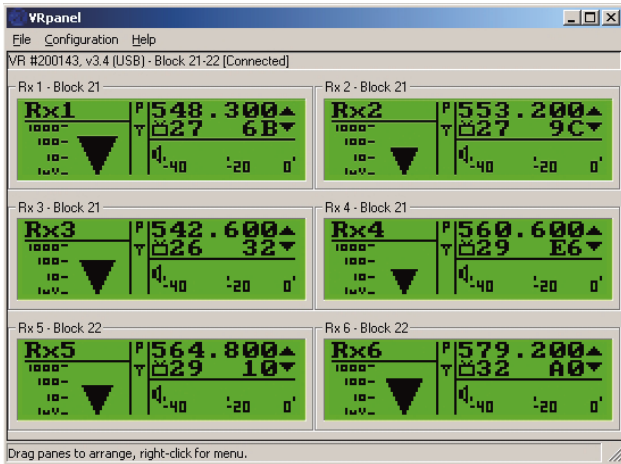
The compatibility modes are independent between the receivers, so some channels can be used in the native hybrid mode while others operate in an analog mode to work with other transmitters. The VR also ensures exact time alignment (compensates for latency) of the audio outputs in the event that digital and analog transmitters are used simultaneously.

Controls and Monitoring

Setup options and adjustments can be made via the front panel LCD interface, or with an attached computer. USB and RS-232 ports are available on the rear panel. The LCD interface consists of six channel select switches, two selection and navigation switches and a pushbutton rotary encoder control. A computer can be connected for setup only or for continuous system monitoring and control via either the USB or serial port. Popular touch screen control systems can also be configured for remote control and monitoring.

LecNet2™ Software

The VRpanel software included with the Venue Receiver simplifies setup and monitoring. The software runs under the Windows 2000 and XP* operating systems with minimal system requirements. All functions and settings can be made via the software, including firmware updates, through the USB and serial ports.

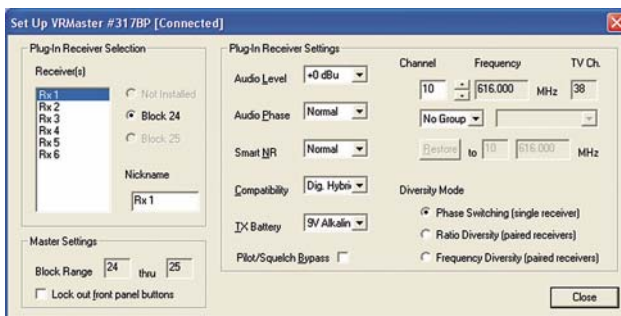


The VRpanel Main Screen graphically displays the Venue Receiver systems being monitored. More than 16 Venue Receivers, each with a full complement of receiver modules can be monitored simultaneously.



This VRpanel Main Screen illustrates how two independent VR systems with six receivers each can be easily monitored at the same time.

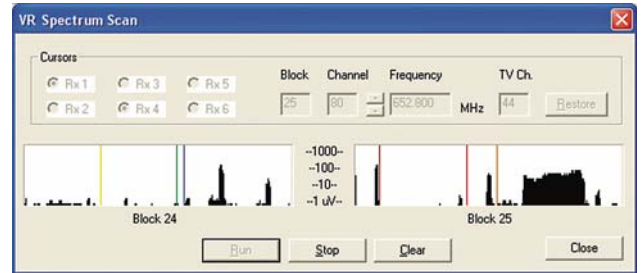
The screen automatically resizes as units are added. Each individual pane displays information about the installed receiver modules for a particular Venue Receiver.



Set Up VR dialog box

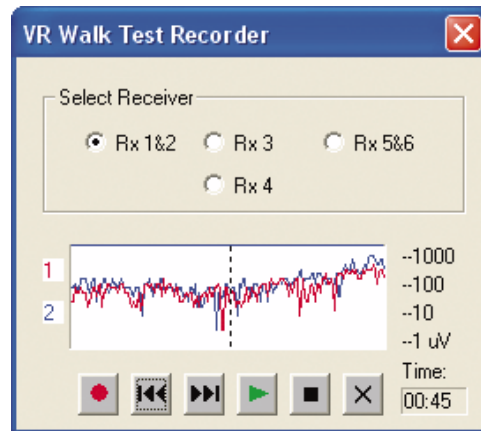
Double-clicking a receiver module opens the "Set Up VR" dialog box which displays the settings for each receiver module installed in the selected Venue Receiver. This screen also allows tuning of selected receiver modules, setting their individual compatibility modes, selecting diversity modes and setting audio output levels.

Right-clicking anywhere in a Venue Receiver opens a pop up a menu with additional functions available for the associated Venue Receiver, including an RF spectrum scanner and walk test recorder.



VRpanel Spectrum Scanner

The spectrum scanner provides a visual display of RF activity within the tuning range of the system to quickly locate clear operating frequencies. Convenient Block, Channel, Frequency and TV Channel are displayed for the selected receiver simplifying setup of the associated transmitter.



VRpanel Walk Test Recorder

A unique walk-test recorder is provided to verify system performance as the transmitter moves through the area where the transmitter will be used. RF level is recorded during the walk test in a scrolling window. During playback a "strip chart" scrolls past the cursor. By mentioning locations during the walk test, it is possible to quickly identify potential trouble spots.

*Microsoft® and Windows® are registered trademarks of Microsoft Corp.

Front Panel

The front panel provides an easy-to-use LCD interface for setup, and provisions for quick monitoring to assist in troubleshooting. In normal operation, the LCD shows RF and audio levels, diversity status, pilot tone status (where applicable) and transmitter battery status (when available) for all six receivers at the same time.



Individual screens for each receiver are also available to provide additional information and setup adjustments. A headphone jack and level control is provided for individual channel monitoring.

Rear Panel

The rear panel provides six balanced audio outputs on standard XLR connectors, 50 ohm BNC antenna inputs, 50 ohm BNC antenna outputs from the built in zero-gain multicoupler, power jack with a locking connector, USB port and RS-232 serial port for the computer interface.



It is powered from an external source at 10 to 18 VDC, allowing the unit to operate from a wide variety of sources in stage, studio and mobile applications.

Specifications

Operating Frequencies (MHz) for Receiver Modules:

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

Digital latency:

- 1.5 mS (receiver only - hybrid mode)
- 3.0 mS (receiver and transmitter in hybrid mode)
- 3.0 mS (receiver only - analog compatibility mode)

The 3.0 mS latency in analog compatibility mode time aligns the audio from analog and hybrid transmitters when they are used together in a Venue system.

Frequency selection: 256 frequencies in 100 kHz steps per 25.5 MHz frequency block

Channel Spacing: 100 kHz

Dual Block Range: Built in antenna multicoupler covers a two block range.

Pilot tone: 25 to 32 kHz; 5kHz deviation; unique pilot tone frequency for each selected carrier frequency (Hybrid mode)

Deviation: ± 75 kHz (max) (Hybrid mode)

Receiver Type: Triple conversion superheterodyne

Frequency Stability: ±0.001 %

Front End Bandwidth:

VR Master:	50 MHz @ -3 dB
VRS Module:	30 MHz @ -3 dB
VRT Module:	11 MHz @ -3 dB

Sensitivity (20 dB Sinad): 0.9 uV

AM Rejection: >60 dB, 2 uV to 1 Volt

Image and Spurious

Rejection: 85 dB

Third Order Intercept: VRS:+0 dBm, VRT: +6 dBm

Diversity Methods: Switched, ratio and frequency

FM Detector: Digital pulse counting detector @ 300 kHz

Audio Performance (overall system):

Frequency Response: 32 Hz to 20 kHz (+/-1dB), overall system (400 Series mode)

THD: 0.2% (typical) (400 Series mode)

SNR at receiver output (dB)

(in Hybrid operating mode):

SmartNR	No Limiting	W/ Limiting
OFF	103.5	108.5
NORMAL	107.0	111.5
FULL	108.5	113.0

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

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

Audio Output Level: -15 dBu to +8 dBu, in 1 dB increments

LCD: 122x32 graphical display

Power Requirements: 10 to 18 VDC; 12 W max., (1.2 A at 10 VDC to .67 A @ 18 VDC)

Weight: VRM with 6 VRS modules: 4.28 lbs. (1946 g)

VRM with 6 VRT modules: 4.45 lbs. (2018 g)

Dimensions: 19"W x 1.75"H x 7.75"D (panel to rear jacks) (48.26 cm x 4.45 cm x 19.67 cm)

Note: Some specifications apply only when the receiver is operating in the 400 Series (Digital Hybrid) mode.

