May 26, 2005

Venue

Digital Hybrid Wireless™ Modular Receiver System

(US Patent Pending)

Reference Manual

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Change Page

May 25, 2005: Added Changes to transmitter battery monitoring and frequency matching as per Firmware Version 3.2.

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General Technical Description

Introduction

Lectrosonics Digital Hybrid Wireless™ systems use innovative technology to combine the new advantages of digital audio with the classic advantages of analog RF transmission. 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 the latest filters, RF amplifiers, mixers and detector to capture the encoded signal and a DSP (Digital Signal Processor) 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 a compandor can offer, and, since the encoded audio is sent in analog format, spectral and power efficiency and operating range are not compromised.

The Venue System introduces a new flexibility to Digital Hybrid Wireless™ design. The modular design operates with all Digital Hybrid Wireless™ transmitters, and a variety of analog transmitters. It consists of a Venue Receiver Master (VRM) that includes an antenna multicoupler, computer communications interface, microprocessor, digital signal processor (DSP), A-D and D-A converters and audio output circuits, plus mechanical rack mounting for up to six receiver modules.

The system can be setup and operated either through front panel controls and display, or via rear panel USB or RS232 ports connected to a Windows™ 2000 or Windows™ XP based computer system and VRpanel, which is part of the LecNet2™ software package. (See Venue Installation Guide, or VRpanel Help.)

VRM

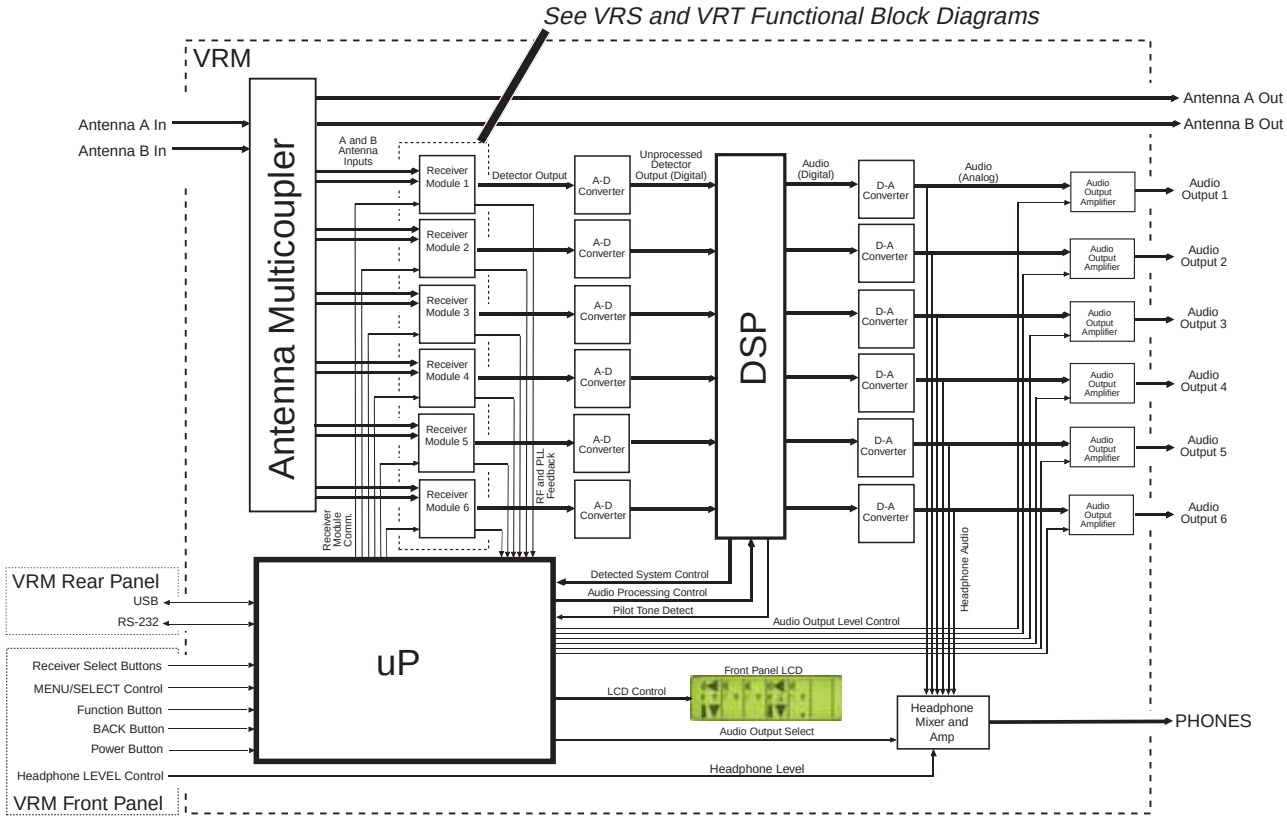
Each VRM spans two frequency blocks and supports from one to six receiver modules. (See Specifications.) System setup and control is handled by the VRM with the receiver modules handling frequency reception, conversion and signal detection.

Antenna Multicoupler

There are two independent antenna multicouplers. One supports input from the rear panel Antenna A BNC jack and the other supports input from the rear panel Antenna B BNC jack.

The individual antenna inputs pass through a 50 MHz bandpass filter centered on the VRM's assigned frequency block range prior to entering the associated

VRM Functional Block Diagram



multicoupler. Each of the multicouplers includes a high intercept amplifier whose output feeds a seven-way splitter. Six of the splitter's outputs are presented to the respective Ant A or Ant B tabs on each of the receiver module connectors. A seventh output is fed to a rear Antenna (A or B) OUT connector for use by other Venue Receiver Systems.

The result is that the same signal entering the rear panel Antenna Inputs is presented to each receiver module and to the pass-through rear panel Antenna Output jacks. The design allows each receiver module to be used independently.

Microprocessor Control

System setup parameters and control signals from DSP are used by an 8-bit microprocessor to both set up and control the Venue System in general and to control each individual receiver module (or receiver module pair if they are used in ratio or frequency diversity mode).

Initial system setup and control can be accomplished through front panel controls, or via software using convenient USB or RS-232 I/O ports. The setup parameters plus control signals from the DSP are used to control the installed receiver modules, audio processing and audio output.

The microprocessor also receives RF signal strength information from each receiver module and information from the DSP concerning transmitter operation. This information is used both to control the Venue System and to display current status in various LCD menus or setup screens. (See Venue System Controls and Functions, and Menus and Setup Screens.)

Frequency Tuning Groups

The Venue System provides four factory preset intermodulation free frequency groups (A through D) and two user programmable frequency groups (U and V).

The factory groups have been selected to avoid intermodulation problems. Each factory group contains eight frequencies.

The user programmable frequency groups can have up to 16 frequencies per group, per frequency block.

Digital Signal Processor

The analog detector output from each receiver module is digitized and sent to a DSP. The DSP processes the digitized detector output according to the active settings. These signals include Compatibility Modes, Diversity Modes and SmartNR™ modes.

The DSP also detects the Pilot Tone used to control the receiver module's squelch (only in 400 Series, 200 Series and IFB Compatibility Modes – see DSP-Based Pilot Tone).

In addition to the audio, a 1 kHz tone is also available from the DSP. This tone is used to preset the Venue System's audio output levels according to the input requirements of any attached equipment and for diagnostic purposes. (See Level Setup Screen.)

Each of the six audio channels is then sent through its own D-A converter to recover the original analog audio. The analog audio is then sent to both the appropriate Audio Output Amplifier and to the Headphone Mixer and Amp.

Note
While all audio channels are sent to the respective Audio Output XLR jacks, only one audio channel at a time may be monitored via the front panel PHONES jack. (See Headphone Mixer and Amp.)

Compatibility Modes

The Venue System was designed to be compatible with Lectrosonics Digital Hybrid (400 Series) transmitters and will yield the best performance when operating in Digital Hybrid mode. However, due to the flexibility of digital signal processing, the Venue System is also able to operate with Lectrosonics 200 Series, 100 Series and IFB transmitters, and certain non-Lectrosonics transmitters in special compatibility modes. (Contact the Lectrosonics Sales Department for a complete list of compatible transmitters.)

Ratio Diversity and Frequency Diversity Reception

Both ratio diversity (OptiBlend™) and Frequency Diversity combine the outputs of two adjacent receivers.

OptiBlend™ is a ratio diversity method which combines the audio output from two adjacent receiver modules (1-2, 3-4 or 5-6) relative to the RF signal input levels at both receivers.

Frequency Diversity pairs two transmitters with two adjacent receiver modules. (The receiver pair combinations are the same as those used for OptiBlend: 1-2, 3-4 or 5-6.) Each transmitter/receiver combination in the pair is tuned to a different frequency. The RF signal level at each receiver is monitored and the audio is blended in a manner similar to ratio diversity.

In both cases, because of the mixing function, the blended audio is duplicated at each XLR jack associated with the receiver pair. (See also Switched Diversity Reception.)

DSP-Based Pilot Tone

The 400 Series, 200 Series and IFB systems use a DSP generated ultrasonic pilot tone from the transmitter to control the receiver audio muting (squelch). The DSP monitors all incoming audio and generates a Pilot Tone Detect signal if a pilot tone is detected. The Pilot Tone Detect signal is routed to the microprocessor to enable or disable squelch depending on the PilotBP setting for that receiver module. (See PilotBP Setup Screen.) Squelching is performed in the DSP.

IN 400 Series mode, 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 such as the Venue System which use a common antenna and where a pilot tone signal can appear in the wrong receiver via intermodulation products. Using the DSP to detect the pilot tone also eliminates the need for fragile crystals.

In 200 Series and IFB modes, only one pilot tone frequency is used on all channels, emulating the original crystal-based system. In other compatibility modes (100 Series and Mode 3), no pilot tone is used.

(SmartNR™) Smart Noise Reduction

While the Venue System has been designed using the best available low noise components and techniques, the wide dynamic range of Digital Hybrid technology, combined with flat response to 20 kHz, makes it possible to hear the noise floor in the mic preamp, or the (usually) greater noise from the microphone itself in certain conditions. The SmartNR™ algorithm reduces this noise without sacrificing high frequency response, thus increasing the effective dynamic range of the system.

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." It offers significantly increased transparency over the sophisticated variable low pass filters used in previous Lectrosonics designs. Desired high frequency signals having some coherence such as speech sibilance and other tones are not affected.

Note

The SmartNR setting is user selectable only in 400 Series mode. In other modes, noise reduction is applied in such a way as to emulate the original analog system as accurately as possible and is not user adjustable.

Audio Output Amplifiers

The six digitally controlled Audio Output Amplifiers are adjustable from -15 dBu to +8 dBu in 1 dB increments. There is one Audio Output Amplifier per XLR jack.

Headphone Mixer and Amp

The Headphone Mixer and Amp is used to monitor the audio output through the front panel PHONES jack. Audio output levels at this jack are controlled only by the front panel LEVEL control. Only one channel can be monitored at a time. That channel is selected through one of six front panel Receiver Module pushbuttons. If the selected receiver module is part of a ratio diversity or frequency diversity pair, the audio outputs are blended and the audio is presented to both XLR Audio Output jacks for the diversity pair and the front panel PHONES jack.

Note

The front panel LEVEL control has no effect on the output levels at the rear panel XLR Audio Output jacks. Likewise, the software controlled audio output levels at the XLR jacks (via the VRpanel GUI or the LCD) has no effect on the levels at the front panel PHONES jack.

VRS and VRT Modules

Both the VRS (Venue Receiver Standard) and VRT (Venue Receiver Tracking) modules are individual high performance, triple-conversion, frequency synthesized UHF receivers controlled by the DSP. The VRT modules include an RF frequency tracking front end.

PLL and VCO Circuits

Each receiver module is frequency agile and can be set to operate on any one of 256 frequencies within its tuning range. The PLL synthesizer receives instructions from the microprocessor, then uses those instructions to set the receiver module's operating frequency by controlling the 1st and 2nd Voltage Controlled Oscillators (VCO).

Switched Diversity Reception

All installed receiver modules can operate as switched diversity receivers. Switched diversity (or SMART Diversity™) minimizes dropouts in situations where multi-path reflections can cause serious problems. The phase diversity switch is controlled by the VRM microprocessor using a sophisticated algorithm that ensures antenna phase switching is performed at optimal times.

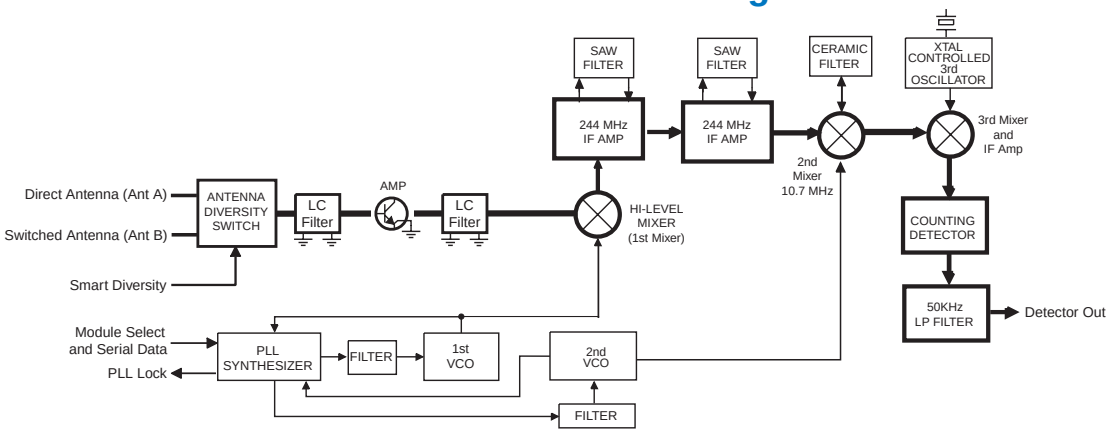
RF Front-End and Mixer (VRS Module)

A tuned LC filter before and after a low noise, high current RF amplifier provides good selectivity. The first mixer uses GaAs technology with a very high third order intercept point. The overall design ensures stability, selectivity and precise gain in order to handle strong RF signals without input overload.

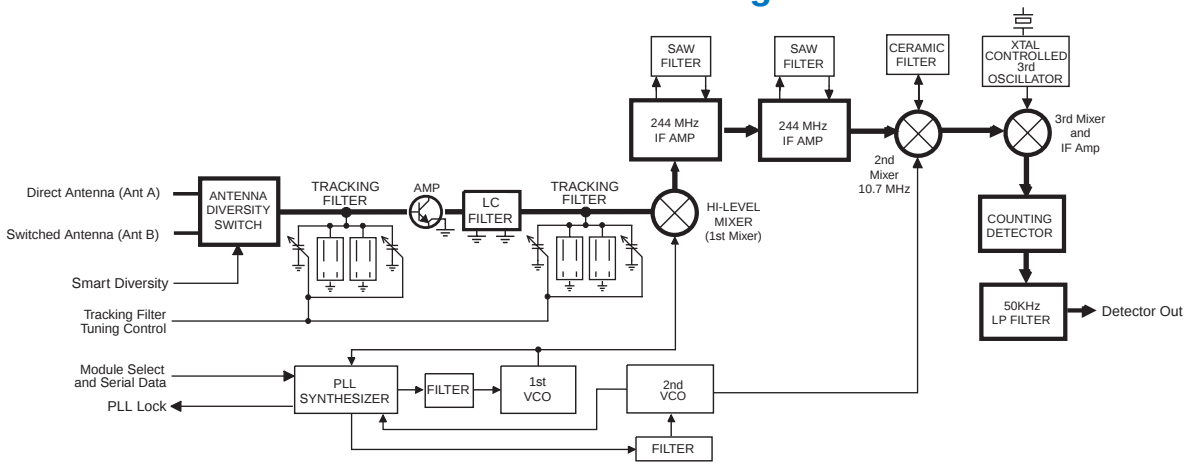
RF Frequency Tracking Front-End and Mixer (VRT Module)

The VRT module includes two RF frequency tracking filters controlled by the microprocessor to increase selectivity. Each tracking filter consists of two varactor tuned ceramic line resonators. A tuned LC filter is also provided after a low noise, high current RF amplifier and before the second tracking filter. As with the VRS module, the first mixer uses GaAs technology with a very high third order intercept point. The overall design ensures stability, selectivity and precise gain in order to handle strong RF signals without input overload. The

VRS Functional Block Diagram



VRT Functional Block Diagram



increased selectivity provided by the tracking filters is highly beneficial in RF rich environments.

IF Amplifiers and SAW Filters

The first IF low noise amplifier is controlled with feedback regulation and drives a quartz SAW (Surface Acoustical Wave) filter. The 244 MHz SAW filter combines sharp tuning, constant group delay, wide bandwidth and excellent temperature stability, far superior to conventional LC filters. The second mixer converts the 244 MHz first IF signal down to 10.7 MHz. The second IF is filtered through two ceramic filters for sharp selectivity, then converted down to 300 kHz and fed to the Digital Pulse Counting Detector.

Digital Pulse Counting Detector

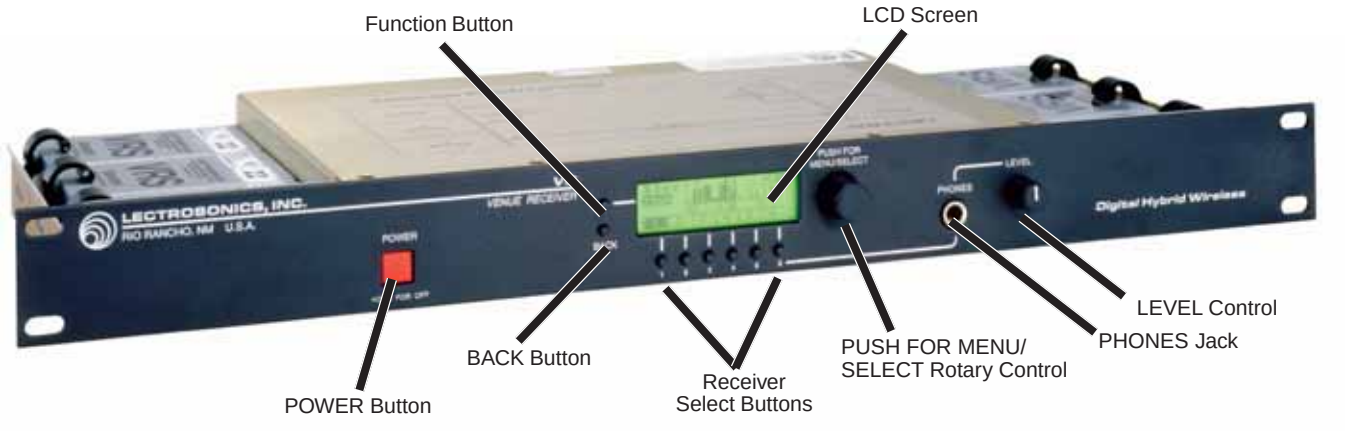
Each module uses an elegantly simple, yet highly effective digital pulse detector to demodulate the FM signal, rather than a conventional quadrature detector. This unusual design eliminates thermal drift, improves AM rejection, and provides very low audio distortion. The output from the Digital Pulse Counter is an analog signal which is fed through a low pass filter and on to the VRM.

Power Supply

The Venue System can be operated from an external DC power source with a range of +10 VDC (1.2 A) to +18 VDC (700 mA). (A +15 DCV, 1.23 amp power source is supplied with each unit.) The receiver has a built-in Poly-Fuse to protect the unit. If a problem occurs that trips this fuse, it will reset after the power supply is disconnected for about 15 seconds.

Venue System Controls and Functions

Front Panel



Front Panel Controls and Functions

The Venue System consists of a VRM (VR Master) and one to six individual receiver modules. The VRM front panel provides an easy-to-use LCD interface for system setup, monitoring and troubleshooting. During 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 make adjustments.

Individual output channel audio can be monitored via the front panel.

POWER Button

The POWER button is used both to control the application of power to the unit and to clear (or reset) the Scan Mode spectrum analyzer.

Pressing and holding the POWER button for at least two seconds turns the unit off.

Function Button

Used for special functions in selected Setup Screens.

LCD Screen

The LCD Screen is a graphics-type Liquid Crystal Display used to set up and monitor system operation. (See LCD Interface.)

PUSH FOR MENU/SELECT Rotary Control

The PUSH FOR MENU/SELECT (hereafter called the MENU/SELECT control) is a dual function control for navigating and selecting Setup Menus or Setup Screens, and for setting parameters within the Setup Screens.

LEVEL Control

The LEVEL control is used to adjust the output level of the front panel PHONES jack.

PHONES Jack

The stereo PHONES jack is provided for monitoring the audio output of selected receivers. Only the audio from a single receiver (or diversity pair) selected via the Receiver Select Buttons will be present at this jack.

Receiver Select Buttons

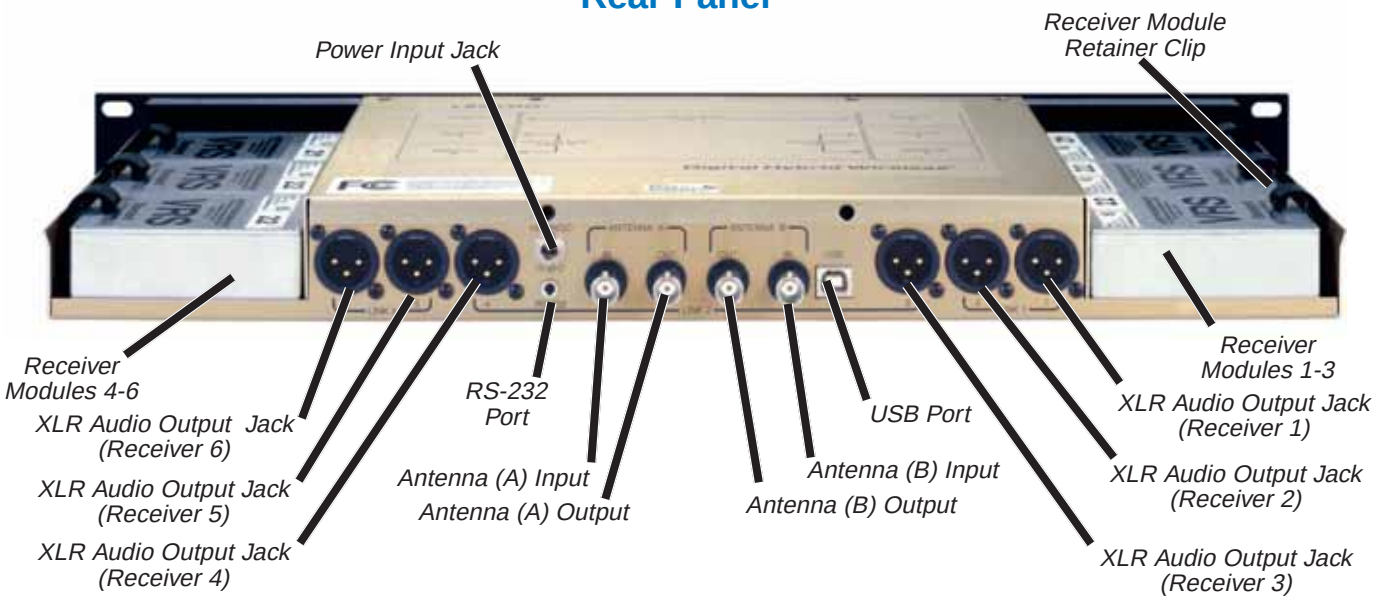
The six Receiver Select buttons are used to select individual installed receiver modules either for monitoring via the PHONES jack, or for setup and adjustment.

BACK Button

The BACK button is used to return to the previous menu or setup screen.

Pressing the BACK button from the SetUpRx menu returns to whatever screen was active prior to entering SetUpRx.

Rear Panel



Rear Panel Features

The rear panel provides six balanced XLR audio outputs, two 50 Ohm BNC antenna inputs, two 50 Ohm BNC antenna outputs from an internal multicoupler, a power jack with a locking connector, and USB and RS-232 serial ports.

Power Input Jack

The power input jack accepts +10 VDC to +18 VDC (center pin is positive and sleeve is ground). The input is diode protected to prevent damage if the power is accidentally applied with reversed polarity. The unit will not operate until the correct polarity is restored.

Receiver Modules

Up to six receiver modules in two rows of three can be installed in each VRM. Spring loaded Receiver Module Retainer Clips ensure module connections are maintained during transport and installation.

XLR Audio Output Jacks

Six balanced audio output jacks using standard XLR connectors are provided to connect the Venue System to external equipment.

RS-232 Port

A serial RS-232 interface is provided for setup and control of the Venue System from computers or other devices using industry standard RS-232 communication links.

Antenna Input Jacks

Two BNC input connectors are provided for right-angle whip antennas, cables from remote antennas, or cables from another VRM. An internal mulitcoupler ensures the RF is applied equally to all installed Receiver Modules and also to the Antenna Output Jacks.

Antenna Output Jacks

Two pairs of 50 Ohm BNC output jacks provide zero-gain antenna “loop-throughs” for an additional receivers, allowing convenient expansion without the need for an external RF multicoupler or additional antenna systems.

Note

Venue Systems can be looped together successfully only when they cover the same frequency block range. Units outside of the frequency block range will experience substantial signal loss and very short operating range.

USB Port

Standard USB Version 1.1 connector for setup and control of the VRM from computer systems (Windows® 2000 or XP only) with a USB interface.

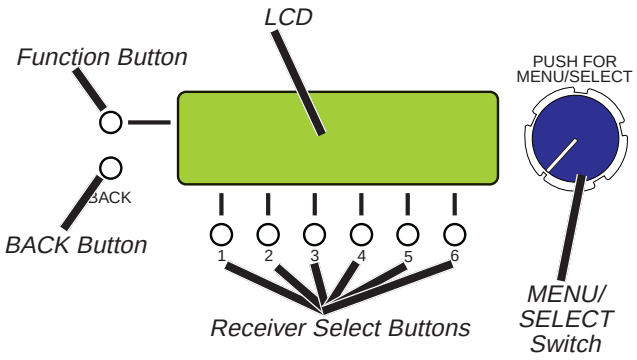
LCD Interface

While the software supplied with the Venue System may make setting up and operating the system quicker and more efficient, the system can also be completely set up and controlled via the front panel LCD and controls. Direct interaction is provided using the front panel controls and the LCD. A variety of menus and setup screens are provided to assist with the setup and also to allow for changing all parameters without the need to connect a computer system.

The main components of the LCD interface are the Function Button, BACK Button, Receiver Select Buttons, MENU/SELECT rotary encoder/switch and the LCD.

Note

Adjustments made through the LCD interface are performed in real time. As each setting is made, the results will be immediately observed.



Types of Information Displayed

The information displayed via the front panel LCD includes: powerup screens, receiver screens, TopMenu, setup menus and setup screens (including scanning functions).

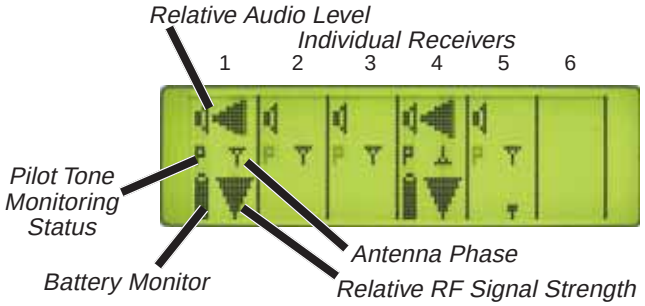
Powerup Screens

A series of three screens is displayed when the unit is first turned on. These Powerup screens identify the firmware version and block configuration of the VRM and installed receiver modules. They are followed by the Overview Screen which displays the operating status of the installed receiver modules.

Overview Screen

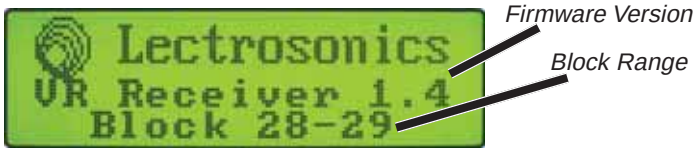
The Overview Screen, which appears after the Powerup Sequence is completed, is the normal display during operation. This screen is sectioned into six equal columns, one for each receiver module location. Any given column displays information about the corresponding receiver module. This information includes relative audio levels, antenna phase, pilot tone

Overview Screen



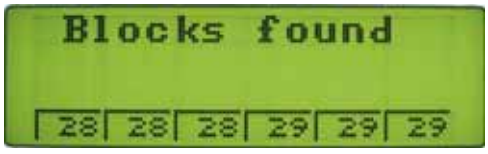
Powerup Screen Sequence

Initial screen identifies firmware version and the operating frequency range of the system (Block Range). The blocks have to be contiguous.



The second screen provides information for the user that the VRM is detecting all installed receiver modules within the designated operating range. (Modules outside of the block range identified in the first screen will not be detected.)

The third screen identifies all installed receiver modules within the system's block range. Empty receiver slots, or slots with receiver modules outside of the block range identified in the first screen, will have an "X" displayed instead of frequency block number.

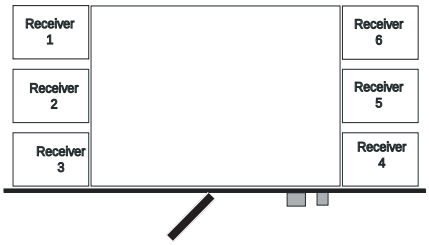


The Powerup sequence is followed by the Overview Screen.

monitoring status, the battery status of the associated receiver (relative charge left or time of operation) and the relative RF signal strength.

The receiver modules are numbered one through six and correspond to the following physical layout:

Top View of VRM Chassis



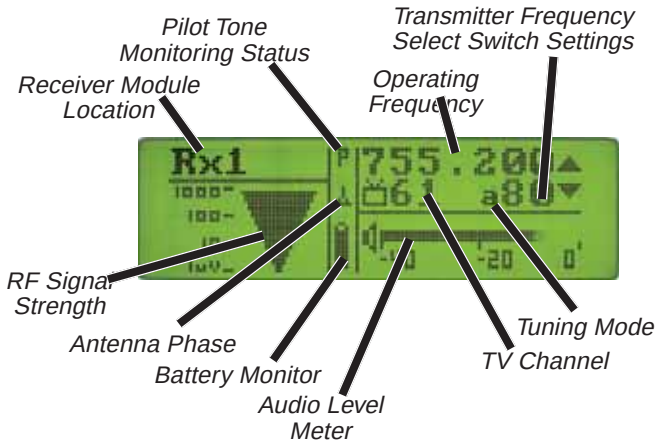
VR Front Panel

Receiver Detail Screen

Pressing a front panel Receiver Select Button opens the corresponding Receiver Detail Screen. This screen displays more detailed information about the selected receiver and is used for setting the operating frequency of the selected Receiver Module and offering information such as transmitter Frequency Select Switch settings, RF signal strength and audio attenuator level, etc.

This screen is also the only means for tuning a receiver module.

Receiver Detail Screen



Tuning a Receiver Module with the LCD

There are several methods to set the operating frequency for individual receiver modules. (See also DivMode Setup Screen.)

If there is no indication for a Tuning Mode for the selected receiver module, then rotating the MENU/SELECT control allows the selection of any of the 256 available frequencies. Stopping at any frequency sets the selected receiver module to that channel in real-time.

If there is an indication that one of the group tuning modes is active for the selected receiver module, then rotating the MENU/SELECT control selects only the frequencies that are part of the selected Tuning Group. (See Tuning Setup Screen for information.) Stopping at any of the freselected channels sets the receiver module to that frequency in real-time.

The operating frequency of a receiver module can also be set through the Scan Function. (See Scan Function for more information.)

Tuning Group Select Shortcut

To instantly select or change a Tuning Group from the Receiver Detail Screen, hold the FUNCTION button, then press a Receiver Select button according to the chart below:

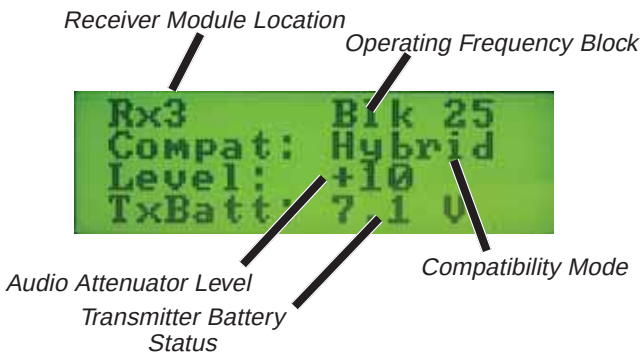
Button	Tuning Group
BACK	No Group
Receiver Select 1	Group A
Receiver Select 2	Group B
Receiver Select 3	Group C
Receiver Select 4	Group D
Receiver Select 5	Group U
Receiver Select 6	Group V

Receiver Info Screen

From the Receiver Detail Screen, pressing the front panel Receiver Select Button for the selected Receiver Module again displays the Receiver Info Screen. This screen temporarily displays the receiver module location, operating frequency block, compatibility mode, output audio level and transmitter battery condition. This can be a voltage level or an elapsed time depending on the TXBatt set up. (See TxBatt.) After approximately five seconds, the display returns to the Receiver Detail Screen.

The Level setting on this screen is a user-selectable audio output attenuator setting and should not be confused with the instantaneous Audio Output Level displayed in the Receiver Detail Screen. The latter is a measure of the channel's instantaneous audio output level.

Receiver Info Screen



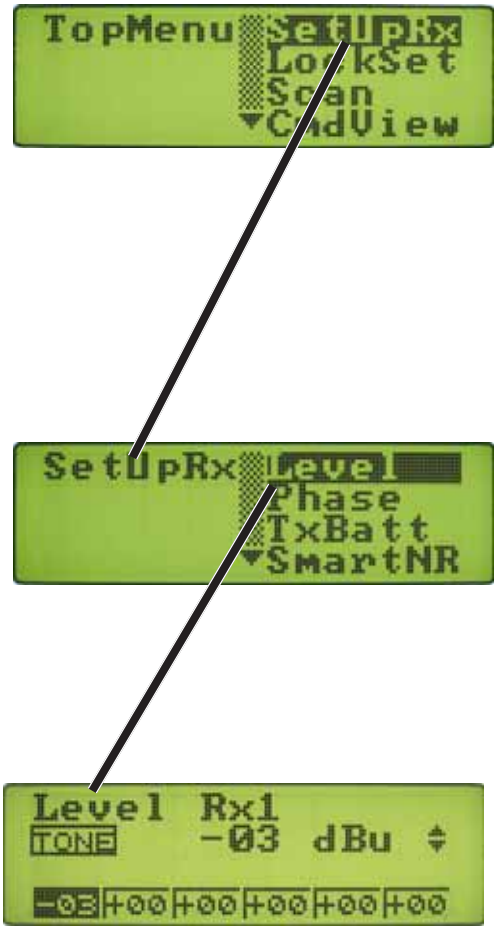
LCD Menus and Setup Screens (Descriptions and Functions)

Top Menu

The Top Menu is accessed from the Overview Screen by pushing the MENU/SELECT rotary control. Rotating this control navigates through the various menu items. The four menu items are:

SetUpRx
LockSet
Scan
CmdView

Rotate the MENU/SELECT control to highlight a menu item, then push the control to access the top screen associated with that menu item.



Setup Menus

Selecting any item from the TopMenu goes directly to that item's setup screen. Selecting SetUpRx displays the SetUpRx menu. Each item on the SetUpRx setup menu accesses a different setup screen.

Selecting or accessing items from the SetUpRx menu is identical to selecting items from the TopMenu--rotate the MENU/SELECT control to highlight the desired setup menu item, then push the control to access the menu item.

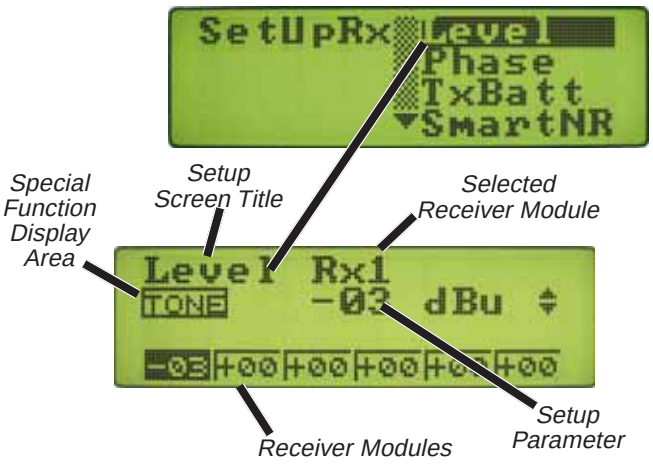
Pressing the BACK button returns the user to the previous menu or screen. Pressing the BACK button from the SetUpRx menu returns the user to whatever screen was active prior to entering SetUpRx (either the TopMenu or a selected Receiver Detail Screen.)

Setup Screens

Individual setup screens are used to set the operating parameters for each installed receiver module, including audio levels, audio phase, battery status, compatibility modes, noise reduction and diversity modes.

SetUpRx Menu

The SetUpRx menu accesses the setup screens used to control the operation of the receiver modules. These include: audio level, antenna phase, transmitter battery condition, noise reduction, pilot tone/squelch bypass, compatibility mode, tuning group selection and diversity mode.



Rotate the MENU/SELECT control to highlight a menu item, then press the control to access it.

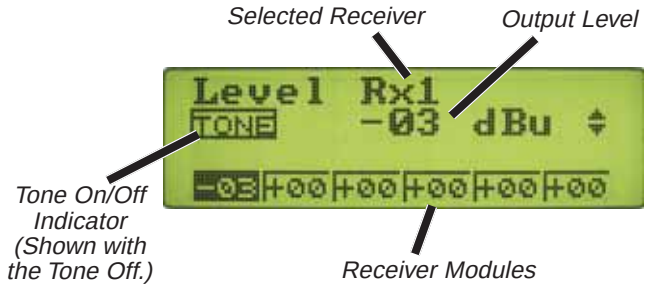
While each setup screen affects a different setup parameter, they all follow the same basic design. They identify the setup item, selected receiver module and setup parameters, plus any special functions that are affected by the front panel Function pushbutton.

Six boxes are also displayed along the bottom of each setup screen with one box highlighted. These boxes correspond to the installed receiver modules. The highlighted box is the currently selected module. Each box displays the parameter setting for one receiver module. Pressing a front panel Receiver Select button selects the corresponding receiver module as the current module, allowing modification of that module's parameters.

Level Setup Screen

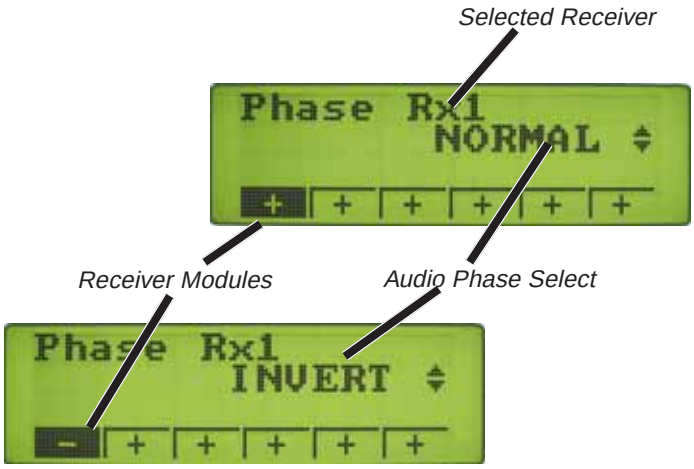
The Level setup screen displays the audio output level setting of the selected receiver. The output range is from -15 dBu to +8 dBu in 1 dB increments. The Level Setup Screen displays the selected receiver, audio output level setting and reference tone status.

An internally generated 1 kHz audio test tone can be made available at the selected receiver's XLR output. This tone is used for precise level matching with other equipment without actually going "on the air" and can be very useful for diagnostic purposes. The tone is toggled on or off by pressing the front panel Function button. The Tone icon in the example below indicates that the tone signal is turned off. The TONE box is filled in (reveresed) when the tone signal is active.



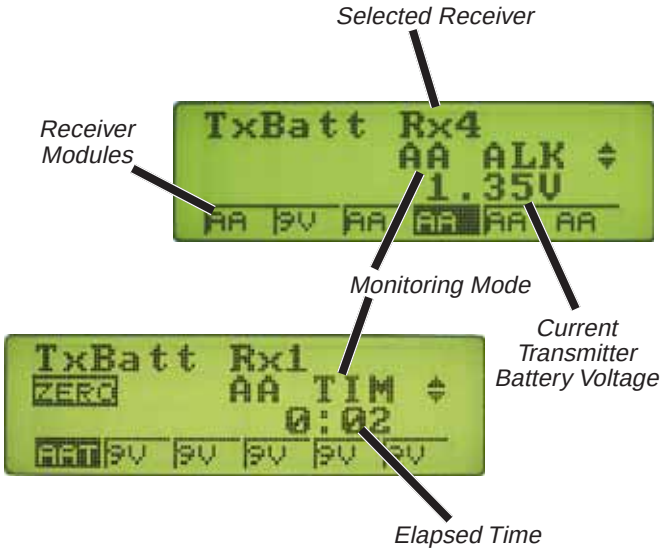
Phase Setup Screen

The Phase setup screen controls the phase of the audio output at the rear panel XLR jack relative to the audio signal from the associated transmitter. Two modes are available: NORMAL and INVERT. A receiver set to Normal mode (default) will display a "+" in the associated Receiver Module box. Rotating the MENU/SELECT control to select INVERT changes the display in the Receiver Module box to "-" and inverts the audio output at the associated rear panel XLR jack.

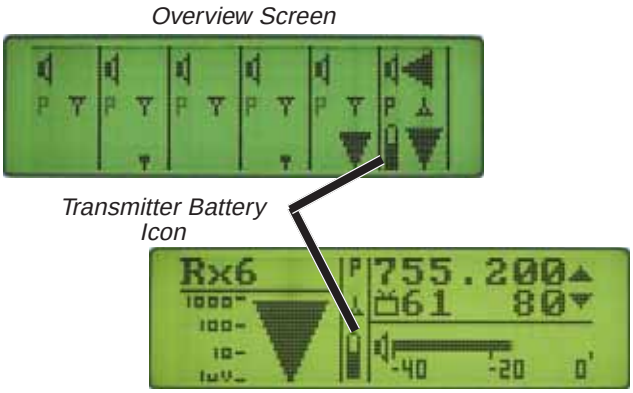


TxBatt Setup Screen

The TxBatt setup screen allows the selection of the exact battery type being used in the transmitter to provide more accurate battery level monitoring. Four different types of batteries are commonly used in Lectrosonics transmitters: 9 Volt alkaline, 9 Volt lithium, AA alkaline, and AA lithium. Rechargeable NiMH batteries can also be used in the transmitters (see 9V TIM and AA TIM). Correctly set, this feature will ensure that adequate warning will be provided in advance of battery failure.



Depending on the TxBatt mode, a battery icon or timer will be displayed on both the Overview and Receiver Detail screens, and the battery level or timer value will be displayed on the Receiver Infomation Screen. The icon, timer or voltage only appears after a valid signal has been detected for at least 10 seconds and when both the transmitter and receiver module are operating in either 200 Series or Digital Hybrid (400 Series) compatibility mode.



The TxBatt Setup Screen offers six monitoring choices:

9V ALK (9V) - For Lectrosonics Digital Hybrid (400 Series) and 200 Series transmitters using 9V alkaline batteries. The voltage remaining in the battery is displayed as an icon on the Overview and Receiver Detail screens and as the value on the TxBatt Setup Screen for the selected receiver module. Receiver modules set up for 9V alkaline batteries will have 9V displayed in the corresponding Receiver Module box at the bottom of the TxBatt setup screen.

Note

In 9V ALK, 9V LTH, AA ALK and AA LTH modes, a blinking Battery icon indicates that the it is close to exhaustion and needs replacing.

9V LTH (9VL) - For Lectrosonics Digital Hybrid (400 Series) and 200 Series transmitters using 9V lithium batteries. The voltage remaining in the battery is displayed as an icon on the Overview and Receiver Detail screens and as the value on the TxBatt Setup Screen for the selected Receiver Module. Receiver modules set up for 9V lithium batteries will have "9VL" displayed in the corresponding Receiver Module box at the bottom of the TxBatt Setup Screen.

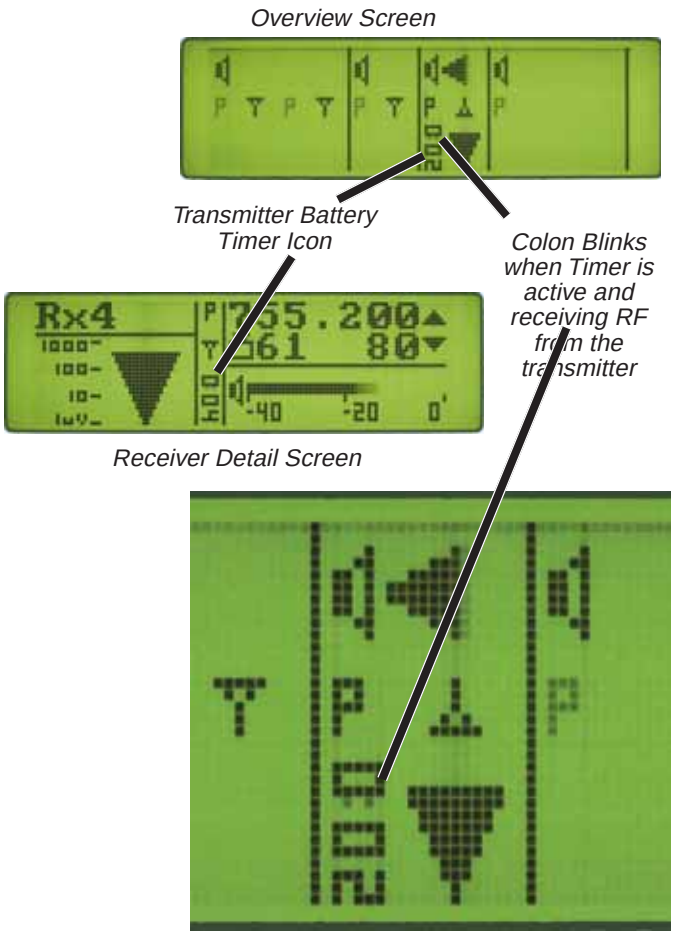
AA ALK (AA) - For Lectrosonics Digital Hybrid (400 Series) and 200 Series transmitters using AA alkaline batteries. The voltage remaining in the battery is displayed as an icon on the Overview and Receiver Detail screens and as the value on the TxBatt Setup Screen for the selected Receiver Module. Receiver modules set up for AA alkaline batteries will have "AA" displayed in the corresponding Receiver Module box at the bottom of the TxBatt Setup Screen.

AA LTH (AAL) - For Lectrosonics Digital Hybrid (400 Series) and 200 Series transmitters using AA lithium batteries. The voltage remaining in the battery is displayed as an icon on the Overview and Receiver Detail screens and as the value on the TxBatt Setup Screen for the selected Receiver Module. Receiver modules set up for AA lithium batteries will have "AAL" displayed in the corresponding Receiver Module box at the bottom of the TxBatt Setup Screen.

9V TIM (9VT) - This timer is compatible with any transmitter using a 9V battery, with or without battery telemetry capabilities, or for rechargeable batteries where voltage is constant over the life of the battery. The timer monitors the accumulated time it receives RF from a transmitter operating at the same frequency as the selected receiver module. The elapsed time is displayed in both the Overview and Receiver Detail screens, and the TxBatt Setup Screen for the selected receiver module. Its format is H:MM and it can run for up to 10 hours (9:59) before rolling over.

The timer's colon blinks (in both the Main Receiver screen and the Receiver Detail Screen) when the timer is active and receiving RF from the associated transmitter. When the transmitter or VR is turned off, the timer will retain the last time setting and resume counting after the transmitter or receiver is powered up and a signal is detected from the transmitter.

To reset (or zero) the timer, navigate to the TxBatt Setup Screen, select the appropriate Receiver Module using the front panel Receiver Select button, then press the Function button to reset the timer to zero.



Receiver modules set up for 9V TIM will have "9VT" displayed in the corresponding Receiver Module box at the bottom of the TxBatt setup screen.

AA TIM (AAT) - Operates essentially the same as the 9V TIM timer except it applies to transmitters using AA batteries. Receiver modules set up for AA TIM will have "AAT" displayed in the corresponding Receiver Module box at the bottom of the TxBatt setup screen.

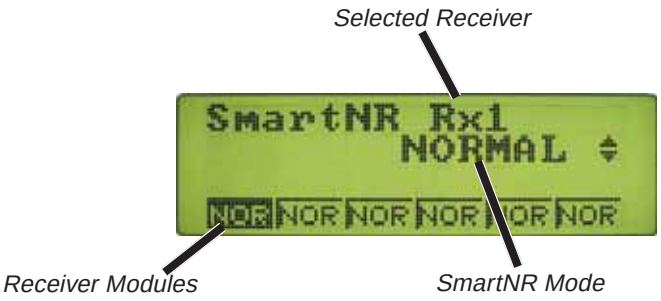
SmartNR Setup Screen

Available in Digital Hybrid (400 Series) Compatibility Mode, the SmartNR (Smart Noise Reduction) Setup Screen is used to select one of three noise reduction modes:

Note

If any mode other than Digital Hybrid (400 Series) is selected, the SmartNR mode will indicate "FIXED" and "N/A" will appear in the corresponding Receiver Module box. SmartNR is still applied in this mode; however, it is automatically set to best emulate the original analog receiver.

OFF - No noise reduction is performed and complete transparency is preserved. All signals presented to the transmitter's analog front end, including any faint microphone hiss, will be faithfully reproduced at the receiver.



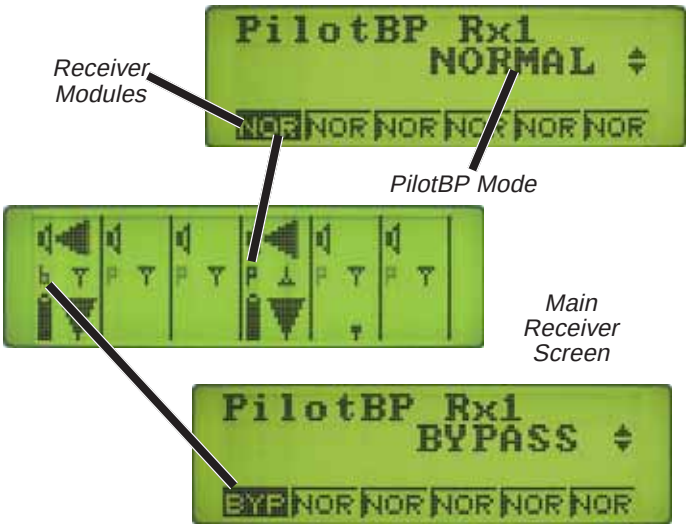
NORMAL (factory default) - Enough noise reduction is applied to remove most of the hiss from the mic preamp and some of the hiss from lavaliere microphones. The noise reduction benefit is dramatic in this position, yet the degree of transparency maintained is exceptional.

FULL - Enough noise reduction is applied to remove most of the hiss from nearly any signal source of reasonable quality, assuming levels are set properly at the transmitter.

Rotate the MENU/SELECT control to display the desired noise reduction mode. The selected mode will be displayed in the Receiver Module box at the bottom of the display. Press BACK to return to the previous screen, or press a Receiver Select button to select a different receiver module without leaving the SmartNR Setup Screen.

PilotBP Setup Screen

PilotBP (pilot tone/squelch bypass) operates differently depending on the compatibility mode. In the case of 100 Series, or Mode 3, PilotBP bypasses the squelch. In 200 Series, IFB and Digital Hybrid (400 Series) modes, PilotBP bypasses both the pilot tone detector and the squelch. The VR always powers up with normal squelch operation (pilot tone bypass mode disabled).



Caution

PilotBP was made available as a diagnostic tool in the case that a receiver does not appear to be working properly, or to determine the nature of RF interference. However, it should be used with caution. The selected receiver can output very loud noises in this mode.

To enable pilot tone bypass mode for a Receiver Module, navigate to the PilotBP Setup Screen and press the appropriate Receiver Select button. Rotate the MENU/SELECT control to select BYPASS. BYP should appear in the Receiver Module box for the selected receiver. Press the BACK button return to the previous menu, or a Receiver Select button to select a different receiver module.

Pilot BP Shortcut

From the Overview Screen it's possible to set the PilotBP mode by holding the front panel Function button while pressing the appropriate Receiver Select pushbutton. This toggles the PilotBP setting for the corresponding receiver module, or, depending on the diversity mode selected, receiver modules.

To return the Receiver Module to normal PilotBP operating mode (pilot tone bypass mode disabled), access the PilotBP Setup Screen, select the receiver module and rotate the MENU/SELECT control to select NORMAL.

Compat Setup Screen

The Compat setup screen is used to select the compatibility mode for individual Receiver Modules, allowing the VR to operate with a variety of transmitters. The available compatibility modes are:

HYB- This is the factory default setting and works with all Lectrosonics Digital Hybrid Wireless™ (400 Series) transmitters. This mode offers the best audio quality.

M 3 - Mode 3 works with a number of non-Lectrosonics analog transmitters. Contact the company for a list of compatible transmitters.

200 - This mode works with all Lectrosonics 200 Series compatible transmitters.

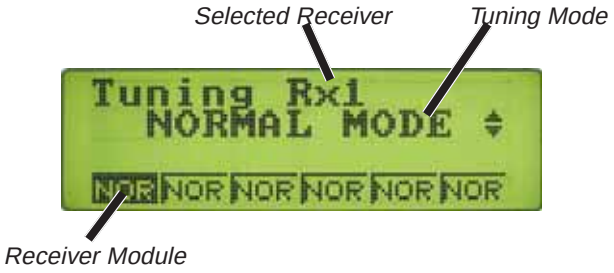
100 - This mode works with all Lectrosonics 100 Series compatible transmitters.

IFB - IFB mode works will all Lectrosonics IFB transmitters.

Tuning Setup Screen

The Tuning Setup Screen allows selection of one of four factory set frequency groups (Groups A through D), two user programmable frequency groups (Groups U and V) or the choice to not use groups at all.

In the four factory set frequency groups, eight frequencies per group are preselected. These frequencies are chosen to be free of intermodulation products. (See Frequency Coordination.)

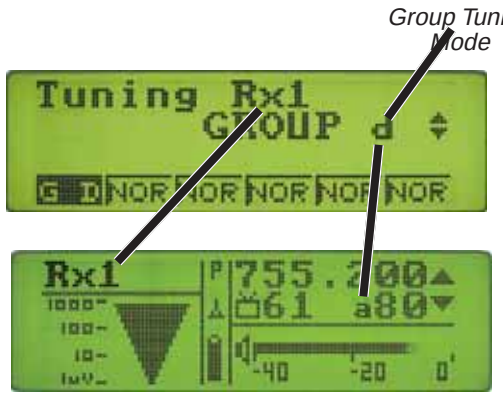


In the two user programmable frequency groups, up to 16 frequencies can be programmed per group.

Note

The Tuning Setup Screen only selects the tuning mode for the selected receiver module (NORMAL or Group Tuning) and not the operating frequency for that module. Actual operating frequencies are chosen through the Receiver Detail Screen. (See Adding/Deleting User Group Frequencies.)

To set a receiver module's tuning mode, access the Tuning Setup Screen, press the appropriate front panel Receiver Select button, rotate the MENU/SELECT control to select either NORMAL mode, or one of the group tuning modes. The tuning mode will be displayed in the Receiver Module box at the bottom of the Tuning Setup Screen. If NORMAL mode is selected, then "NOR" will be displayed in the Receiver Module box. If a tuning group is selected, then "G A" through "G V" will be displayed in the Receiver Module boxes, depending on the group selected.



Receiver Detail Screen

Returning to the Overview Screen and pressing the front panel Receiver Select button for the appropriate receiver displays the Receiver Detail Screen for the selected receiver. In the example, Tuning Group A was selected for Receiver 1. The small "a" displayed next to the Frequency Select Switch settings in the Receiver Detail Screen indicates that this receiver module has been set tuning Group A.

In NORMAL mode, only the Transmitter Frequency Select Switch settings would be displayed here.

When a receiver module is set to use a user programmable frequency group, the tuning behavior is modified slightly. Turning the MENU/SELECT control navigates among the frequencies that are "in" the currently selected tuning group. Turning the MENU/SELECT control while holding down the Function button allows any frequency to be selected, whether or not it is in the currently selected turning group.

Any time the currently tuned frequency is not in the current tuning group, the Group Tuning Mode indicator on the Receiver Detail Screen will blink. Any time the currently tuned frequency is in the current turning group, the Group Tuning Mode indicator will give a steady (non-blinking) indication.

User Programmable Frequency Group Behavior

The user programmable frequency groups work very similar to the factory groups with a few exceptions. The most obvious difference is the ability to add or remove frequencies from the group. Less obvious is the behavior of a user programmable frequency group with only one, or no entries.

A user programmable frequency group with only one entry will only display that one frequency regardless of how much the MENU/SELECT control is turned (without holding the Function button).

A user programmable frequency group with no entries reverts to non-group-mode behavior, i.e., access is allowed to all 256 available frequencies in the selected receiver module's frequency block. However, once a frequency has been added to the tuning group, this behavior changes to group-mode behavior where the Function button must be pressed to access frequencies that are not part of the current tuning group.

Adding/Deleting User Programmable Frequency Group Entries

Note

Each User Programmable Frequency Group has separate contents for each frequency block covered by the VRM. However, each user group's contents are common to all receivers sharing the same group tuning mode and frequency block.

1. Start from the Receiver Detail Screen of a receiver module that is set to use Group "u" or Group "v" that is also in the desired frequency range block. (See Tuning Setup Screen.)

Note

To get to the Receiver Detail Screen for a receiver module, press BACK until the Overview screen appears, then select the receiver module by pressing its Receiver Select button. If the Group Tuning Mode indicator is blinking, then currently tuned frequency is not in the group. If the Group Tuning Mode indicator is steady, then the current frequency is in the group. If the Group Tuning Mode indicator is absent, or displays as "a", "b", "c", or "d", then the receiver module is not set to on of the User Programmable Tuning Modes.

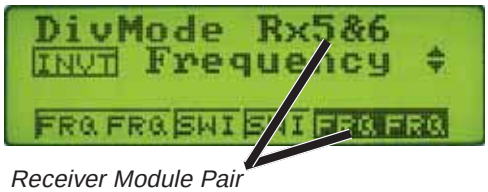
2. Hold the Function Key and rotate the MENU/SELECT control to any of the 256 frequencies in the block. Whenever the selection comes to rest on a frequency that is in the current group, the Group Tuning Mode indicator (letter "u" or "v") will give a steady indication. On frequencies that are not in the group, the indicator will blink.
3. To add or remove the displayed frequency from the group, hold the Function button while pressing hte MENU/SELECT control. The Group Tuning Mode indicator will stop blinking to show that the frequency has been added to the group, or begin blinking to indicate that the frequency has been removed from the group.

DivMode Setup Screen

The Venue System offers three different Diversity modes of operation: SmartDiversity™ (switched), OptiBlend™ (ratio diversity) and Frequency Diversity. Regardless of which diversity mode is selected, receiver modules are always paired using the following combinations: 1-2, 3-4 and 5-6. However, in switched diversity operation, the individual receiver modules operate independently with each module having its own set of controls and indicators.

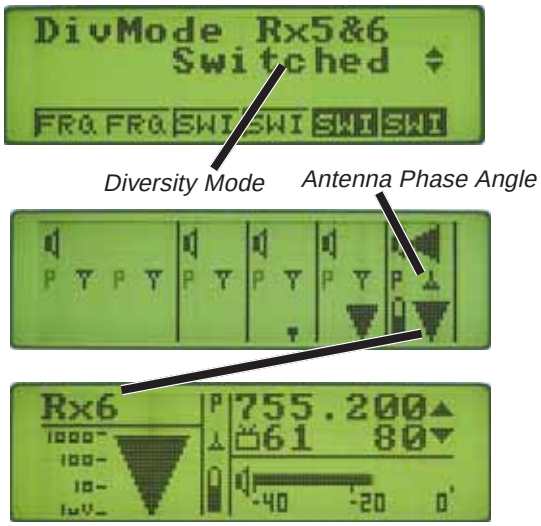
In ratio diversity and frequency diversity modes, the paired receiver modules act as a set. Pressing the Receiver Select button for one member of the pair has the effect of selecting or operating on both receiver modules in the pair.

Frequency diversity adds another facet in that it uses two transmitters requiring the transmitter outputs to be balanced in order for this mode to function correctly. (The figure below shows Receiver Modules 5 and 6 set for Frequency Diversity Mode.)



SmartDiversity™

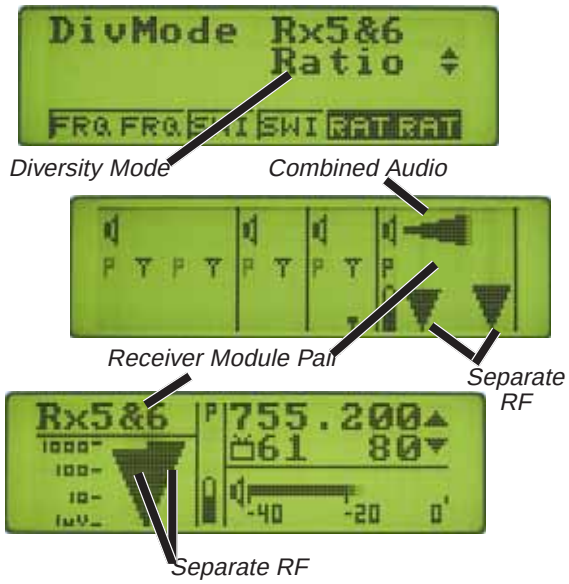
The VRM is designed to route both antenna inputs to each receiver module. SmartDiversity is a microprocessor controlled antenna phase switching process which switches phase angle between the antenna inputs by 0 or 180 degrees depending on relative RF. The goal is to minimize dropouts caused by multi-path reflections.



Since each receiver actually acts independently in this mode, SmartDiversity allows diversity reception of up to six independent channels.

OptiBlend™

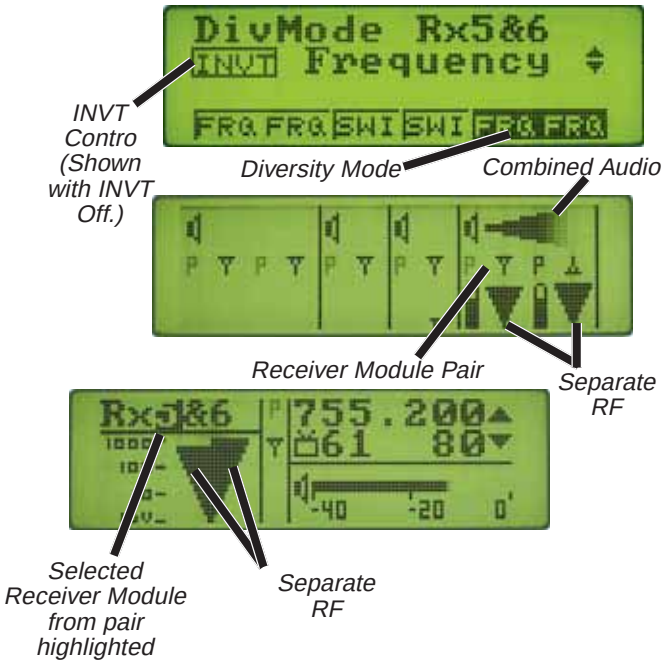
OptiBlend™ is a ratio diversity method which combines the audio output from two adjacent receiver modules (1-2, 3-4 or 5-6) relative to the RF signal input levels at both receivers. The Overview Screen displays the paired receivers with the relative RF input for each receiver and a single (combined) audio output. While two independent RF channels are displayed on the Overview Screen, all other setup parameters are the same for both



receivers. From the Overview Screen, pressing a Receiver Select button for either member of the diversity pair displays the Receiver Detail Screen for that pair. In this screen, the RF Signal Strength meter is split with each side showing the RF signal strength of one of the members of the diversity pair. (In the previous figure, the RF signal strength for Receiver Module 5 is the left half of the meter and the RF signal strength for Receiver Mocule 6 is the right half.)

Frequency Diversity

Frequency Diversity mode uses two transmitters simultaneously carrying identical audio (the transmitter microphones are placed right next to each other), and the Venue System performs a ratio blend of the audio output from the associated receiver modules to protect against dropouts. Another benefit of this mode is the system avoids a transmitter that is signaling the end of its battery life.



Frequency Diversity pairs two transmitters (of the same make and model) with two adjacent receiver modules (1-2, 3-4 or 5-6). Each transmitter/receiver in the pair is tuned to a different frequency. The RF signal level at each receiver is monitored and the audio is blended in a manner similar to ratio diversity.

Select button for either member of the diversity pair displays the Receiver Detail Screen for that pair. In this screen, the RF Signal Strength meter is split with each side showing the RF signal strength of one of the members of the diversity pair. (In the previous figure, the RF signal strength for Receiver Module 5 is the left half of the meter and the RF signal strength for Receiver Mocule 6 is the right half.)

In Frequency Diversity mode, the compatibility mode, noise reduction, pilot tone bypass and output level are all matched. For example, setting the compatibility mode to Digital Hybrid in one receiver of the pair automatically sets the other receiver to the same compatibility mode. However, transmitter battery monitoring and operating frequency are set independently.

Frequency Diversity has two modes of operation: normal mode and test mode. Test mode is automatically activated when the DivMode Setup Screen is active and Frequency Diversity is selected. In this mode, the audio is always blended exactly 50/50 allowing a true null to be achieved when the INVT function is activated. When exiting this setup screen, normal mode is activated and the blending ratio depends on the RF signal strengths.

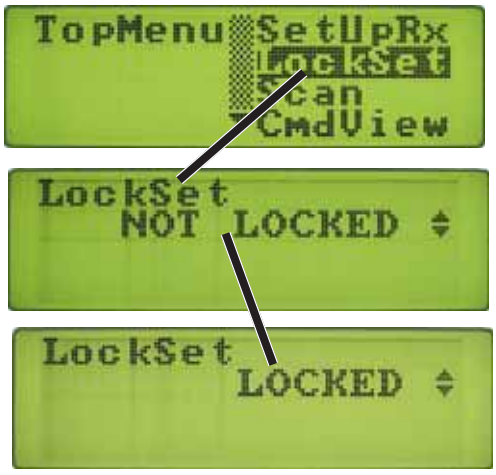
The INVT control is used during system setup to match the audio from each transmitter/receiver module pair. Pressing the front panel Function button inverts the audio from the second half of the selected receiver pair. This control can be used to balance transmitter audio output levels and to allow transmitters having opposing output audio phases to be used together in this mode.

Note

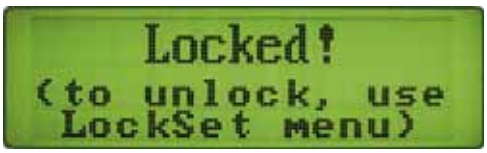
Each Receiver Module in the Frequency Diversity pair must be tuned independently to match the associated transmitter. This is done by selecting the receiver using the front panel Receiver Select Button to open its Receiver Detail Screen, then rotating the MENU/SELECT control to the desired frequency.

LockSet Setup Screen

The LockSet function is used to prevent inadvertent changes to the Venue System setup. LockSet is accessed from the Top Menu. The MENU/SELECT control is used to toggle between the "NOT LOCKED" and "LOCKED" states.



When the system is LOCKED, no settings or operating parameters may be changed from the LCD interface. The system also will not enter Scan Mode. This provides a measure of insurance against accidental changes while still allowing all parameters to be viewed. Attempts to change a parameter or enter Scan Mode when the system is LOCKED results in the LOCKED! screen message being displayed. The only exception is the LockSet Setup Screen itself.



Scan Function

Warning
Do not enter the Scan Function during normal operation. This is a setup mode and not an operating mode. The Scan Function automatically removes two receiver modules from normal operation (one from each frequency block) and uses them to scan the frequency block ranges. (The reciever modules used for scanning cannot be changed by the user.) Entering the Scan Function during normal operation may result in unwanted audio interferrence, or accidental retuning of the scanning receiver modules.

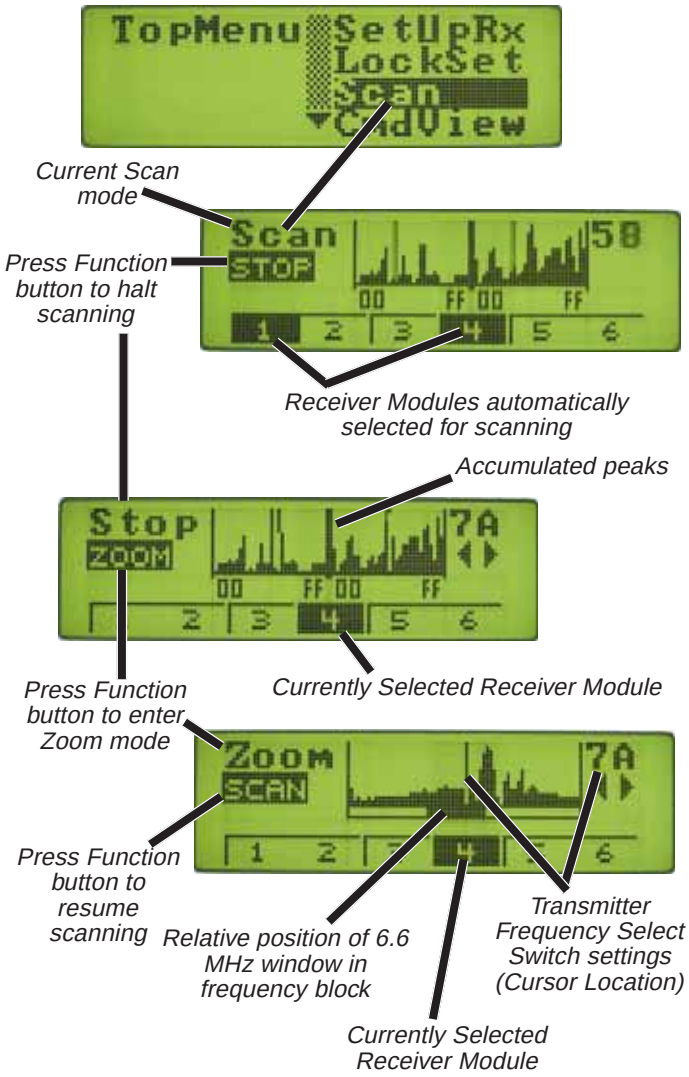
The Venue System has an integrated scanning function that displays a spectrum analysis as it scans across the frequency block range. The purpose is to find unused frequencies, or frequencies with minimal RF interference. The Scan function has three modes: Scan, Stop and Zoom. These modes are displayed on the Scan screen and are accessed by pressing the front panel Function button.

Note
The current Scan mode is displayed in the upper left corner of the Scan screen. The mode which will be selected by pressing the Function button is highlighted and located under the current Scan mode.

To use the integrated scanning function, from the Overview Screen push the MENU/SELECT control to enter the Top Menu then rotate the control to highlight Scan. Pressing the MENU/SELECT control again begins the scanning function.

Scan Mode

The LCD switches to the Scan screen and automatically starts progressively scanning all installed frequency blocks. The unit will scan continually, accumulating the highest peak seen on each channel with each subsequent pass, until stopped by pressing the Function button or the MENU/SELECT control. Data gathered during the scanning process shows the "worst case scenario" for any given channel and is retained until the VRM is turned off or scanning is reset by momentarily pressing the POWER On/Off switch.



In Scan mode, the highlighted Receiver Module boxes are the receiver modules automatically selected for use for spectrum analysis. The user cannot change this selection. The lowest numbered receiver from each frequency block is used. They are essentially "borrowed" for the scanning function and are returned to their original frequencies in Stop or Zoom modes, or when Scan is exited.

In Scan mode, each vertical band of the display represents eight frequencies (800 kHz).

Warning
If one of the receiver modules is manually tuned in Stop mode or Zoom mode, the new frequency setting will persist when exiting Scan. Moving the cursor for the selected receiver module tunes that receiver in real time.

Stop Mode

To stop scanning (but not exit Scan), press the front panel Function button once. In Stop mode, each vertical band in the display still represents eight frequencies (800

kHz). Rotating the MENU/SELECT control scrolls the cursor for the currently selected receiver across the tuning range. As the cursor scrolls across the tuning range, the Transmitter Frequency Select Switch settings associated with the cursor location are shown in the upper right corner of the display.

Up to six individual cursors appear in Scan mode, depending on the number of receiver modules installed and the diversity modes selected. (See DivMode Setup Screen.) Pressing the Receiver Select button for an individual receiver selects the corresponding cursor for that receiver. (The selected cursor blinks.) The corresponding Receiver Module box will be highlighted, and that receiver will be monitored at the PHONES jack. Rotating the MENU/SELECT control moves the selected cursor and tunes the selected receiver in real time.

The location of the selected cursor also controls the value displayed for the Transmitter Frequency Select Switch settings. Changing the cursor location, or selecting a different receiver module (and thus a different cursor) will change the value for the Transmitter Frequency Select Switch setting.

Zoom Mode

Pressing the Function button from Stop mode accesses Zoom mode which displays an expanded portion of the spectrum around a fixed, vertical cursor. In this view, each vertical band represents one frequency (100 kHz). As the MENU/SELECT control is rotated, a 6.6 MHz window moves across the frequency block. The relative position of this window in the frequency block range is indicated on a horizontal bar at the bottom of the spectrum display.

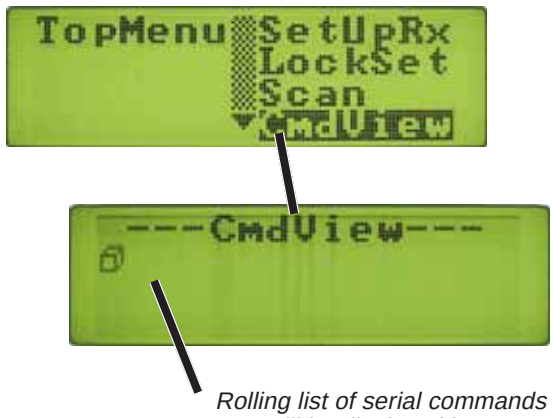
Warning
If one of the receiver modules is manually tuned in Stop mode or Zoom mode, the new frequency setting will persist when exiting Scan. Moving the cursor for the selected receiver module tunes that receiver in real time.

Pressing the Function button again returns to Scan mode and resumes the scanning function.

CmdView Screen

The CmdView Screen is used primarily for diagnostics and for troubleshooting communication problems when setting up serial remote control systems.

The CmdView screen is a convenient utility to assist in verifying correct serial commands have been sent to the unit. This screen offers feedback when using computers or other devices connected to the RS-232 or USB serial ports. As commands are transferred through either of these ports to the Venue System, those commands are listed in order of entry on the CmdView Screen.



Rolling list of serial commands will be displayed here

Frequency Coordination

Intermodulation interference is a problem constantly lurking in the background, especially when working in environments were multiple productions are taking place simultaneously in relative close proximity. In these cases, proper frequency coordination is a must. There are basically three methods coordinate frequencies:

Use the Compatible Frequency Chart
Scan for clear channels (See Scan Function and Using Scan to Find Clear Channels)
Call Lectrosonics

Compatible Frequency Chart

Because the Venue System includes one to six Receiver Modules per unit, each unit can handle up to six independent wireless channels. Considering that multiple Venue Systems can be used in a production, coordinating frequencies to minimize interference between these channels can be a daunting process.

The Compatible Frequency Chart was designed to assist in minimizing intermodulation problems for multiple channel wireless systems. It does this by identifying potential intermodulation problems and listing compatible frequencies and frequency groups. This chart can be used with all Digital Hybrid Wireless™ (400 Series) receivers.

The Compatible Frequency Chart divides the frequency blocks used in the North American market into Row 1 and Row 2, then further divides each row into two groups of eight frequencies each. These frequency groups are labeled A and B and C and D, and correspond to the factory set frequency groups (Groups A, B, C and D) described in the Tuning Setup Screen. (See Compatible Frequency Chart.)

Understanding and using the Compatible Frequency Chart is not as difficult as it first appears. There are a few basic rules to follow:

Note
Refer to the Compatibility Frequency Chart's Compatible and Incompatible frequency combinations. (Only frequency blocks 21 and 22 are shown for illustrative purposes.)

Rule No. 1

Row 1 and Row 2 live in two different worlds. The frequencies in Row 1 are not compatible with the

Compatible Frequency Chart

ROW 1

Grp A

BLOCK 21			BLOCK 22			BLOCK 23			BLOCK 24		
FREQ	SW SET	US TV CH	FREQ	SW SET	US TV CH	FREQ	SW SET	US TV CH	FREQ	SW SET	US TV CH
538.100	0,5	tv25	563.700	0,5	tv29	589.300	0,5	tv33	614.900	0,5	tv38
538.700	0,B	tv25	564.300	0,B	tv29	589.900	0,B	tv33	615.500	0,B	tv38
539.600	1,4	tv25	565.200	1,4	tv29	590.800	1,4	tv34	616.400	1,4	tv38
540.200	1,A	tv25	565.800	1,A	tv29	591.400	1,A	tv34	617.000	1,A	tv38
541.500	2,7	tv25	567.100	2,7	tv30	592.700	2,7	tv34	618.300	2,7	tv38
542.400	3,0	tv26	568.000	3,0	tv30	593.600	3,0	tv34	619.200	3,0	tv38
542.900	3,5	tv26	568.500	3,5	tv30	594.100	3,5	tv34	619.700	3,5	tv38
543.700	3,D	tv26	569.300	3,D	tv30	594.900	3,D	tv34	620.500	3,D	tv39

Grp B

550.100	7,D	tv27	575.700	7,D	tv31	601.300	7,D	tv35	626.900	7,D	tv40
552.300	9,3	tv27	577.900	9,3	tv31	603.500	9,3	tv36	629.100	9,3	tv40
553.000	9,A	tv27	578.600	9,A	tv32	604.200	9,A	tv36	629.800	9,A	tv40
554.300	A,7	tv28	579.900	A,7	tv32	605.500	A,7	tv36	631.100	A,7	tv40
556.100	B,9	tv28	581.700	B,9	tv32	607.300	B,9	tv36	632.900	B,9	tv41
557.000	C,2	tv28	582.600	C,2	tv32	NOT AVAILABLE			633.800	C,2	tv41
559.600	D,C	tv28	585.200	D,C	tv33	NOT AVAILABLE			636.400	D,C	tv41
561.900	F,3	tv29	587.500	F,3	tv33	NOT AVAILABLE			638.700	F,3	tv42

ROW 2

Grp C

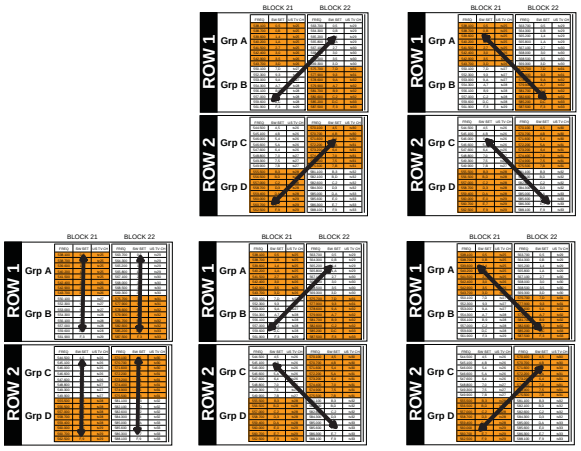
FREQ	SW SET	US TV CH	FREQ	SW SET	US TV CH	FREQ	SW SET	US TV CH	FREQ	SW SET	US TV CH
544.500	4,5	tv26	570.100	4,5	tv30	595.700	4,5	tv34	621.300	4,5	tv39
545.100	4,B	tv26	570.700	4,B	tv30	596.300	4,B	tv35	621.900	4,B	tv39
546.000	5,4	tv26	571.600	5,4	tv30	597.200	5,4	tv35	622.800	5,4	tv39
546.600	5,A	tv26	572.200	5,A	tv31	597.800	5,A	tv35	623.400	5,A	tv39
547.600	6,4	tv26	573.200	6,4	tv31	598.800	6,4	tv35	624.400	6,4	tv39
548.800	7,0	tv27	574.400	7,0	tv31	600.000	7,0	tv35	625.600	7,0	tv39
549.300	7,5	tv27	574.900	7,5	tv31	600.500	7,5	tv35	626.100	7,5	tv40
549.900	7,B	tv27	575.500	7,B	tv31	601.100	7,B	tv35	626.700	7,B	tv40
555.500	B,3	tv28	581.100	B,3	tv32	606.700	B,3	tv36	632.300	B,3	tv41

Grp D

556.500	B,D	tv28	582.100	B,D	tv32	607.700	B,D	tv36	633.300	B,D	tv41
557.000	C,2	tv28	582.600	C,2	tv32	NOT AVAILABLE			633.800	C,2	tv41
558.700	D,3	tv28	584.300	D,3	tv32	NOT AVAILABLE			635.500	D,3	tv41
559.400	D,A	tv28	585.000	D,A	tv33	NOT AVAILABLE			636.200	D,A	tv41
560.000	E,0	tv29	585.600	E,0	tv33	NOT AVAILABLE			636.800	E,0	tv41
560.700	E,7	tv29	586.300	E,7	tv33	NOT AVAILABLE			637.500	E,7	tv41
562.500	F,9	tv29	588.100	F,9	tv33	NOT AVAILABLE			639.300	F,9	tv42

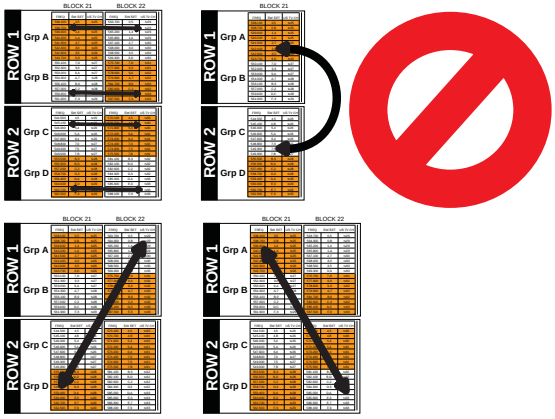
Compatible

The following frequency combinations have no intermodulation problems.



Incompatible

The following frequency combinations have intermodulation problems and should not be used.



Compatible Frequency Chart (cont.)

BLOCK 25

FREQ	SW SET	US TV CH
640.500	0,5	tv42
641.100	0,B	tv42
642.000	1,4	tv42
642.600	1,A	tv42
643.900	2,7	tv42
644.800	3,0	tv43
645.300	3,5	tv43
646.100	3,D	tv43
652.500	7,D	tv44
654.700	9,3	tv44
655.400	9,A	tv44
656.700	A,7	tv45
658.500	B,9	tv45
659.400	C,2	tv45
662.000	D,C	tv45/46
664.300	F,3	tv46

BLOCK 26

FREQ	SW SET	US TV CH
666.100	0,5	tv46
666.700	0,B	tv46
667.600	1,4	tv46
668.200	1,A	tv47
669.500	2,7	tv47
670.400	3,0	tv47
670.900	3,5	tv47
671.700	3,D	tv47
678.100	7,D	tv48
680.300	9,3	tv49
681.000	9,A	tv49
682.300	A,7	tv49
684.100	B,9	tv49
685.000	C,2	tv49
687.600	D,C	tv50
689.900	F,3	tv50

BLOCK 27

FREQ	SW SET	US TV CH
691.700	0,5	tv50
692.300	0,B	tv51
693.200	1,4	tv51
693.800	1,A	tv51
695.100	2,7	tv51
696.000	3,0	tv51
696.500	3,5	tv51
697.300	3,D	tv51
703.700	7,D	tv52
705.900	9,3	tv53
706.600	9,A	tv53
707.900	A,7	tv53
709.700	B,9	tv53
710.600	C,2	tv54
713.200	D,C	tv54
715.500	F,3	tv54

BLOCK 28

FREQ	SW SET	US TV CH
717.300	0,5	tv55
717.900	0,B	tv55
718.800	1,4	tv55
719.400	1,A	tv55
720.700	2,7	tv55
721.600	3,0	tv55
722.100	3,5	tv56
722.900	3,D	tv56
729.300	7,D	tv57
731.500	9,3	tv57
732.200	9,A	tv57
733.500	A,7	tv57
735.300	B,9	tv58
736.200	C,2	tv58
738.800	D,C	tv58
741.100	F,3	tv59

BLOCK 29

FREQ	SW SET	US TV CH
742.900	0,5	tv59
743.500	0,B	tv59
744.400	1,4	tv59
745.000	1,A	tv59
746.300	2,7	tv60
747.200	3,0	tv60
747.700	3,5	tv60
748.500	3,D	tv60
754.900	7,D	tv61
757.100	9,3	tv61
757.800	9,A	tv61
759.100	A,7	tv62
760.900	B,9	tv62
761.800	C,2	tv62
764.400	D,C	tv63
766.700	F,3	tv63

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

FREQ	SW SET	US TV CH
672.500	4,5	tv47
673.100	4,B	tv47
674.000	5,4	tv47/48
674.600	5,A	tv48
675.600	6,4	tv48
676.800	7,0	tv48
677.300	7,5	tv48
677.900	7,B	tv48
683.500	B,3	tv49
684.500	B,D	tv49
685.000	C,2	tv49
686.700	D,3	tv50
687.400	D,A	tv50
688.000	E,0	tv50
688.700	E,7	tv50
690.500	F,9	tv50

FREQ	SW SET	US TV CH
698.100	4,5	tv52
698.700	4,B	tv52
699.600	5,4	tv52
700.200	5,A	tv52
701.200	6,4	tv52
702.400	7,0	tv52
702.900	7,5	tv52
703.500	7,B	tv52
709.100	B,3	tv53
710.100	B,D	tv54
710.600	C,2	tv54
712.300	D,3	tv54
713.000	D,A	tv54
713.600	E,0	tv54
714.300	E,7	tv54
716.100	F,9	tv55

FREQ	SW SET	US TV CH
723.700	4,5	tv56
724.300	4,B	tv56
725.200	5,4	tv56
725.800	5,A	tv56
726.800	6,4	tv56
728.000	7,0	tv56/57
728.500	7,5	tv57
729.100	7,B	tv57
734.700	B,3	tv58
735.700	B,D	tv58
736.200	C,2	tv58
737.900	D,3	tv58
738.600	D,A	tv58
739.200	E,0	tv58
739.900	E,7	tv58
741.700	F,9	tv59

FREQ	SW SET	US TV CH
749.300	4,5	tv60
749.900	4,B	tv60
750.800	5,4	tv60
751.400	5,A	tv60
752.400	6,4	tv61
753.600	7,0	tv61
754.100	7,5	tv61
754.700	7,B	tv61
760.300	B,3	tv62
761.300	B,D	tv62
761.800	C,2	tv62
763.500	D,3	tv62
764.200	D,A	tv63
764.800	E,0	tv63
765.500	E,7	tv63
767.300	F,9	tv63

frequencies in Row 2. If you are forced to use frequencies from Row 1 with frequencies from Row 2, be aware that intermodulation problems may exist.

Rule No. 2

Frequencies within an individual frequency block in the same row are compatible. For example, all 16 frequencies within Row 1, Block 21 are compatible, and all frequencies in Row 2 Block 21 are compatible. However, frequencies in Row 1, Block 21 are not compatible with the frequencies in Row 2, Block 21. If possible, it is highly recommeneded to choose frequencies that are in the same row and same group. For example, stick with frequencies in Row 1 Group A, or Row 2 Group D rather than choosing frequencies from Row 1 Groups A and B.

Rule No. 3

Some frequencies in adjacent blocks are compatible and some are not. Refer to the "Compatible/Incompatible" illustration which shows compatible and incompatible frequency relationships.

By following the three rules, it is possible to locate a number of potential clear operating frequencies early in the production that are intermodulation free, then refine the list during system setup.

Using the Scan Function

Refer to the section titled "Using Scan to Find Clear Channels" for details on how to use the built-in spectrum scanner.

Interference can result from a wide variety of sources including TV station signals, other wireless equipment in use nearby, or from intermodulation within the Venue system itself. The RF spectrum analyzer built into the Venue system uses a receiver in each frequency block to scan the tunable spectrum and find clear channels with little or no interference. After scanning and finding the needed number of clear channels, one final procedure is necessary to verify the compatibility of the chosen frequencies.

Turn on all transmitters and receivers and verify there is a strong RF signal for each receiver. Turn each transmitter off one at a time and observe the RF level indicator on the matching receiver. The RF level should disappear or drop to a very low level. If it does not, change frequency on that receiver and transmitter and try it again.

Any time a frequency is changed on any of the systems in use, you must start at the beginning and go through this procedure for all systems. This will test for higher order imtermodulation from all signal sources and avoid interference.

Call Lectrosonics

Lectrosonics uses a proprietary computer program 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 LECTRO™ or Lectrosonics® wireless microphone and wireless IFB systems.

Antenna Use and Placement

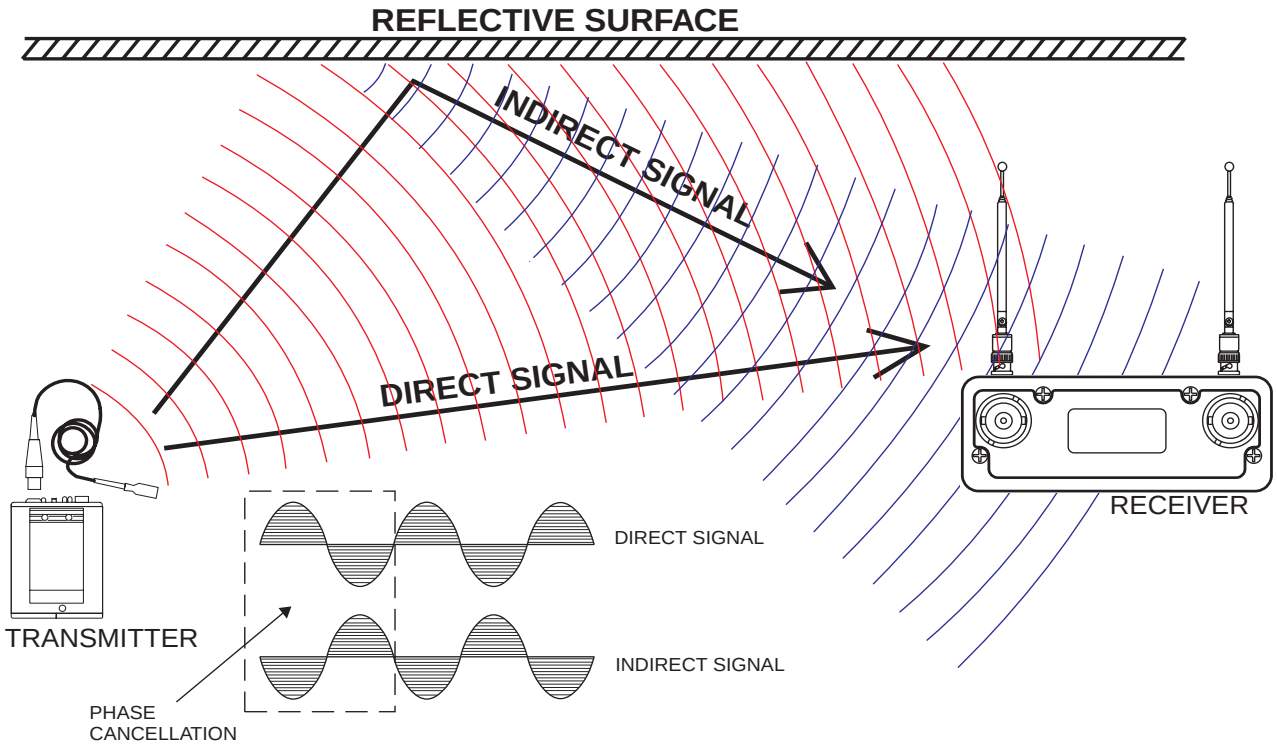
The Venue System is designed for rack mounting. Although it can be operated with two right angle BNC whip antennas, it is suggested for maximum reception to use remote antennas such as the SNA600 or ALP700. Position the remote antennas at least three or four feet apart and not within three or four feet of large metal surfaces. If this is not possible, try to position the antennas so that they are as far away from the metal surface as is practical. It is also good to position them so that there is a direct “line of sight” between the transmitter and the receiver antennas.

In situations where the operating range is less than about 100 feet, the antenna positioning is much less critical. However, the length of the cabling between antennas and the system is critical. Long cable runs can experience serious signal loss. Lectrosonics offers in-line RF amplifiers suitable for compensating for this signal loss. Contact your dealer or the factory for more information.

A wireless transmitter sends a radio signal out in all directions. This signal will often bounce off nearby walls, ceilings, etc. and a strong reflection can arrive at the receiver's antennas along with the direct signal. If the direct and reflected signals are out of phase with each other a cancellation may occur. The result is a “dropout.” A dropout can sound like audible noise (hiss or swishing), or in severe cases, it may result in a complete loss of both the carrier and the sound. Moving the transmitter even a few inches will change the sound of the dropout, or may even eliminate it. A dropout situation also may be either better or worse as a crowd fills or leaves the room.

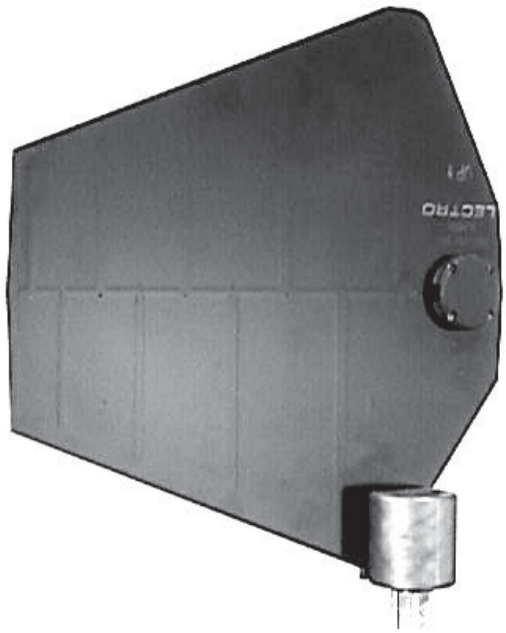
The Venue System offers a several sophisticated diversity designs which can overcome most dropout problems. In the event, however, that you do encounter a dropout problem, first try moving the one of the remote antennas at least three or four feet from its current location. This may alleviate the dropout problem at that location. If dropouts are still a problem, try moving the antennas to entirely different locations.

Lectrosonics transmitters radiate power very efficiently, and our receivers are very sensitive. This reduces dropouts to an insignificant level. If, however, you do encounter dropouts frequently, call the factory or consult your dealer. There is probably a simple solution.



MULTI-PATH DROPOUT

VR Replacement Parts and Accessories



Part No.	Description
DCR15/1A2U	Power Supply for Venue Receiver; 90-240 VAC, 50/60 Hz input; 15 VDC (regulated), 1.2 A max. output, 18 W.
A500RA	UHF flexible whip antenna with right angle BNC connector (470 - 767 MHz)
SNA600	Collapsible dipole antenna adjustable from 550 MHz to 800 MHz. Ideal for situations where a full 360 degree receiving pattern is required as opposed to a directional pattern.
ALP600	"Shark Fin" Log Periodic Dipole Array (LPDA) provides useful directional pattern over 500 to 800 MHz range. Ideal for portable applications including temporary setups for field production. Although the ALP600 is extremely rugged, it is not intended to be left outdoors permanently.
ALP700A	LPDA (Log Periodic Dipole Array) provides useful directional pattern over a broad frequency bandwidth (500 to 800 MHz).
ARG15-ARG100	Coaxial cables for remote antennas are available from Lectrosonics in a variety of lengths - from 2 to 100 ft. Cables include Velcro tie wraps.
VRS	Standard receiver module.
VRT	Tracking receiver module.
P1196	Receiver Module Retainer Clips for securing individual receiver modules in VR chassis.
UFM-50	UHF Filter/Amplifier Module. Amplifier provides 5 dB, 8 dB or 12 dB of user selectable gain.
MC65	Audio interconnect cable for connecting Venue Receiver to computer audio input for Walk Test Recorder.

Troubleshooting

Symptom	Solution
Powerup Problems	
LCD display not active	External power supply disconnected or malfunctioning. Main power supply fuse tripped. Turn the receiver off, remove the cause of the overload and turn the receiver back on. (it may be necessary to wait up to 15 minutes for the Poly Fuse to reset.) Wrong polarity power source. The external DC in requires POSITIVE to be on the center pin.
Receiver Modules Not Detected	Receiver Module outside of VRM Frequency Block Range. Receiver Module not seated properly on Receiver Module Connector. (See Hardware Installation.) Receiver Module Connector defective. Receiver Module defective. (Swap Receiver Module with adjacent module in same frequency block and see if problem changes channels. If problem follows Receiver Module, the module may be defective.)
RF Problems (All Modules)	
No Antenna Icon in any Receiver Module on Overview Screen	The antenna icon is only present in switched diversity and frequency diversity modes, and never present in ratio diversity mode.
RF Level Weak	Improper length antenna (if using UHF Whip Antennas) Excessive length of cable between Venue System and remote antenna assemblies. (Add UFM-50 if necessary. See Accessories.) Antenna cables or connectors defective. Antenna patch cables loose or defective (Multiple Venue System installations only.)
RF Problems (Individual Modules)	
RF Level Weak or Nonexistent	Receiver Module not installed properly. Receiver Module and Transmitter operating frequencies do not match. Improper length antenna on associated transmitter Transmitter battery low. Transmitter defective.
RF Level Weak or Nonexistent and Check Frequency message displayed on LCD 	Receiver Module and Transmitter operating frequencies do not match.
Audio Problems	
PILOT indicator is solid “P” for Receiver Module on Overview screen, but no sound	Observe the RF Signal Strength Meter on the Receiver Detail Screen. If the meter is not moving, the problem is probably with the transmitter. If the meter is moving, the problem is probably with the receiver. Audio output cable attached to Audio Output XLR Jack for selected Receiver Module bad or disconnected. Audio Output level for Receiver Module set too low. Use the built-in test tone to verify levels.

Symptom	Solution
PILOT "P" keeps flashing for Receiver Module when transmitter power switch is 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. Observe the RF Signal Strength Meter on the Receiver Detail Screen. If the there is little or no RF, then the problem is RF-related. If there is plenty of RF, then the transmitter and receiver are not on the same frequency, or there may be a compatiblity mode mismatch.
Noise on audio and Pilot indicator is "b"	The pilot tone/squelch bypass has been activated. Set PilotBP for selected Receiver Module to NORMAL.
Pilot indicator not present but audio is being received	Receiver Module is set to a Compatibility Mode that doesn't use pilot tone. Check that the Receiver Module's Compatibility Mode matches the associated transmitter as any sufficiently strong signal can unsquelch the receiver in this mode, compatible or not. *Note* *In Digital Hybrid (400 Series), 200 Series and IFB compatibility modes, the PILOT indicator on the front panel 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.* *Activating the "pilot bypass" function in any mode causes a lowercase "b" to appear in the pilot indicator position on the main window and forcibly unsquelches the audio.*
Poor signal-to-noise ratio	Associated 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 associated Receiver Module and see if the noise lowers correspondingly. If the noise remains, the problem is not in the Venue System. Receiver Module output is too low for the input of the device it is feeding. Try increasing the output level of the associated Receiver Module and lowering the input gain on the device the Receiver Module channel is feeding.
Distortion	Input gain on associated transmitter set too high. Check and/or readjust input gain on transmitter according to the manufacturer's recommendations and then verify the setting with the audio meter in the associated Receiver Detail Screen. Audio output level too high for the device the Receiver Module's output channel is feeding. Lower the output level of the associated Receiver Module.

Symptom	Solution
Bad frequency response or generally poor audio quality	Ensure the Receiver Module is set to the Compatibility Mode matching the associated transmitter. Check for Intermodulation problems. (See Frequency Coordination.)

Note

A number of symptoms may be caused by a strong interfering signal on the same frequency. Use the Venue System's Scan function to verify the transmitter and receiver are operating on a clear frequency channel.

Computer Interface Problems

"New Hardware Found" message does not appear when USB cable plugged into Venue System	Defective USB cable between Computer System and VRM, or between Computer System and USB Hub (Multiple System Configuration). Defective USB Hub (Multiple System Configuration) VRpanel software installed, but USB Driver not installed. (See Installing LecNet2™ Software and USB Driver.)
VRpanel detected by Windows but cannot be detected by VRpanel program	VRpanel software installed, but USB Driver not installed. (See Installing LecNet2™ Software and USB Driver.)
Not all Venue Systems appear in response to the "Add VR(s) via USB..." command	Defective USB cable between USB Hub and affected Venue System. Defective USB Hub.

Specifications

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

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: 3.0 mS (whole system, Digital Hybrid transmitter)
3.0 mS (whole system, analog transmitter*)
1.5 mS (receiver only, Digital Hybrid mode)
3.0 mS (receiver only, analog compatibility mode*)

*delay is added to analog channels to align them with digital channels

Frequency selection: 256 frequencies in 100 kHz steps

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

Block 21/22 537.600 - 588.700
Block 22/23 563.200 - 614.300 (excluding 608.000 to 614.000)
Block 23/24 588.800 - 639.900 (excluding 608.000 to 614.000)
Block 24/25 614.400 - 665.500
Block 25/26 640.000 - 691.100
Block 26/27 665.600 - 716.700
Block 27/28 691.200 - 742.300
Block 28/29 716.800 - 767.900

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

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

Receiver Type: Triple conversion, superheterodyne

Frequency Stability: ±0.001 %

Front End Bandwidth: 50 MHz @-3 dB (VR-Master)

Sensitivity (20 dB Sinad): 0.9 uV

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

Image & Spurious Rejection: 85 dB

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 (using a UM400 transmitter in Digital Hybrid mode)

THD: 0.2% (typical), (Digital Hybrid (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 @ 10 VDC to 0.67 A @ 18 VDC)

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 out the interconnecting cords and then go through the TROUBLESHOOTING section in the 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

You will save yourself time and trouble if you will follow the steps below:

A. DO NOT return equipment to the factory for repair without first contacting us by letter 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 am to 4 pm (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 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.

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

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

Telephones:
Regular: (505) 892-4501
Toll Free (800) 821-1121
FAX: (505) 892-6243

Web: http://www.lectrosonics.com **Email:** sales@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.

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