

SNV-12

Signal-and-Noise Voter



The **SNV-12** modular receiver voting system uses individual Digital Signal Processing (DSP) channels to measure the quality of received signals for fast and accurate determination of the best signal. The SNV-12 chassis accommodates from 2 to 12 receiver Site Voter Modules and interfaces easily with standard dispatch consoles.

ADVANTAGES

- Independent DSP Inputs Vote the Best Voice Channel
- DSP Quality Determination for Each Site Input
- Up to 12 Site Inputs Voted Per Chassis
- Console Interface Module Connects to Industry Standard Dispatch Consoles
- Multiple Types of Repeater Control and Transmit Steering Capability
- Provides Tone Keying and Repeat Mode
- Digital Delay Compensates for Differences in Link Paths
- Local Control plus Parallel and Serial Remote Control
- System Expansion to 36 Sites by Daisy-Chaining Multiple SNV-12s
- 5.25" High by 19" Wide Rack-Mount Modular Card-Cage Package

Applications

The SNV-12 uses individual Digital Signal Processors (DSPs) to continuously monitor multiple remote sites and select the receiver with the best signal quality. This is a vital function in two types of applications. The first is a two-way radio application in which mobiles and portables can hear a repeater, but due to their lower transmit power and/or antenna placement, the repeater sometimes can't hear the mobiles and portables. Remote receivers can be positioned in the communications deadspots, with audio from each receiver linked to the voter via microwave, land-line, twisted pair, or fiber optics. The voter will select the best quality signal from all remote receivers and forward this signal to the repeater for rebroadcast. This provides greater talk back range for mobiles and portables. The second application involves a critical message sent simultaneously via several transmission media, or by several transmitters on different frequencies in the same frequency band. In this 'Diversity Reception' application, the message is picked up by multiple receivers and sent to the SNV-12 for selection of the best quality signal.

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DSP Voting

The Site Voter Module uses a spectral approach to continuously measure the noise or Signal-to-Noise Ratio (SNR) of the audio signal from each receiver site. The signal and noise amplitudes are measured by JPS proprietary speech detection and measurement algorithms. Each Site Voter Module continuously measures its receiver signal and calculates a Signal Quality Number in 31 discrete steps. The SNV-12 continuously monitors all Site Voter Modules and votes the site with the best Signal Quality Number. This ensures that the best site is voted even if the received signal is emanating from a vehicle that is moving between buildings or between remote voting receiver sites. The flexible SNV-12 setup

parameters also allow the voter to be set to lock on the initially voted site, which is important in systems where no voted site transitions are desired during any individual field transmission.

The voting process is initiated whenever any receiver unscquelches. This is signalled either by loss of pilot tone or by a hardwired receiver signal (COR output or multiplexer E-Lead); individually configurable on each Site Voter Module. The SNV-12 will accept pilot tone (idle tone) frequencies of either 1950 or 2175 Hz, configured by dip-switch.

Local and Remote Control

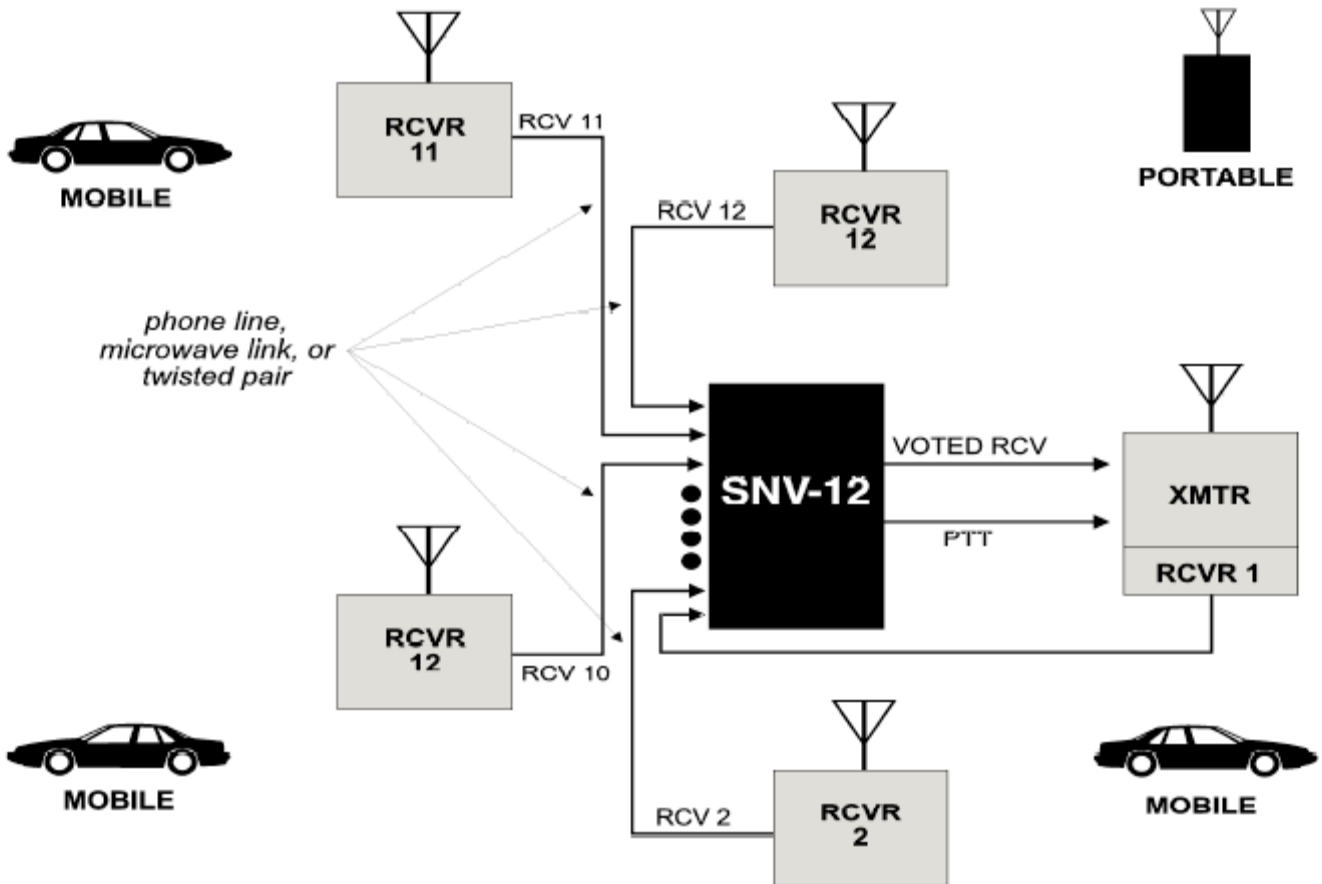
Front panel switches offer local control of the unit, allowing

receiver sites to be manually voted or disabled. Front panel LEDs provide a quick indication of system status. The SNV-12 also provides both parallel and serial remote control, so interfacing with a PC or with any of a variety of industry-standard dispatch consoles is straightforward. Fault indicators on each of the modules provide quick warning of system problems. Each Site Voter Module monitors the status of its associated remote receiver and its link to the voter. If a failure of either is detected, the site is automatically removed from voting consideration, and the fault indicated by a front panel Fault LED and via remote control. As soon as the site again becomes operational, its fault status is automatically removed. A front panel speaker

on the Console Interface Module allows continuous monitoring of the currently voted receiver audio and the transmit audio from a dispatch console.

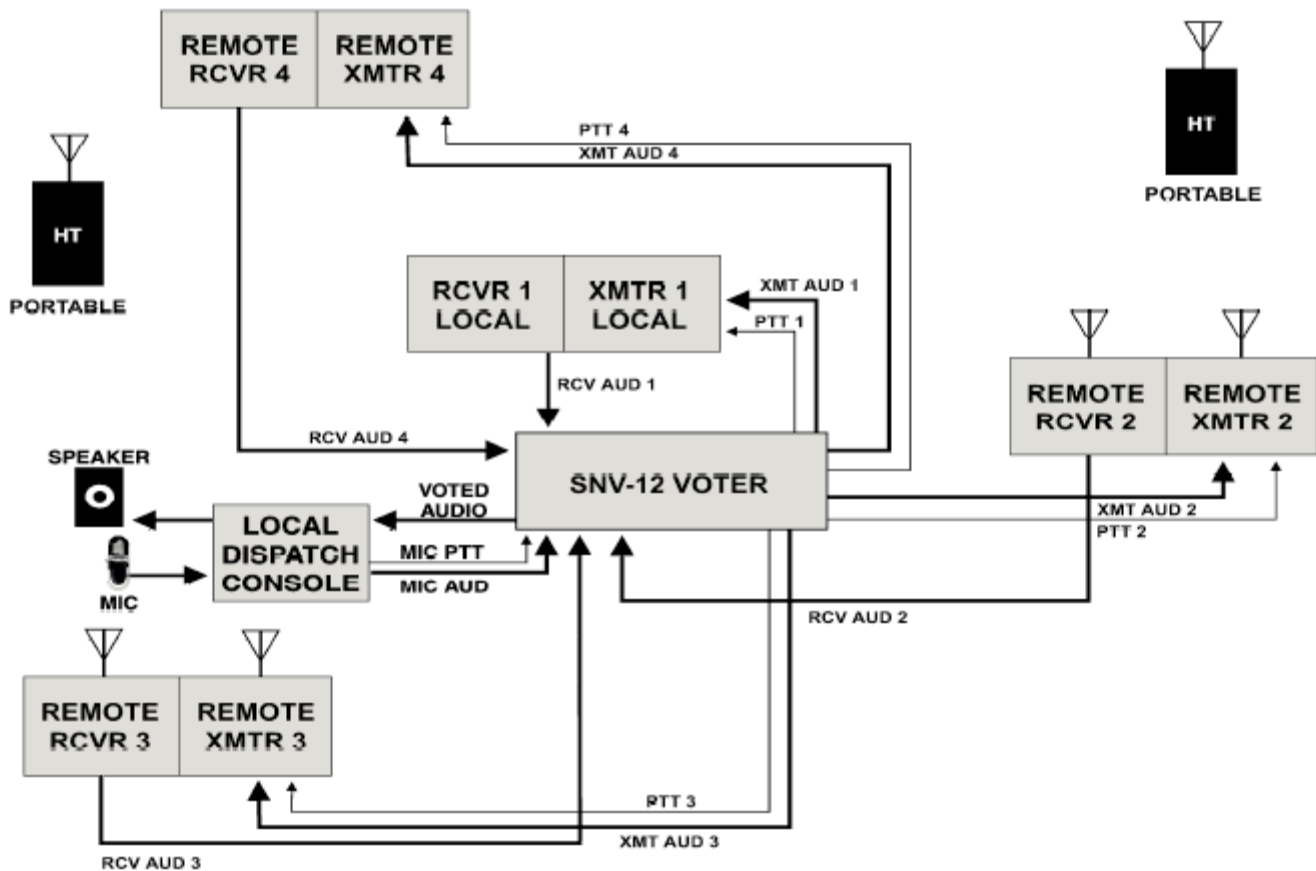
Repeater Control

The SNV-12 provides two transmitter keying methods: tone keying or hardwired PTT signal. If tone keying is enabled, the EIA tone sequence is mixed onto the outgoing transmit audio. Hardwired PTT options include a logic-level output or a relay contact closure for direct connection to a transmitter or the E&M circuits of a multiplexer.



Repeater System Using the SNV-12 Voter with 12 Receivers

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Automatic Transmit Steering routes the console operator's reply to the transmitter associated with the last voted receiver.

Transmit Steering

Both automatic and manual transmit steering are supported. In automatic transmit steering applications, the transmitter associated with the currently voted receiver is used for a reply from the dispatch console to the mobile or portable in the field that made the initial call, as well as to any nearby radios. The SNV-12 automatically routes console transmit audio and keying information to the proper remote transmitter site, and communications between the field unit and the console operator remain automatically steered until the conversation ends. In manually controlled applications, the dis-

patcher decides which transmitter site to use for a reply. The Voter can also group multiple voting receivers around individual remote transmitters. Tone Keying and Repeat Mode (Voted Site Talkthrough) are also provided within the Transmit Steering function.

System Expansion

One or two additional SNV-12s may be connected to the initial chassis, each expanding the number of voting sites by up to twelve. This expansion capability is implemented by daisy-chaining each SNV-12 to the next via rear panel connectors, up to a practical maximum of three chassis or 36 site inputs.

Modular Packaging

The SNV-12 is packaged in a 19" wide EIA standard rack-mounted Eurocard cage equipped with a backplane board. A Power Supply Module, Console Interface Module, Control Processor Module, and two to twelve Site Voter Modules are plugged into the card cage backplane. Remote receiver signals are connected to the Site Voter Modules via barrier terminal strips on the backplane board for ease of hook-up. The Site Voter Module RX signal level test point, adjustment setting control potentiometer, and level indication LEDs are available via the front panel for ease of adjustment and level monitoring. Each

plug-in module has a front panel handle for removal and insertion. The unit is designed for hot plugging so that any Site Voter Module may be inserted or removed with power applied without damage or disruption to rest of system.

Additional Features

The SNV-12 is an extremely flexible voter with many features not described in this data sheet. For more information, please refer to the Features and Capabilities chapter of the SNV-12 manual. It's available under Support on the Raytheon JPS Communications web site at www.jps.com.

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SPECIFICATIONS

Site Voter Module Audio Inputs	
Input Impedance	Balanced 600 Ohms or 10k Ohms, unbalanced 10k Ohms.
Input Level	-30 to +10 dBm, adjustable.
Minimum Pilot Tone Sensitivity	-20 dBm.
Unsquench Indications	2175 Hz pilot (idle) tone; 1950 Hz pilot (idle) tone; E-Lead input. Pilot tone generator accessory, PTG-10, available to enable use of any receiver.
Voting Audio Output	
Output	Balanced 600 Ohms.
Output Level	-20 to +11 dBm, adjustable.
Frequency Response	200 to 3200 Hz \pm 2 dB. (300 to 3000 Hz \pm 1 dB)
Keying	EIA Keytones or E & M
Absolute Output Delay	Less than 10 msec.
Distortion	Less than 1%, 200 to 3200 Hz @ 0 dBm.
Voting Comparator	
Switching Time Between Sites	Less than 1 msec.
Unselected Output Rejection	Greater than 60 dBm.
Voting Thresholds	31 steps.
Audio Delay	0 to 450 msec in 30 msec steps.
General/Environmental	
Serial Port	RS-232 DCE connector (female DB9). Baud rates: 300, 1200, 2400, 4800, 9600, 19200, 38400, and 57600.
Power Supply Front Panel (PSM-1A)	Power on/off Switch; AC On LED, DC On LED, +12 VDC LED, -12 VDC LED.
Console Interface Front Panel (CIM-2A)	Speaker Off/Rx/Rx and Tx, Volume control, Norm audio level LED, Peak audio level LED, Fault LED, Remote LED.
Control Processor Front Panel (CPM-1)	Master LED, Exp 1 LED, Exp 2 LED, Fault LED.
Site Voter Module Front Panel (SVM-2)	Select/Normal/Disable Switch, Voted LED, Unsquenced LED, TX LED, TX Select LED, Fault LED, Input level test point and control.
Rear Panel	DC fuseholder, AC filter module, Connectors to interface up to 12 site voter modules, Serial Remote Connector, Console Interface Connector, and Expansion Connector for daisy chaining SNV-12s for voting of up to 36 sites.
AC Input Power	115 or 230 VAC \pm 15%, 47-63 Hz, 130 VA maximum when "fully-loaded".
DC Input Power	+11 to +15 VDC @ 5 A, nominal.
Size	5.25" H x 19" W x 11" D (13.3 x 48.3 x 28 cm).
Temperature	Operating: -20 to +60 degrees C. Storage: -40 to +85 degrees C.
Humidity	Up to 95% @ 55 degrees C.
Certifications	CE, TUV, FCC Part 15. Class A.
Vibration/Shock	MIL-STD-810D, Method 514.3, Category I. / Method 516.3 procedure VI.

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