August 4, 2008

# WiNRADiO Programmable Receivers Show Flexibility of Software Defined Radio

Broadcast engineers looking for a new way to monitor the RF spectrum might want to consider a software-defined radio (SDR) from Australian receiver manufacturer WiNRADiO (Oakleigh, Australia, www.winradio.com). The WR-G33WSM Receiver (see photo, MSRP of $999.95), which requires a personal computer for the user interface, can easily be configured for specific tasks using the "RBASIC" application development environment available free-of-charge from WiNRADiO.

An SDR is a radio for which most of the radio signal processing is performed in software, using digital signal processing methods, rather than with traditional discrete hardware components such as resistors, capacitors, diodes, etc. In the WR-G33WSM, the received RF signal is digitized early in the signal processing chain and all further processing, demodulation and decoding of the digitized signal is performed entirely in software. Some of the advantages to this approach include flexibility of demodulation modes (new modes can be added easily by simply upgrading software); improved performance over a conventional receiver since digital techniques make it possible to implement sharper selectivity filters and more accurate (i.e. mathematically precise) demodulators and decoders; and, improved consistency and stability because component tolerances and aging do not play as important a role compared to conventional receivers.

Some of the technical specifications for the WR-G33WSM are provided in the table below. While the WiNRADiO company makes a broad array of programmable receiver devices, this unit was developed especially for sound engineers and performers who work with wireless microphones and other wireless audio devices. Using the WR-G33WSM an engineer can map the radio spectrum environment of a particular location, determine available frequencies and then allocate wireless microphones to the available channels.
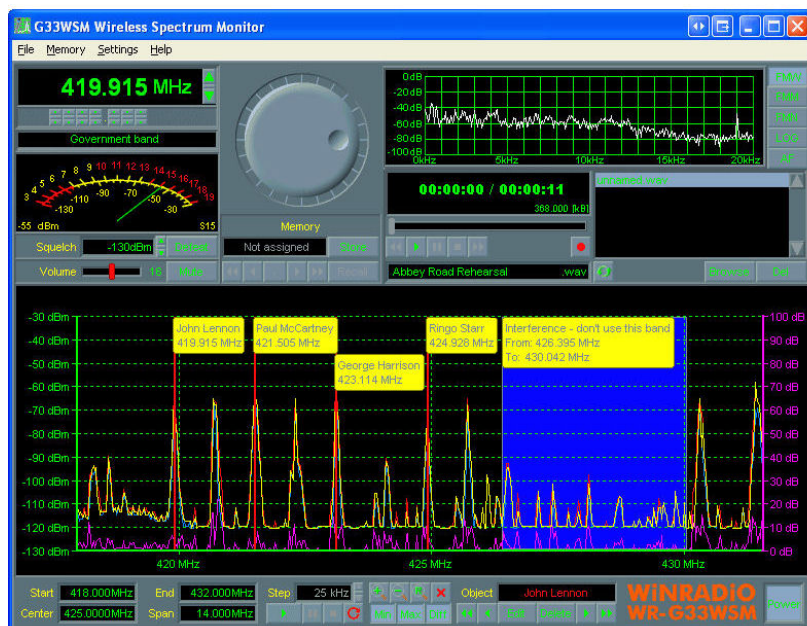
| Parameter | Value |
|---|---|
| Receiver type | DDS-based dual-conversion superheterodyne w/ software-defined final IF stage and demod |
| Frequency range | 30 to 1000 MHz |
| Tuning resolution | 1 Hz |
| Mode | FMN, FMM, FMW |
| Spurious-free dynamic range | 93 dB |
| Image rejection | 60 dB |
| RSSI accuracy | 5 dB |
| RSSI sensitivity | 1 µV |
| Selectivity | FMN: 12 kHz FMM: 30 kHz FMW: 230 kHz |
| Sensitivity (12dB SINAD) | 0.7 to 2.5 µV |
| Antenna input | 50 ohm (SMA connector) |
| Output | USB (1.0 and 2.0 compatible) |
| Dimen. (LxWxH) | 6.46" x 3.78" x 1.61" |
| Weight | 16.40 oz |

The entire spectrum environment of each venue can be saved and recalled later, to save time during the next visit.

An example of the user interface is shown above (to the right of the specifications) which also illustrates one of the most useful features of the WR-G33WSM, namely the real-time spectrum analyzer (the large graph at bottom) which supports both linear and logarithmic scales and a variable intermediate frequency (IF) filter bandwidth. In the image, cursors and text labels have been added to the display to assist the engineer in remembering which frequencies are assigned to which performers (apparently this particular receiver was taken back in time to a Beatles concert!)

WiNRADiO receivers also support what is called the Extensible Radio Specification (XRS), a standard-based platform for the control of radio devices (receivers or transmitters) by a computer. The XRS standard defines the interface between a radio control program (the "server") and an add-on plug-in software module (the "client"). Over 30 different XRS plug-ins have been developed and are available for download (free-of-charge) from the XRS Web site, xrs.winradio.com, from the following categories:

- Tuning tools and panels
- Memory management
- Scanning and searching
- Spectrum analysis
- Signal strength and channel occupancy logging
- Calibration (including the "Calibrated S-Meter" shown at right)
- Frequency logging
- Antenna switching
- Task scheduling, miscellaneous



RBASIC (mentioned earlier) is also an XRS plug-in which is described in detail (and available for free download) at the Web site www.rbasic.com. With RBASIC, users can create their own applications to control and/or automate every aspect of receiver operation, and can create data files containing receiver-derived data for later use. A host of public-domain RBASIC applications is available, as well.

**NAB AM Antenna Computer Modeling Seminar**
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- Moment Method Modeling Basics
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- State of the Art in Phasing System Design Nodal Analysis of AM DA Phasing and Coupling Systems
- Pattern Design Considerations for Optimum Performance

AM antenna experts Ron Rackley and Ben Dawson, along with antenna modeling software specialist Jerry Westberg, will lead the seminar demonstrating how moment method modeling makes analysis of actual tower current distributions possible and how a model can be used to proof an array provided the proper criteria are considered. All instructors are well known in the radio industry as experts in the field of directional antenna

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**Seminar fee: $395.00 (NAB members) and $495.00 (non-members).** For more information on the curriculum, how to register or housing go to AM DA Seminar on the NAB Web site or call Sharon Devine at (202)-429-5338. Register now for the NAB AM Antenna Computer Modeling Seminar!