PRODUCT REVIEW

WAVENODE WN-2 STATION MONITORING SYSTEM

The WaveNode WN-2 is an updated version of the WN-1 we reviewed in October 2004.[7] During lab testing, we noticed that this model has improved accuracy. Another major difference is that the WN-2 includes an LCD numerical and bargraph display — the WN-1 had output just via a computer. The WN-2 can thus be operated as a standalone unit, although it clearly shows its stuff when computer connected. In addition, responding to the trend in PC ports, the WN-2 has a USB connection in place of the WN-1's connection to a parallel (printer) port.

The normal LCD display function (Figure 7) provides an output of both peak and average power and SWR for any of the four power sensors (see below). A bargraph indicating real time power output is shown simultaneously. In addition, the unit can be set to alarm on high SWR and trip a relay that could be used to disable a linear amplifier, for example. Even without a connected computer, this display can show you much of what's happening through the WN-2.

Check Your Operating System

You will want to connect your WN-2 to

[7]J. Hallas, W1ZR, "WaveNode WN-1 Station Monitoring System," Product Review, *QST*, Oct 2004, pp 71-74.

Figure 7 — The WN-2's numerical readout shows peak power, average power, SWR and sensor (up to four sensors can be connected at one time), as well as a bargraph for power output.

Bottom Line

The WN-2 provides a wide range of station information in flexible ways. The ability to simultaneously monitor up to four radios makes it particularly useful for some station configurations.

Table 3
WaveNode WN-2 (no serial number)

Manufacturer's Specifications	Measured in the ARRL Lab
Frequency range	Sensor dependent.
Power range(s)	20/200/2000 W (HF-1 sensor).
Power requirement	9-16 V dc, 200 mA.
PEP measurement	Active.*

Size (height, width, depth): Controller, 1.875 × 6.25 × 5.5 inches; weight, 3 pounds.
Price: WN-2 System (includes one sensor, cable and software), $385; additional sensors, $55 to $88 each, depending on model.

Actual Forward Power	HF-1 Sensor Measurement			
Frequency (MHz)	2	14	28	50
5 W CW (avg)	4	4	4	2
5 W CW (peak)	4	5	5	3
5 W 50% (peak)	4	5	5	3
100 W CW (avg)	97	104	103	102
100 W CW (peak)	97	104	103	102
100 W 50% (peak)	99	104	105	103
100 W Two-Tone (peak)	–	100	–	–
1 kW CW (avg)	990	1050	1100	–**
1 kW CW (peak)	990	1050	1100	–
1 kW 50% (peak)	1040	1100	1170	–
SWR Accuracy (worst case)				
1:1 SWR	1.0:1	1.0:1	1.0:1	1.1:1
2:1 SWR	2.3:1	2.0:1	2.1:1	2.0:1
Insertion Loss (dB)	<0.1	<0.1	<0.1	<0.1

Notes
*For PEP monitoring, Active indicates that a circuit requiring external power is used.
**A 1000 W amplifier for 6 meters was not available at the time of testing.
– Not measured.

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a PC though, to use its advanced functions and measurement capabilities. I confirmed that the WN-2 software won't work on old clunker PCs such as the one in my shack that runs on *Windows 98*. If your shack is as computer challenged as mine, the WN-1, with connectivity via the parallel port, is still available and is less expensive. It may be worth a look if you don't need the front panel LCD. The WN-2 is specified to work with newer versions of *Windows*, and came up just fine on the new laptop loaned by my wife Nancy, W1NCY, running *Windows XP*.

Perhaps the requirement for USB-2 support is the actual limitation. In any case, modern PCs should be compatible.

Multiple Sensors Supported

As is the case with the WN-1, multiple sensors are available, and there is room to plug in up to four in at a time. HF (to 60 MHz) sensors are available in ranges 0 to 60 W (LP-1), 0 to 2000 W (HF-1) and 0 to 8000 (!) W (HF-8KW), neatly lining up with the recent trend of "HF" transceivers covering through 6 meters. They also offer a UHF-1
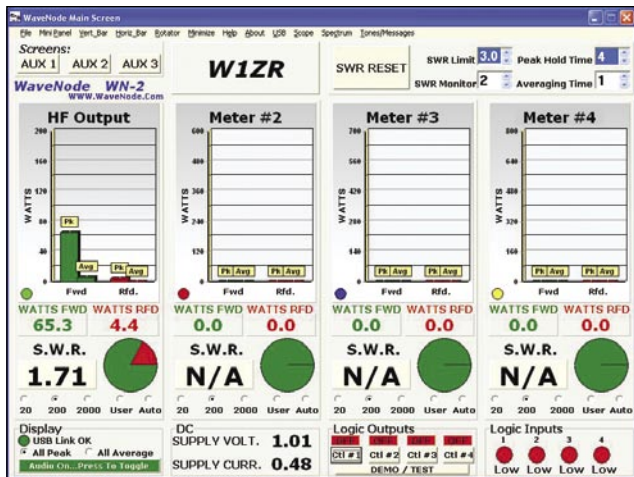

Figure 8 — This screen allows you to monitor the WN-2 with up to four sensors connected simultaneously. In this case there is just one active HF sensor.

Figure 9 — Spectral analysis of typical SSB modulation as sampled on coax sensor.

sensor covering 140 to 460 MHz at a power range of 0 to 500 W and a UHF-2 that covers 120 to 170 MHz at up to 2000 W. It is handy that the sensors are compatible between units, so if you bought some for your WN-1, they will work with your new WN-2 as well.

Operating with Just One

The screen shot in Figure 8 shows the basic screen with input from the single HF-1 sensor we obtained with the unit (your choice of a single sensor is supplied with the unit). It shows the power and SWR in terms of both average and peak levels for sensor number one. For the figure, I was sending alternating dots and dashes into a dummy load, and inserted some mismatch by adjusting my tuner to give a reflected power reading.

WN-2 makes it easy to make to a plot of SWR versus frequency to record and characterize antenna operation. Just click on AUX 3 and an SWR plot appears. Select the desired frequency range and sample spacing. The software prompts you to transmit a signal at each selected frequency. Be sure to set your radio inside the band edges even if it asks you to transmit at 7000 kHz, for example.

Another interesting new feature of the WN-2 is the capability to serve as a digital oscilloscope and spectrum analyzer to allow examination of the RF modulation waveform and frequency content of a transmitted signal. This function provides a graphical output that indicates transmit intermodulation products in real time, providing a way to make sure you are putting out a clean signal. Figure 9 shows a view of the digital spectrum analyzer function observing a 100 W SSB transmission.

Why not Use More?

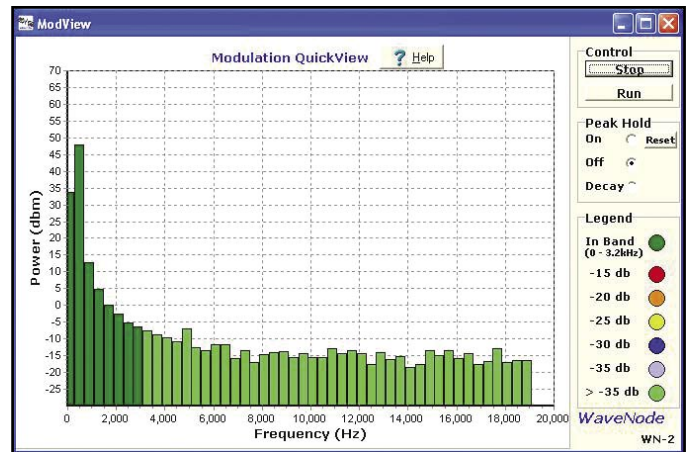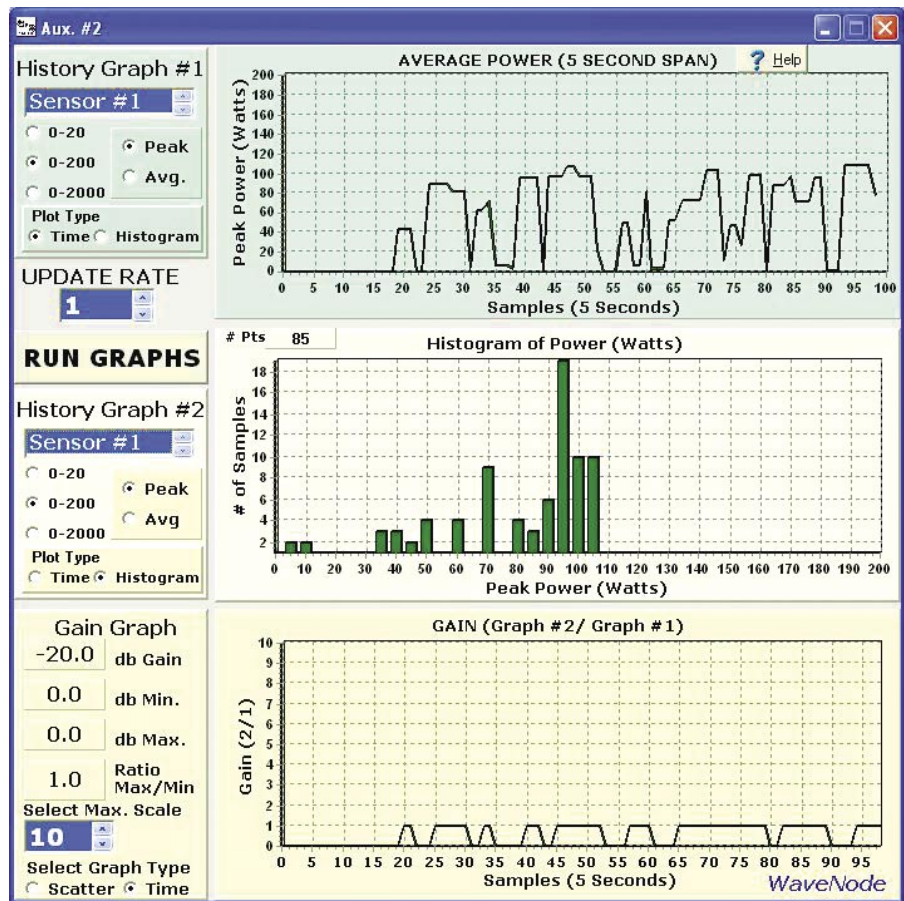The power of the WN-2 shows up during monitoring of multiple transmitters, or moni-

Figure 10 — WN-2 power graphic display. The upper plot is a running view of average output power, the middle a histogram of quantity of samples in each power bin. The bottom gain chart requires a second sensor.

toring multiple points within a transmitting system, all at the same time. Routines provided in the software package provide operations, such as gain calculations, that can be conducted on the multiple sets of data.

Those with a single sensor can still perform many interesting studies. Figure 10 shows a plot indicating average power over

time, a good way to get a feel for how your speech compressor is acting. The middle chart provides a histogram showing the number of samples at each of the power ranges. The lower GAIN plot can be used with two sensors, for example with one on each side of a linear amplifier, to automatically determine the gain.

For the WN-1 review we had two sensors, and it was quite handy to have one on each side of a linear amplifier to see just what was happening. Additional sensors can be left in the lines to V/UHF radios, or other HF station equipment, to provide indication whenever those units are used without having to change any cabling or settings.

Other Modes

As with the WN-1, this unit can make other measurements and perform related logic. A 16 pin expansion connector provides four analog and four logic inputs, and four logic outputs. These can be used for remote control of monitored systems. If you power your WN-2 via your radio equipment power supply, you can monitor supply voltage at the same time you perform other functions. There is provision to power a transceiver from the power supply connected WN-2 and then both voltage and current can be monitored. The documentation leaves it to you to figure out how to make the connections, so we didn't. All dc and logic data is shown at the bottom of the main display screen.

Documentation

The primary operating and setup documentation for the WN-2 is provided via the HELP button on the main display screen. Somewhat overlapping choices of HARDWARE HELP and SOFTWARE HELP are provided, each including extensive information on most aspects of operation. While extensive help screens are very commendable, it would be nice if an expanded and printable version were also available on the supplied CD and WaveNode has indicated that they will do so. Specialized detailed documentation for applications such as rotator control, or use with Bird power measurement equipment, is provided via files on the supplied CD.

Manufacturer: WaveNode, PO Box 111404, Campbell, CA 95011; tel 408-933-8059; **www.wavenode.com**.