

WiNRADiO's External G303e

By Lee Reynolds KD1SQ
leereynolds@monitoringtimes.com

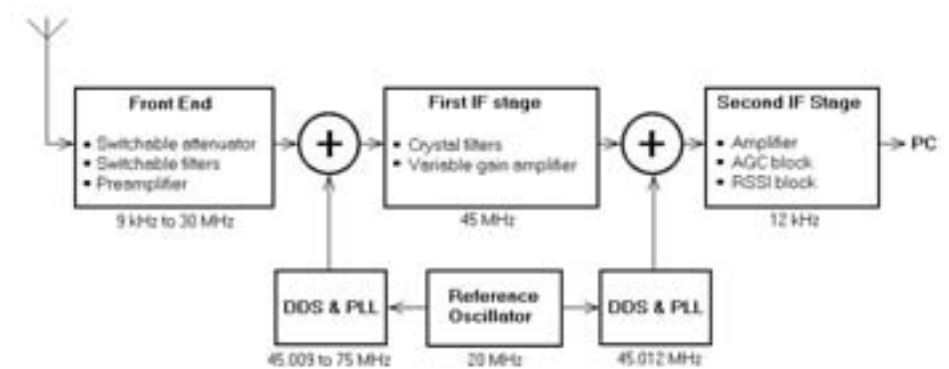
“Speak softly and carry a big stick”

Teddy Roosevelt quoted that proverb many years ago as a brief statement of his approach to foreign policy, and the phrase “Big Stick” diplomacy became a part of the political lexicon thereafter. One possible paraphrasing of that proverb is “Be able and ready to do big things but don’t make a big show about it!”

When I looked at one of WiNRADiO’s latest offerings, it went through my head that it looked as if the people at WiNRADiO had taken a page right out of Teddy’s book. The unassuming WiNRADiO G303e looks like mild-mannered Clark Kent, but makes like Superman for its user. In my opinion, it qualifies as one of the best designed and implemented SDRs (Software Defined Radios) that can be used portably (with a laptop) or in a vehicle. I’ll tell you why I like it so much at the end of this article – let’s get the review details out of the way first.

❖ What is it?

The G303e is the externally cased, connected, and powered version of the WiNRADiO G303i PCI-card-based shortwave receiver. This has made the G303i into a receiver that can be



used in the home, portably with a laptop, or in a vehicle – again, with a laptop. (That’s the important thing to note, people: The receiver needs a computer with a USB port in order to be used. It’s **not** a standalone receiver!)

The table below shows the (simplified) specifications for the radio; they’re essentially the same as for its brother, the G303i.

The specs are pretty good, flexibility in terms of modes and selectivity is excellent, and sensitivity is good across HF from 2-30 MHz.

Physically, the G303e is a compact metal box shrouded in a protective plastic cover that’s a little bigger than a man’s hand – it’s slightly smaller than a 600-page paperback book. This compactness means that it can be readily installed just about anywhere. For connections, all it needs

is 12vdc (power supply included for home use), a USB cable (again, supplied) and an antenna (a simple one is provided.)

Control software for the receiver is provided on CD-ROM, free updates are available for it from the WiNRADiO web site. The G303e needs a computer with a 500 MHz Pentium-class CPU running Windows, sound card/speakers and a USB port as the host system. You can use a serial port if you don’t have a USB port in your system, but the optional serial port adapter needs to be purchased in that case.

Testing indicates that a slower (300MHz) computer can be used with the G303e, but the system’s operation can become a little choppy under the load. Setup is easy and is the same as adding any other USB device to your computer; plug in the USB cable, connect the antenna, power the device on, install the drivers/GUI and you’re up and running!

Table 1: Specifications

Receiver Type	Direct digital synthesis dual conversion superhet with software defined last IF stage and demodulator.
Frequency Range	9 kHz – 30 MHz
Tuning Resolution	1 Hz
Modes	AM, AM Narrow, Synchronous AM, LSB, USB, CW, FM3, FM6, FMN, DSB and ISB
Selectivity (-6dB)	Continuously variable from 1Hz – 15kHz in 1Hz steps.
Sensitivity	AM.....0.9uV (10dB SINAD) LSB/USB0.3uV (10dB SINAD) CW0.1 uV (10dB SINAD) FMN/3/6.....0.2uV (12dB SINAD)
Intermediate Frequencies	IF1: 45MHz IF2: 12kHz
Frequency Stability	10 ppm (0-60°C)
Image/Spurious Rejection	60 dB IP3 +5 dBm @ 20kHz MDS.....-135 dBm
Phase Noise	-146 dBc/Hz @ 100 kHz
Output	12kHz IF2 signal
Interface	USB (1.0 & 2.0 compatible) (Serial interface optional)
Antenna Connector	50 Ohm SMA
Size	Length: 6.46" Width: 3.78" Height: 1.61" Weight 16.40 oz

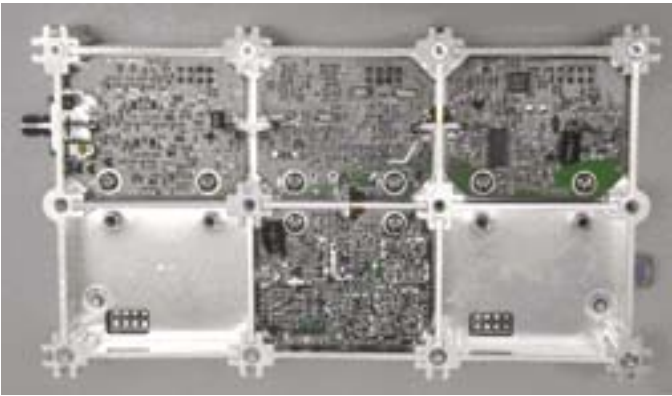
❖ A Peek Inside

I’ve always been a little curious as to just what’s inside the G3 series of receivers, so I did a little investigating and question-asking this time around. The results follow, starting with a simple block diagram of the receiver’s various stages.

And what’s actually *inside* that mysterious box?

Open the plastic cover, remove the (polished stainless steel) lids from both sides of the aluminum extruded box, and you’ll see the following

1. The top left compartment contains the RF module. It contains switchable front-end filters and an MMIC preamplifier.
2. The top center compartment holds the IF1 module. You can see the four crystal filters there which provide the 15 kHz wide roofing filtration. It also contains IF1 amplification, S-meter and AGC circuitry.



3. The bottom center compartment is the DDS/PLL for the first LO (local oscillator). It contains a DDS (direct digital synthesizer) and PLL (phase locked loop) which runs at 45 MHz above the received signal.
4. The top right compartment contains the IF2 module. It contains DDS/PLL for the second IF, which runs at a fixed 45.012 MHz, resulting in the final 12 kHz IF output.
5. The 12 kHz IF is then taken to the control board (below) on the other side of the box, where it is digitized by an analog-to-digital converter at a 64 kHz sampling rate. This board also contains the USB control chip, serial interface chip, a PIC controller for the modules, and power supply circuitry.



The G303e Control Board

If you use the serial interface, the analog 12 kHz IF goes out of the combined 15-way connector (which also contains the USB and serial control signals), to be connected to the line input of a sound card.

All four RF modules are double-sided and densely populated; the control board is single-sided. The layout of the modules follows that of the block diagram, so figuring out what's what isn't too difficult. Construction looks to be very solid, so I suspect you'd have to try very hard to damage this radio before it breaks.

I didn't include a picture of the assembled radio or the software GUI, as high resolution full color versions of each can be found at – <http://www.winradio.com/home/g303e.htm>
<http://www.winradio.com/home/g303-gui.htm>
 – or in almost any of WiNRADiO's advertisements in the hobbyist press.

❖ How Does It Play?

Exactly like its brother G303i. As far as I can tell, there is no difference between them in terms of operation or performance. Tests were

carried out using a common antenna and multicoupler, comparisons were made between the G303i and G303e initially with no discernible differences in performance between them. Subsequent tests against an ICOM R-75 and JRC NRD-525 indicated that the G303e offers performance that is quite close to that of the higher-end JRC product.

So if they are identical, how do you

know which model is preferable for your purposes, you may ask? First of all, the G303e is an externally housed and powered device that connects to the hosting computer via either a USB port or serial port. This enables you to combine the abilities of the G303 receiver line with the portability of laptop computers for the first time.

This new model also enables you to add the G303 receiver to desktop computers that don't have available PCI device slots. The compact design permits you to quickly and easily switch the receiver between different systems and lends itself to easy use when traveling or staying at remote locations.

(For further reviews and comparisons, see MT's review of the WR303i, March 2003, and online at <http://www.monitoringtimes.com>; WR G313i review November 2004, online; August 2003 "On the Bench," WR303i vs Ten-Tec RX320.)

❖ Bottom Line

I like this radio a lot. WiNRADiO gave the implementation of this receiver some careful thought and it shows in the sturdy, go-anywhere package that is the G303e. The tailoring of the device's power requirements so that it comfortably uses 12vdc; its small size, and comparatively simple interconnections have made it a pleasure to travel with and to use in the field. If you take into account the extra functionality that the various add-in software packages for this series of receivers offers – digital modes decoding, seamless DRM reception, different visualization tools for tuning, memory management and station reception – you have a high performance radio that takes some beating and can easily be carried with one hand along with its controlling laptop.

WiNRADiO has even produced a small wall mount/clip for the G303e that can be used to install the radio just about anywhere you can think of. (I can't help but speculate about three or four of these devices hanging off one PC – might WiNRADiO ever come up with consumer-level code that would enable us to use such a setup productively?)

As far as I am aware, there are no "Gotcha's" with this radio. Everything seems solid, everything performs nicely. About the only thing that could improve on the G303e would be to modify the design further so that it could be powered via the USB port as so many other USB devices are.

If you want a radio that can be used anywhere, and for almost any conceivable shortwave listening task, this is the one for you.

(Oh, don't forget to make sure you purchase the Professional Demodulator software, whether you buy this radio or the G303i. If you don't get this package you'll be missing some very useful functions and abilities!)

The WinRadio G303e is available from Grove Enterprises (1-800-438-8155; <http://www.grove-ent.com>) for \$599.95, or for \$699.95 with the Professional Demodulator which includes DRM decoding.

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August 2005 MONITORING TIMES 71