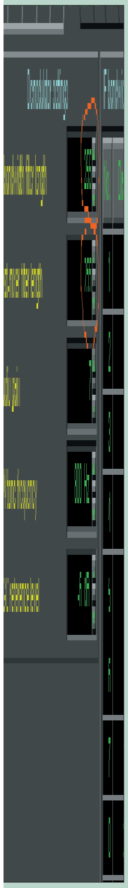


UK's First from the UK's First!

WiNRADiO

G-303i - PC Card HF receiver System

John Wilson brings us an in-depth look at the new G-303i receiver from WiNRADiO. This first offering from a new series of receivers uses a computer sound card to perform the final i.f. and demodulation functions. Coupled to the benefit of a very user friendly display, this is one desirable radio.

A Shock To The System

I never thought that I would be so surprised by a receiver as to not know how to start describing it, but I'm sitting here wondering where to begin, and how to tell you of the experience. The receiver in question is a brand new product from WiNRADiO Communications. in Australia, and is marketed under their WiNRADiO brand name with a model number G-303i. As you will know, WiNRADiO Communications have produced a series of receivers under the WiNRADIO name over the last few years, but these have included wideband monitoring devices covering frequencies up to 1 or 2GHz, and mechanically configured as plug-in cards to fit PC expansion slots, that is to say they sit inside the PC itself. Early personal computers were renowned for being generators of high frequency electrical noise, and you could usually detect a computer's presence by having a typical h.f. receiver anywhere within 50 to 100 metres of the culprit. With the advent of the European EMC Directive the situation has changed, and there is no doubt that modern computers from reputable manufacturers are much less noisy than those of even a few years ago. Still it's a brave manufacturer who will put a sensitive receiver actually inside a PC, but WiNRADiO Communications have persisted with development work on tightly screened enclosures and proper r.f. shielding with the result that the computer/receiver marriage is now a little more blessed than before. So what makes the G-303i different, and why was I surprised?

Proper Receiver

The first thing to know is that the G-303i is not a wideband device but a 'proper' h.f. receiver specified to cover 9kHz to 30MHz, and equipped with all the facilities which we have come to expect from a modern receiver. Some lateral thinking by WiNRADiO Communications has resulted in their analysis of a typical receiver as consisting of three separate sections; the r.f. and i.f. conversion elements, the demodulation and signal analysis elements, nowadays often carried out by digital signal processing (d.s.p.), and a processor controlled management system which drives the whole receiver including the frequency synthesis for frequency conversion and any front panel displays and so on. WiNRADiO Communications have essentially pointed out that anyone with a semi-decent computer already has the processing power, and, with a reasonable sound card fitted, also has the d.s.p. system, so the only missing element of a receiver is the r.f. and i.f. conversion system, and that is

precisely what the G-303i hardware consists of. The card which you plug into the PC contains r.f. front-end filtering, a mixer to convert to a first i.f. of 45MHz, some gain controlled stages at i.f., a second conversion down to a typically d.s.p. second i.f. of 12kHz and then the 12kHz baseband comes out of the card ready for processing in the computer's existing sound card. It's a very neat concept, and by doing all signal processing under software control it is possible to carry out almost any function you might need. WiNRADiO Communications' other strength is an acknowledged expertise in innovative software, and they have really excelled themselves in this department with the G-303i. Let me tell you about it.

What You Get

The G-303i was supplied for this review already fitted to an IBM NetVista computer running a 2GHz Pentium 4 processor and having 256MB of RAM and a fairly whizzy sound card. The monitor was a very attractive IBM flat panel unit which I immediately wanted for myself! This fits in well with the recommended system specified in the G-303i manual, with a minimum system requiring at least a 500MHz Pentium III with 64MB of RAM, 20MB of free drive space and a SoundBlaster 16-bit full duplex sound card. There are several warnings in the manual text about the whole system 'freezing' should the G-303i be fitted to a slower PC than this minimum specification, and I know from previous experience with digital test instruments that this can be a real problem if you try to compromise. The right course of action is to go for the fastest and best equipped PC you can find (or afford). Firing up the G-303i software displayed a screen showing a receiver front panel, but with some features not normally found on a conventional receiver. The necessary frequency display and tuning knob were obvious, but the bottom left hand corner was occupied by a spectrum display centred on the receiver tuned frequency and extending for 10kHz on each side. Overlaid on this was a representation of the i.f. bandwidth currently in use, which changed as different modes and bandwidths were selected, and which clearly showed, for example, that my favourite Radio Five Live was occupying rather more of the spectrum than could be accommodated within the standard 6kHz a.m. bandwidth of the receiver. The display looks exactly like any of those you may have seen in my reviews taken with a Rohde & Schwarz FSA analyser, and I did a quick check by connecting my FSA to the 12kHz output from the G-303i receiver, whereupon I could see that the on-screen G-303i display was identical. The only difference is that the FSA originally cost about £40,000 whereas the G-303i cost - well, I'll surprise you later.

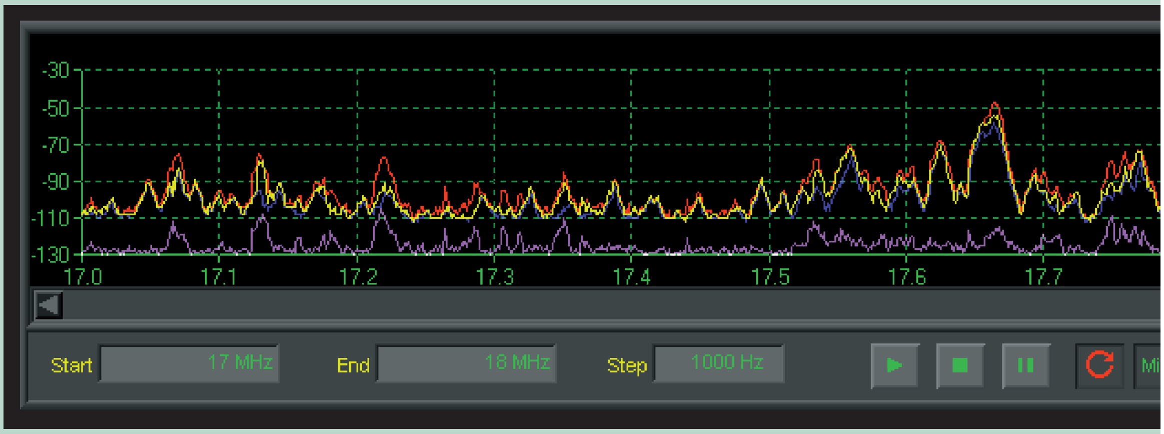
Tuning controls are comprehensive, with a conventional looking main knob above which are left and right arrows associated with a 'step size' display and two more arrows which run the steps at 10 times the selected rate. The step sizes available, selected by tiny up and down arrows range from 1Hz to 100kHz in a sensible selection but for the omission of the all-important 9kHz step for European long and medium wave broadcast bands. However, the step size can be set to anything you might want by simply entering the step value into the step size box using the PC keypad, so 9kHz can be entered and used, although this is lost if you then select another 'standard' step and try to come back to 9kHz - it ain't there any more. A final neat trick with the step size is that if you place the mouse driven cursor between the up and down buttons, a slider appears, and by dragging this up and down the screen, the mouse tunes the receiver up and down in frequency. But that's not all.

Tuning

The main tuning knob is 'rotated' by placing the mouse cursor at the top or bottom of the knob and clicking, which then tunes the receiver up or down in frequency. At first the tuning step (500Hz) seems very coarse, but by pressing the 'Alt' key on the PC keyboard the steps are reduced to 50Hz, whilst the 'Shift' or 'Ctrl' keys will increase the step size to 5kHz for rapid frequency excursions. I personally found this cumbersome in use, and much preferred to use the 'step' facilities for tuning. You can also turn the main tuning knob up or down in frequency by using the cursor up/down keys on the PC keyboard, but there is a curious anomaly here because although the tuning knob rotates, and the receiver changes frequency, the spectrum and frequency displays both 'freeze' so you don't know what frequency you have tuned to until you release the cursor key. Not at all sensible, bearing in mind that the other tuning methods show the frequency and spectrum changing as you tune. The same 'freezing' occurs when using the 'PgUP' and 'PgDown' keys to single step the tuned frequency from the 'step size' facility. But that's not all.

Below each digit of the frequency display are up/down arrows with the centre 'slider' facility, and since the display shows frequency down to 1Hz you can move frequency at any rate you choose, even to complete end to end frequency changes using the 10MHz slider. But that's not all. In the bottom right hand corner of the front panel is a combination display showing a row of yellow squares, each one representing increasing tuning step size moving up or down in frequency from zero, and a quasi-analogue display giving a variable tuning step rate as you drag the mouse cursor along it. Choosing either of these methods from the mouse will tune the receiver continuously up or down in the chosen frequency steps until you release the mouse key. And I think that's all, but what an array of facilities from which to choose. Surely no-one can fail to find a preferred method of tuning from this selection. But, actually, I forgot to mention that we old fashioned operators can simply key in any wanted frequency from the PC keyboard. Below 1MHz you need to terminate the entry with 'k' for kHz, but it's possible to be on a new frequency in a few milliseconds, and that's often faster than the operator of the service to which you are listening.

Before leaving the frequency display, another feature is the window below the frequency in which a text message appears telling you what service is allocated to the frequency displayed. This can be a band of frequencies, such as an amateur band, or a single frequency such as RAF Volmet. The text can be changed by going to a text file held in the software and typing in whatever you need, or, as WiNRADiO Communications suggest, update the whole lot



from an *Excel* spreadsheet. I contented myself by correcting some of the entries for amateur band allocations from American to European bands, just to see how it worked. It worked well, and it was fascinating to see the allocation descriptions changing as the receiver was tuned around.

RSSI

Before going on to the demodulation modes provided, let me tell you about the signal strength metering. The 'S' meter is an analogue representation of a real meter, but unlike the average receiver has three selectable ranges, calibrated in dBm, 'S' units and microvolts. In addition to the analogue display, the signal level is also displayed in numerical form at the bottom of the meter scale, and when reading 'S' units or microvolts the dBm scale is still shown below the analogue scale, so once again WiNRADiO Communications have tried to please everyone - even me! Associated in a way with the signal level is a very neat all-mode squelch system in which the fully adjustable squelch setting is displayed as a red band on the signal meter, showing the exact level in dBm to which the squelch is set. This is extremely clear and unambiguous, and very easy to use. Not only that, the calibration in all modes is very close, although it is clear that the meter units change in 1dBm steps which leads to some peculiar conversions when in 'S' units or microvolts, with signals either being S3 or S4 but never in between. No matter, the metering is amongst the best I've seen outside of professional measuring receivers.

Demodulation

At this point you need to know that the G-303i can be supplied with 'standard' demodulator software, or the 'Professional' demodulator which gives a range of additional and extremely useful functions. The standard unit provides for a.m., with a bandwidth of 6kHz, a.m.n. with a bandwidth of 4kHz, a.m.s. giving synchronous a.m. with the 4kHz bandwidth, l.s.b. and u.s.b. with bandwidths of 2.5kHz, c.w. with a bandwidth of 500Hz, and three f.m. modes with bandwidths of 3kHz, 6kHz and 12kHz. Remember that because demodulation and filtering is done at the final i.f. of 12kHz, these bandwidth filters are digitally derived and may or may not equate to an equivalent conventional filter used in a more conventional analogue receiver. The professional demodulator extends the bandwidths available and also adds a very easy to use continuous bandwidth adjustment using the previously mentioned 'slider' control. This is a very useful feature and allows you to exactly match the filter bandwidth to the incoming signal whilst taking account of adjacent channel noise. Hard to describe, but once experienced never to be forgotten. Additionally, the professional demodulator adds d.s.b. (double sideband) and i.s.b. (independent sideband) modes to those available as standard. Neither demodulator option includes a notch filter or pass band tuning.

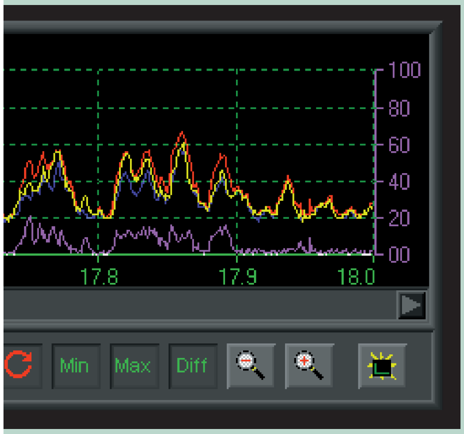
The professional demodulator is definitely worth including in the purchase of the G-303i because it has a comprehensive user definable series of parameters for the i.f. filters and a.g.c. settings, together with a fascinating graphic display of each demodulator system according to the mode selected, with the facility to 'connect' an on-screen spectrum display to each part of the demodulator to show how it is all working. Even this is then extended to include real-time SINAD and Total harmonic distortion measurement on the incoming signal. The user manual is very helpful in leading the user through the various options, and if you really get in a tangle you can restore the normal default settings at the touch of an on-screen button. It really is all so easy to understand and use.

As if that were not enough, clicking on a yellow arrow alongside the power switch drops down a spectrum analyser display below the main receiver panel, on which you can enter start and stop frequencies and, frequency measuring increments. Starting a frequency scan can be done over frequencies having no relationship to the frequency to which the receiver is tuned, so you can be listening to a station on 900kHz and carry out a band scan from 9 to 12MHz then the receiver will revert back to the original station. The receiver is muted during the scan process but it takes only a short time to complete. When the scan is displayed, the mouse pointer can be used to select any displayed frequency, and the measured level is shown in dBm. Clicking the mouse instantly tunes the receiver to the selected frequency, and sliding the mouse drags the receiver frequency to match the mouse movement. There is only one drawback to the system, which is that the measuring bandwidth is fixed and very broad, so that if you sweep across say, 9 to 9.5MHz, instead of a series of sharp signal peaks, you have a broad wavy line with very indeterminate peaks. The facility is fine for sweeping several MHz, but not for looking at a single broadcast or amateur band. There seems to be no way of changing the measuring bandwidth, and it is not related to the selected bandwidth in the main receiver.

Harnessing The Power

My description of the receiver facilities ends with the a.g.c. system, because I must get on and tell you how the G-303i came out under the test spotlight. The r.f. section of the G-303i is, as I have said, contained on the plug-in card, and can be considered as a frequency changer. This section of the receiver system is basically analogue, and as I have seen previously in some d.s.p. receivers, the use of digitally derived a.g.c. has had its drawbacks. The G-303i designers have included an a.g.c. system within the analogue section of the receiver, and this is accessed from the on-screen front panel where you can select decay times of slow, medium and fast, together with an a.g.c. off function. These a.g.c. settings are independent of the digital demodulation, but in both standard and professional demodulators there is a further a.g.c. system which works on the demodulated audio. In the standard demodulator this a.f. a.g.c. has a single time constant, but the professional demodulator allows the user to set the attack and decay times for each of the three a.g.c. settings. Using this facility gives great insight into the effects of inappropriate attack times on various types of signal, and is a valuable facility. All the more reason to opt for the professional demodulator.

So there we have a general overview of a very comprehensive receiver from a user's viewpoint, but this merely demonstrates the skill (and it is a very real skill) inherent in the WiNRADiO



Communications software development staff. What we have to remember however, is that this is an h.f. receiver, so let's proceed on to the real testing and see if the facilities and features live up to their promises. By the way, I haven't forgotten the memory facilities, but will treat them as a PC feature.

A Matter Of Cleanliness

One thing which has plagued many receivers is the generation of internal spurious signals, and with the G-303i living inside a computer I made the search for these unwanted signals my first test. The job was made really easy because all I had to do was terminate the antenna connector in a screened 50Ω load and set the receiver to sweep its entire frequency range in 100Hz steps with the squelch set to its most sensitive setting. I could then let the receiver carry on whilst I did something else, secure in the knowledge that if a spurious signal was found the receiver would stop until I manually re-started it after noting the frequency and level of the unwanted signal. How many signals did I find? Unbelievably only one, at a frequency of 20MHz and at an insignificant level of less than 0.3μV. I was so astonished that I did the whole test again, but the result was the same. As far as I can remember, I have never found any receiver, analogue or digital which had such cleanliness, and the G-303i has set a new standard for others to try and emulate.

Since I was on the trail of signal cleanliness I decided to check the G-303i synthesiser performance by carrying out my standard reciprocal mixing tests. You are by now all familiar with this test, with the results expressed as the phase noise in dBc/Hz (the noise in a theoretical 1Hz bandwidth extrapolated from a real measurement in a chosen receiver bandwidth). At 5kHz from the on-channel frequency the phase noise was -96dBc/Hz, at 10kHz -123dBc/Hz, at 20kHz -133dBc/Hz, at 50kHz -141dBc/Hz and at 100kHz -148dBc/Hz. To put this into context, the performance at 100kHz is close to that of a crystal oscillator, and it is only at 5kHz that the phase noise rises. For a further check I measured my faithful AR7030, and whilst this was 20dB better at 5kHz (-116dBc/Hz against -96dBc/Hz), the performance of the two receivers was equally matched for all the other spacings checked. Another good result for the G-303i.

More Measurements

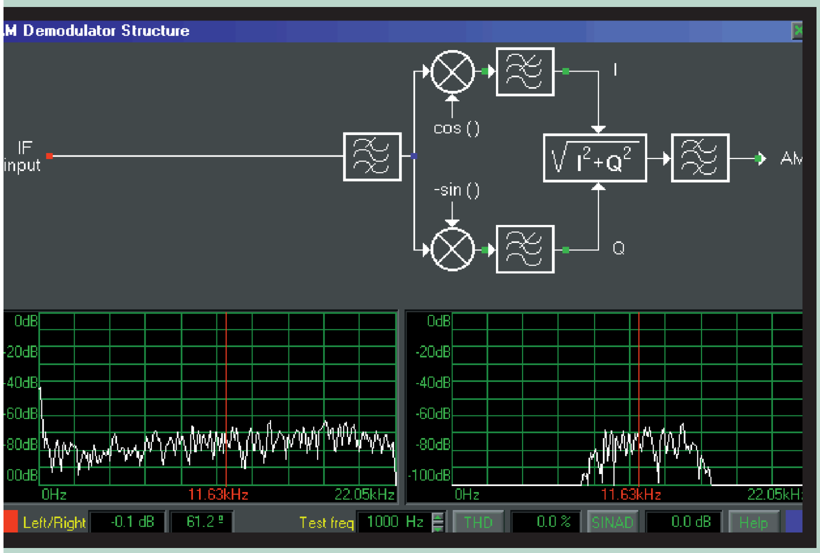
Measured sensitivity for s.s.b. 12dB SINAD was substantially flat at -122dBm from 20 to 3MHz, falling by some 2dB by 30MHz and down to a surprising -113dBm by 1MHz, a change of 9dB. Detailed investigation revealed that at 950kHz the sensitivity was -117dBm but at 951kHz it fell by 11dB to -106dBm. Taking a look at the return loss of the G-303i antenna socket showed that there were some band pass input filters with change over frequencies of (what a surprise) 950/951kHz, 1.8/1.801MHz and at 7.3/7.301MHz. It would seem that the filter for 951kHz to 1.8MHz has much more loss than the other front-end filters, but whether this is normal or a fault I am unable to say. The receiver published specification gives the lowest receive frequency as 9kHz, and checking sensitivity in this range showed a gradual roll off starting at 200kHz with a sensitivity of -115dBm down to -92.5dBm at 20kHz. All these measurements were taken with both r.f. and a.f. a.g.c. system operating; without the a.f. a.g.c. the figures would have shown even more variation. However, it has to be said that Rugby at 60kHz was romping in, although 16kHz GBR never did show much life.

One thing struck me immediately about the h.f. sensitivity and that was, based on my experience with lots of other receivers, the sensitivity was higher than that necessary in a receiver of this type, and that the high sensitivity would probably reveal effects on the r.f. intermodulation performance. Using the accepted technique of feeding in two r.f. signals, 20kHz apart, and raising their combined level until an intermodulation product appeared and equalled the minimum discernible signal (MDS) of the receiver gave me a third order intercept point of +3dBm. Repeating the test using the 'big signal' method used for professional receivers gave a slightly better third order figure of +4dBm, with a dynamic range of 92dB.

Second order intermodulation performance depended on the positioning of the two test signals relative to the band pass filtering in the front-end of the receiver, but with the test signals in band with the IM product I measured the second order intercept at +26dBm with a dynamic range of 80dB, whilst with the test signals out of band relative to the IM product I measured +36dBm with a dynamic range of 85dB. I have to make a comparison with another receiver, if only to check that my test configuration is correct, and I chose my regular AR7030. This returned figures of third order intercept point of +32.5dBm with a dynamic range of 103dB, and a second order intercept point of +65dBm with a dynamic range of 92dB, and it should be noted that the AR7030 has no input filtering to assist the second order performance. It's also only fair to say that the AR7030 is a more expensive receiver than the G-303i.

As a final comment, there is a growing belief based on extensive work by well known authorities on the thorny subject of h.f. receiver performance, that it is the reciprocal mixing parameter which is paramount in determining what constitutes a good or bad receiver, and it is true that the intermodulation characteristics can be improved in real life operation by the simple expedient of putting some attenuation between the antenna and the non linear stages of a receiver. WiNRADiO Communications have included just such a switchable attenuator in the G-303i and whilst at 18dB it may be too much for my preference, switching it in will seriously improve the third order intercept point albeit at the cost of raw sensitivity, but the G-303i is, as I said, very sensitive, and is already ahead in the reciprocal mixing area.

One of the most revealing tests I normally carry out concerns the behaviour of the a.g.c. system of a receiver, and it often reveals the reasons for the odd clicks and pops one hears at the beginning of speech syllables and also at the start of a c.w. dot or dash. Basically what I do is to combine a steady low level r.f. signal with a stepped increase, usually between an equivalent of S4 and S9 on a standard meter. The length of the increase is usually set to about 250ms and I look at the audio output of the receiver during the length of the step increase. All receivers utilising digital



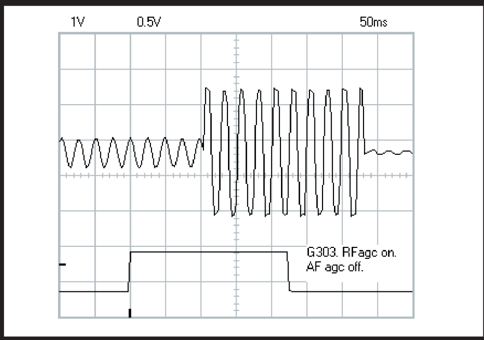


Fig. 1: The receiver's audio response during a 250ms input signal step, with the r.f. a.g.c. on and the a.f. a.g.c. off can be seen in the plot.

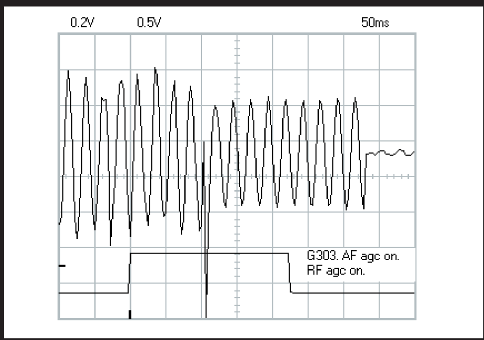


Fig. 2: Switching the a.f. a.g.c. on to add audio control causes a dramatic change.

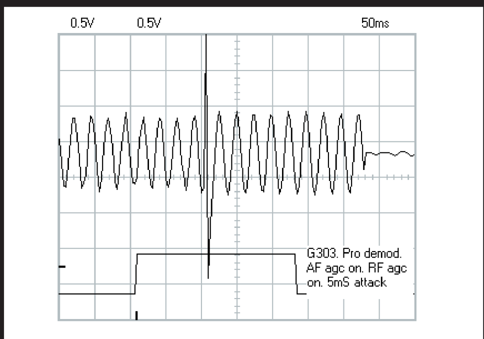


Fig. 3: Switching to the professional demodulator with both r.f. and a.f a.g.c. switched on shows just how much better the 'pro' software works.

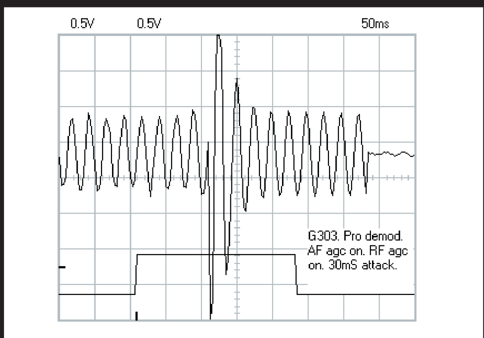


Fig. 4: For this test I set the a.f. a.g.c. attack time to 5ms, but then repeated the test with the attack time set to 30ms.

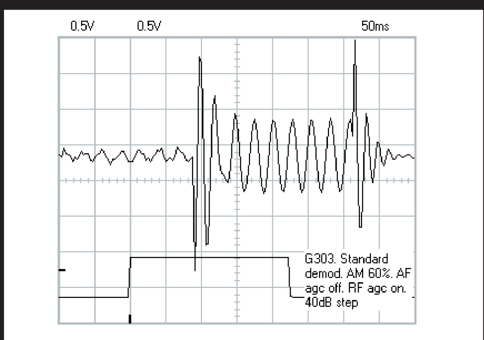


Fig. 5: The audio output change using the standard demodulator with only r.f. a.g.c. switched on.

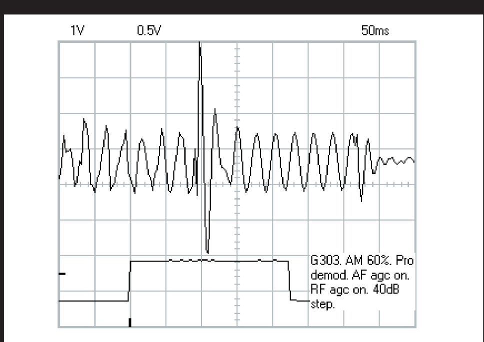


Fig. 6: The 'pro' demodulator and the r.f. and a.f. a.g.c. both on, shows much better control, although the 'click' is still prominent.

signal processing take a finite time to carry out the processing function and this leads to a measurable time delay between application of a signal at the antenna and the audio output appearing at the other end of the chain. Since the r.f. step has been applied before the digital system has done its job, a fully digital a.g.c. system has a hard time coping with the overload which occurs before the a.g.c. control has been applied, and this manifests itself as a loud 'click' in the audio output. One outstanding example of this occurs in the Collins 95S-1 which goes into a wild 'squawk' under these overload conditions. WiNRADiO Communications have overcome some of these problems by having a real time hardware a.g.c. system in the receiver card itself, and this is the 'r.f. a.g.c.' shown on the front panel. However, there also has to be an 'a.f. a.g.c.' within the d.s.p. system and this is also selectable from the G-303i panel. Let's see how the receiver performed.

A Picture Paints...

The receiver's audio response during a 250ms input signal step, with the r.f. a.g.c. on and the a.f. a.g.c. off can be seen in the plot **Fig. 1**. The step increase can be seen and is clean. although the audio output level changes despite the r.f. a.g.c. You can clearly see the processing delay of more than 100ms between application of the signal at the antenna and the audio appearing at the output of the sound card. Switching the a.f. a.g.c. on to add audio control causes a dramatic change as seen in **Fig. 2** where the a.f a.g.c. has brought up the low level r.f. signal to the start of the increase, and then the r.f. a.g.c. has taken over to keep the audio output more or less constant, but at the transition from low level to high level signal there is a loud and obvious 'click' in the audio. Switching to the professional demodulator with both r.f. and a.f. a.g.c. switched on shows in **Fig. 3** just how much better the 'pro' software works The transition from low level to high level input signal takes place with hardly any change in the audio output, but look at the 'click'. For this test I set the a.f. a.g.c. attack time to 5ms, but then repeated the test with the attack time set to 30ms. As you can see in **Fig. 4** this resulted in rather more than a 'click' at the transition, and is a good illustration of why it is usually necessary to have as fast an a.g.c. attack as possible on s.s.b. speech or data signals. That deals with s.s.b. and c.w. signals, but what about a.m.? The audio output change using the standard demodulator with only r.f. a.g.c. switched on is there to see in **Fig. 5**. Note the click now at both start and finish of the level change, whereas with the 'pro' demodulator and the r.f. and a.f. a.g.c. both on, **Fig. 6** shows the much better control offered, although the 'click' is still prominent.

What does this mean in practice? Well, on signals below about S9 (-73dBm) the audio clicks are not much of a problem, but on stronger signals the clicks are quite audible and make listening a bit uneasy, particularly on strong c.w. I realise that we c.w. listeners are a dying (literally) breed, but the clicks are noticeable on reasonably strong a.m. broadcast stations - but the G-303i is still much better than a Collins 95S-1, so you pays your money and takes your choice. Did I mention strong broadcast stations? What was the G-303i like on my favourite 900/909/918kHz tests?

No Monkey Chatter

Using either demodulator, the d.s.p. worked well, and I was able to flick between the three test frequencies using the up/down buttons after setting the step size to 9kHz. There was a little sideband splatter from 909kHz but the two continental stations on each side were clear and easy to hear, so no problems there. Going a bit further with the 'pro' demodulator, I found that tuning to something like Five Live and sliding the variable bandwidth control until all the station's sidebands were within the filter passband (and of course you can see this all happening on the spectrum display) you could get really good audio out of the receiver, whilst on weaker a.m. stations in the short wave bands the sliding bandwidth enabled me to close down until I got the best out of what signal was available. A truly excellent facility, but not so good when investigating the 500Hz c.w. filter. Why not?

Listening to c.w. at the bottom end of 40 metres, I realised that I could still hear signals which were well outside the selected and displayed 500Hz passband, so I did some measurements on the true bandwidth of the filter. With the standard demodulator, 500Hz bandwidth, a.f. a.g.c. off, r.f. a.g.c. on, mode set to c.w., I applied an S9 signal at the centre of the filter passband to give an 800Hz audio output. I then tuned the generator to each side of the filter and measured the bandwidth between the points at which the audio output fell by 6dB. The true bandwidth was 1.24kHz, not the 500Hz stated. I then switched the a.f. a.g.c. on and repeated the test to find that because of the levelling effect of the a.f a.g.c., the true bandwidth was now 2.42kHz rather than the stated 500Hz. I think that this should receive some attention, because it makes the narrow c.w. filtering a waste of time. With the 'pro' demodulator which gives total control over the selected bandwidth, sliding the bandwidth on c.w. from 1kHz down to its narrowest setting did absolutely nothing to the signals on each side of the displayed passband, which remained clearly audible throughout. This being an alarming discovery, I checked the other modes, but in all of these the filter passbands were correct, and attenuated adjacent signals properly, so it's a mystery. *(John acted on Milan Hudecek's suggestions re: the sampling rate setting and commented that the result was a transformation of c.w. filtering from useless to superb with the -6dB points being 390Hz* ***- Ed.****)*

Conclusions

I listened to all kinds of material during my all too brief time with the G-303i and did not find anything I couldn't hear. The performance in the l.f. beacon band around 350kHz is worthy of mention, not only because of the fact that I could actually hear so many beacons, but that I could see them all spread out on the spectrum screen below the frequency readout, and could watch the keying take place. Narrow band CB f.m. was excellent, as was s.s.b. and c.w., with the caveat about the c.w. bandwidth. Listening to a.m. with the 'pro' demodulator was excellent, but I have to say that the a.m.s. (synchronous) came out of lock quite easily and did a little 'squeak' when restoring, but I found that with the spot on accuracy of the l.s.b. and u.s.b. filtering it was actually better to use these modes on weak and fading a.m. signals.

The antenna connector on the G-303i card is an SMA; a brilliant connector for high frequency performance but very small, so the G-303i comes with an SMA to BNC adapter. I would recommend using a short length of coaxial cable with an SMA on one end and a free BNC socket on the other, because I have seen several SMA/BNC solid adapters shear off at the socket, and replacing the SMA socket on the G-303i will not be an easy job. WiNRADiO Communications please note.

You may ask "What antenna did I use for my listening tests?", and you probably guessed that it was an active loop. To some extent this explains the terrific beacon band reception, and of course the loop was located some 20 metres away from the dreaded PC, which could have helped the rejection of PC generated noise. The G-303i is normally supplied with a 'get you going' wire antenna, which was missing from the unit supplied to me, so I made one according to the description in the user manual. I can tell you that there was only a trace of noise from the computer monitor, which is a sign of the advances made by PC manufacturers, but the signal levels were obviously well down, so I connected the G-303i to a 15 metre long wire via 10 metres of coaxial cable. Again the noise level from the PC was very low, but the loop, as always, beats the living daylights out of lumps of wire antenna, so my advice is clear!

The user handbook is clear and easy to understand, and has a detailed appendix on the use and setting up of the professional demodulator so that the user can investigate various software configurations - this is almost a hobby in itself. There is a WiNRADIO web site which gives lots of additional information, and because WiNRADiO Communications are so into information technology the facilities exist for downloading additional applications for the G-303i; indeed just such an application (for a signal level monitor and data store) was E-mailed to me during the review, and I was able to install it and have yet another well though out facility available to me.

I note that this is one of the longest reviews I have ever written, and I still haven't covered some of the aspects of this interesting new receiver. It's difficult to place it in a particular market position because in order to use it, you need to have a fairly decent computer system which could cost you anything from £500 to £1000. If, as many of you do, have an existing PC of the minimum specification then the G-303i is definitely for you because the suggested selling price is around £300 for the standard unit (see, I said I would surprise you) and around £350 for the unit fitted with the professional demodulator. I consider that this is the one to go for because of the hugely extended capability of the 'pro' demodulator. Starting with an empty desk and a full wallet, the G-303i and PC could be more expensive than many other stand-alone receivers, but let me put it this way; if I had to choose between a Collins 95S-1 and the G-303i (ignoring the obvious fact that the 95S-1 tunes to 2GHz), I would take the G-303i. That's a statement I thought I would never make.

And, sorry folks, you will have to take it as read that the memory facilities are brilliant, but there are no more pages to tell you about it.

SWM

Manufacturer's Response

We sent a copy of John's findings to WiNRADiO's Milan Hudecek, his comments are as follows:

Excellent review, we are indeed thrilled. There are only a few minor things we believe may deserve some clarification.

- Regarding the c.w. i.f. bandwidth issue, the selectivity of the filter depends on the filter lengths, and this influence is more pronounced the narrower the bandwidth gets. I would suggest to adjust the c.w. filters to the maximum available lengths (255), which provides the sharpest filters. Admittedly, this feature is easy to overlook amongst all those sliders and edit boxes!
- The filter length setting is compromise between the filter selectivity and the CPU resources available. The IBM NetVista we supplied has plenty of excess power, so all filter lengths can be comfortably set to the max. For the Standard Demodulator, we have used compromise filter lengths to allow the software to run even on a very slow, beginners' PCs.
- There is in fact yet one more tuning method - as if there were not enough of them - the wheel on a wheeled mouse! :-) Easy to overlook, but some customers love this feature in our receivers.
- Many thanks to John for having noticed the lack of 9kHz step size preset, and the anomaly with keyboard tuning. Both have been fixed and the new software is now available for download.

In the UK the WiNRADiO G-303i is available from **Falcon Equipment and Systems**. Tel: **(01684) 295807**. E-mail: **winradio@sda-falcon.co.uk** For more details on the WiNRADiO products, news of new developments, distributors in your home territory and software downloads visit: **www.winradio.com**

The G-303i costs **£299** fitted with the standard demodulator. The additional Professional Demodulator costs **£99** as an upgrade. A G-303i and professional demodulator bundle costs **£350**. All prices are plus VAT at 17.5%, P&P is **£15**.