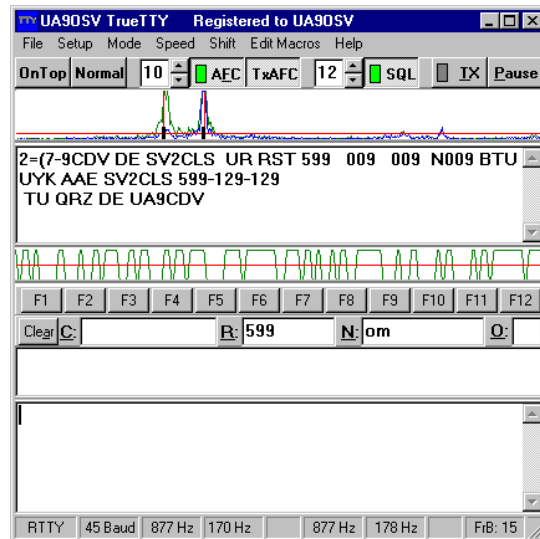


Starting on PSK31 – Some Early Experiences

Have you tried PSK31? No? Well, perhaps you should – it's easy and you might just like it!

It was during the D68C expedition to the Comoros Is that I wished that I could operate on RTTY or PSK31. The reason for this was not really that I had any interest in the modes, it was just that there was a little informal rivalry going on between Keith, G3TLB, Paul, G4DXG, and myself to see who could work D68C on the greatest number of band/modes. In the end it all worked out even, with none of us being able to work them on 40m SSB or on 80m. However, I kept seeing Cluster spots of their digital mode operation and thought that, if I had had the capability of working on those modes, I would have creamed the competition!

So, soon afterwards I decided to find out a bit more about digital modes. I went to my current favourite search engine (www.ixquick.com) and typed in 'PSK31'. Lo and behold! - lots of references. I clicked on one that said 'TrueTTY – RTTY and PSK software' and up came the DXSoft group website (www.dxsoft.com), run by UA9OSV and RZ4AG, with information on the TrueTTY software. It said that it is a '**Program for amateur radio digital communications via a sound card. Supported modes are RTTY (Baudot code), ASCII (7 or 8 bits), PSK31 (BPSK and QPSK) and AMTOR-FEC (SITOR-B, NAVTEX). SELFEC SITOR decoding is possible also. No additional hardware required - you need only transceiver and computer (5x86-133, Pentium-75 or better) with sound card.**' This seemed just what I needed! I downloaded the software and installed it without any difficulty.



TrueTTY

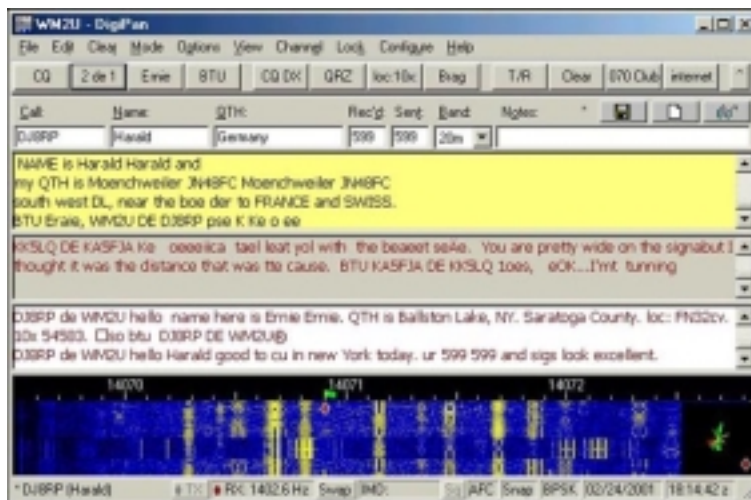
As you can see from the picture, it is Windows software and I was keen to see what it did. So, I connected the headphone output from my rig to the line input of the sound card on my PC and switched on. With some judicious fiddling of the audio gain on the rig and the input level control to the sound card, I eventually managed to get the upper display on the software window to show signals. It was then I realised that I had no idea where on the bands I could find a PSK signal!! Back to the www.

There was another site that had come up on my initial search that said it was 'The Official PSK31 WWW Homepage' (<http://aintel.bi.ehu.es/psk31.html>). Here was more information on PSK31, together with a list of frequencies. I set my rig to SSB, tuned it to 14070kHz and, sure enough, a few little peaks appeared on the upper display. I moved the mouse pointer over one of them and left clicked. Abracadabra! Letters appeared, one after another, in the window below. What is more, the text was intelligible!! I was receiving PSK31. I clicked on another of the peaks on the display and up came another station. Magic! I was hooked

and I spent the next hour, or so, just clicking on the signals as they came up to see whom I could receive. Spain, Italy, Kazakhstan.....I was surprised how many signals were appearing. I wanted to find out more.

'The Official PSK31 WWW Homepage' had links to other PSK31 sites, so I followed one to WM2U's PSK Page (www.qsl.net/wm2u/psk31.html). This site was more interesting. It had more references and links, plenty of other programs to download and details on interfacing the sound card to the rig. His 'Hook-up' page was very comprehensive and informative – I will return to this later.

After reading the WM2U pages, I realised that there was plenty of software about to try. The TrueTTY program is shareware and needs to be registered to operate fully. This costs \$35 – a great disincentive to use it when there are others that are freeware! I downloaded 'DigiPan' to see what that would be like. It seemed rather better than TrueTTY.

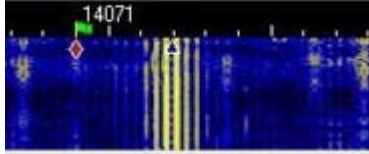


DigiPan

The part that was most striking was the bottom display, known as the 'waterfall'. This is a time-varying display that shows signals as vertical lines – see the picture above. The left-hand edge of the display corresponds to the frequency to which you have your rig set and the right-hand edge is about 3kHz higher. So what you see is effectively a picture of your receiver's SSB bandwidth. PSK signals are shown as vertical 'streaks' within this bandwidth.

If you read any of the reference texts from the links that I have given above, you will see that PSK31 is a form of modulation that alters the phase of the transmitted signal (phase shift modulation, or keying – hence PSK). The bit rate of this modulation (keying) is 31Hz – hence PSK31. This is a relatively slow rate, resulting in signals that have (or should have!) a bandwidth of 31Hz. This means that within the normal 2.7kHz (or round about) bandwidth set for SSB reception there can be several PSK31 signals coexisting without interference to each other. All that is needed is a very sharp audio filter to pick out the one you want. This is done by the software using DSP (digital signal processing) techniques. With PSK31, you get about the equivalent information transfer speed as for 50WPM CW. It's as fast (if not faster) as I can type!! Again, all you have to do to select the signal is to click on the required one on the 'waterfall'. What is more, with a right-click of the mouse, DigiPan can select a second signal. This means you can monitor two stations at the same time: much better than TrueTTY.

I mentioned that the bandwidth of a PSK31 signal should be around 31Hz. Well, so it should. However, if it is over-modulated, or if speech processing is used in the TX, it can get much wider. The picture below shows what can happen. This is very anti-social!



Wide bandwidth due to over-driving

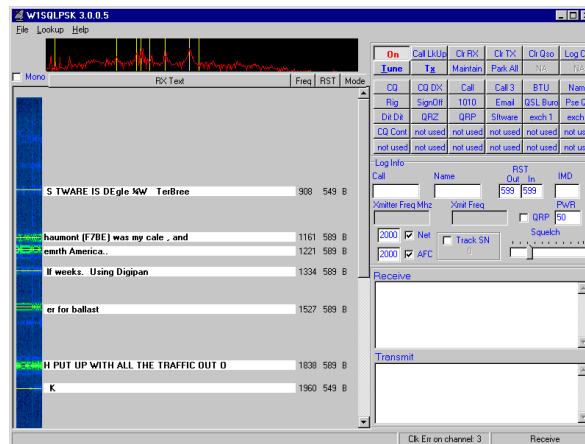
There is a really good introduction to DigiPan on www.qsl.net/wm2u/digipan.html. I recommend it to you.

There are other programs too: WinPSKse is another similar to DigiPan. Again, it is freeware.



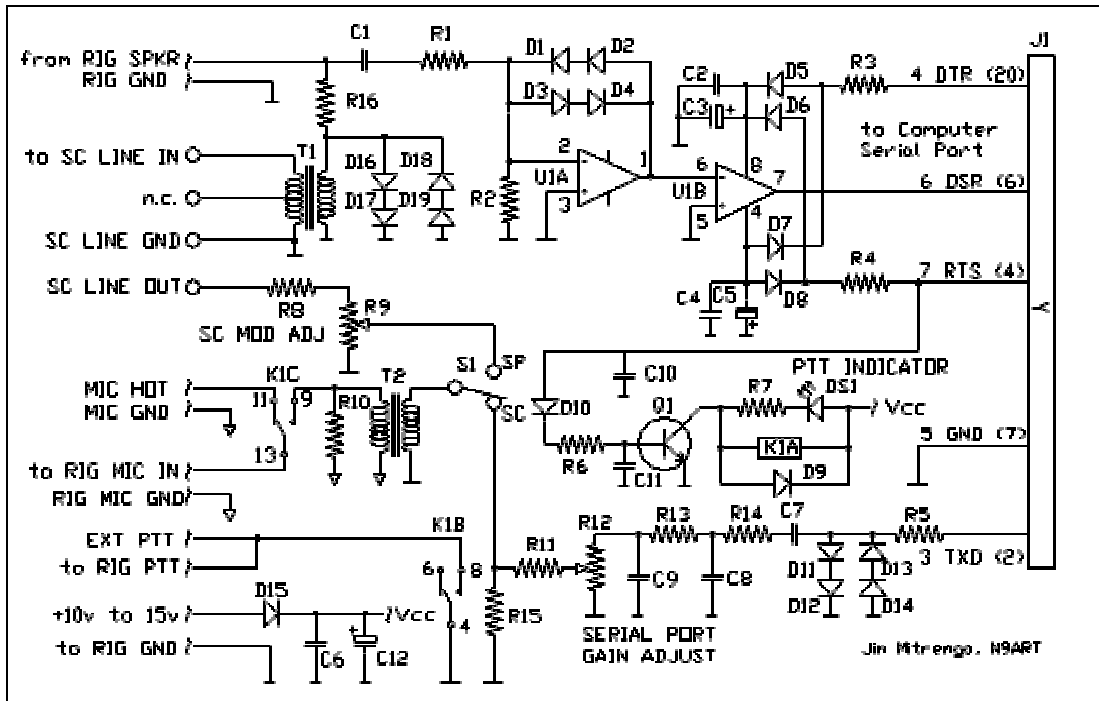
WinPSKse

W1SQLPSK software has a horizontally moving waterfall and can monitor up to 20, or so, signals simultaneously! That seems a bit excessive to me. I downloaded this and installed it, but have never managed to get it to operate successfully. Please let me know if you get it to work.

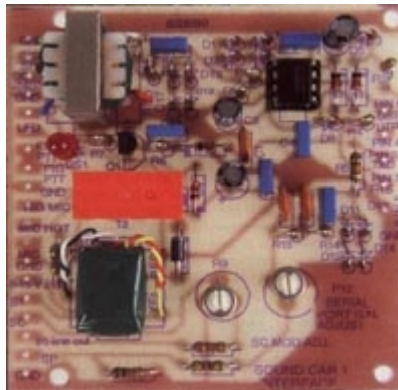


W1SQLPSK

HamScope is another freeware program. It can only cope with one signal at a time, but it can receive more digital modes than most of the others. The list is: BPSK31, QPSK31, RTTY, ASCII7, ASCII8, MFSK16,



The N9ART interface circuit



The assembled PCB from Far Circuits

Now to try it out! The various connections were made between the sound card and the rig and the receive mode was tested with HamScope on BPSK. All worked fine. Then, a dummy load was connected to the rig and the tune button was clicked on the software. Nothing happened! After a deal of investigation and the recruitment of Nick, G1BVI, to try things out on his PC (in case mine had a faulty serial port), the problem was traced to my misreading pin numbers on a serial port connector. When this was rectified, all worked perfectly. The audio levels were adjusted to give about 20 watts output from the transmitter (remember, PSK is a 100% duty cycle mode, so don't try to get 100 watts continuous output from your transceiver – it will not like it!). Now for my first PSK31 QSO.

You may have noticed that all of the pictures of the different software packages show a number of buttons that can be used to program 'macros' into the software. These are to enable the user to send commonly required text with the press of a button, rather than typing it in each time. Examples of macros might be CQ calls, details of the station, QTH, etc, etc. I chose HamScope to use first (I'm not sure why!) and

programmed up the macros, trying to think of what I was likely to want to say. Having done that, I then looked for a suitable poor unwitting station onto whom to inflict my incompetence. I found IK2UWR calling CQ! I typed his call into the box on the screen and 599 into the report box and waited until he finished his call. In fact, I think that I waited until he had had two or three QSOs before I plucked up enough courage to press the 'CALL' button.

'IK2UWR de G3TXZ pse k' came up on the screen and was sent into the ether. 'G3TXZ de IK2UWR GE OM.....' came back. Oh Hell! I was committed to a QSO! Some frantic pressing of macro buttons and some speedy (for me, anyway) typing later and I had completed my first PSK31 QSO. I then went down to the Pub to settle my nerves! Funnily enough, when I came home I looked around to see if there were any more signals about and I worked SP7FBQ and UN7JX without any butterflies at all. I wonder why?

Since then I have had a good number of PSK31 QSOs. Many have been little more than report, details and 73 (aren't many CW and SSB QSOs, these days?), but one or two have been longer keyboard natters. It certainly helps to increase the old typing speed! I haven't tried RTTY yet – that really would need good keyboard speed if a QSO other than by macro buttons were attempted. Since the interface was built I have yet to find any stations on MFSK16, so I have not tried that mode either.

The points about PSK31 that really appeal to me are its very narrow bandwidth, its low power requirements and its ability to be copied when only just perceptible above the noise. I can recommend to you all to have a go! It is fun to try something new. If you are interested in building the N9ART interface read www.qsl.net/wm2u/interface.html first then please let me know (g3txz@qsl.net), as I have a couple of spare PCBs and have now sourced the transformers cheaply (www.buxcommco.com/buxcat.html) (thanks Tom, G0JDM). I could probably make up kits of parts if enough want them.

For more information on other digital modes look at www.qsl.net/zl1bpu/, it really is an informative web site.

Good luck if you decide to have a go. 73 de Eric, G3TXZ.