

USB Digimode-2 Interface Guide

First of all, thank you for purchasing my USB Digi-Mode interface. Hopefully, this guide will allow you to get your PC connected to your transceiver with the minimum of effort. Your Interface comes with a 30 Day No Questions Satisfaction Guarantee and full 12 Month warrantee against material failure.

Please note: Although I have never had any interface damage a Radio or associated Computer, you use this item entirely at your own risk. I will not be responsible for any damage caused to your equipment through use of this product. You should always follow the manufacturer's instructions when connecting items to your equipment.

To use this interface you will need a PC with an available USB port and suitable Digimode software such as Fldigi or DM780 which comes with the Ham Radio Deluxe distribution. However, as long as your chosen Digimode software can operate the PTT via a comm port RTS line, the software will be compatible. Your transceiver requires an accessory/data/packet port that presents Tx/Rx audio plus PTT.

The interface and cables connect between your PC's USB port and soundcard jacks to your transceivers accessory/data/packet connector.

Interface description and connection

The interface gives you transformer isolated Tx/Rx audio and opto-isolated hardware PTT keying. It allows you to use digimode software giving you access to any AFSK mode such as PSK31, SSTV etc.

The interface is very simple to connect and set-up. The interface box is very compact measuring just 50x35x20mm. The USB and audio cables (1.8m long) from your PC enter into one side of the interface box and a single cable (0.5m long) with the appropriate accessory plug plugs into your transceiver.

1. **PC Audio.** This cable connects to the Line Out and Line/Mic input of your PC. The **Green** coded jack is to the Line output jack and the **Blue** coded jack to Line/Mic input.
2. **PC USB.** This cable connects to a free USB port on your PC to give you USB PTT control of the transceiver.
3. **Radio Audo/PTT.** This cable connects to the accessory/data/packet jack on your transceiver. On purchase, you will have specified your transceiver type and so this connector will be appropriate to your set-up. For instance Icoms use the 8 or 13 Pin accessory jack, Yeasu use the 6 pin Mini Din or 5 Pin Din Data/Package jack, Kenwood use the 13 pin accessory jack.

The interface uses professional Bourns 600:600 Ohm isolation transformers for both transmit and receive audio. The hardware PTT is opto-coupled giving full isolation on those signals eliminating the chance of ground loops.

USB Set-up.

The interface is based around the excellent FTDI USB to TTL Serial adapter product which provides a virtual comm port similar to a traditional RS232 interface. This gives Tx/Rx data used for the CAT control and the RTS signal is used for hardware PTT keying via the interface opto-coupler.

The FTDI Chipset is highly reliable and is compatible with most versions of Microsoft Windows including Windows 2000, Windows XP, Windows Vista, Windows 7, Windows 8 and Windows 10. If your PC does not have the FTDI drivers already installed, you will need to download them from the FTDI website together with the comprehensive installation guides.

FTDI Drivers are available from here: <http://www.ftdichip.com/Drivers/VCP.htm>

FTDI Installation guides are available from here:

<http://www.ftdichip.com/Support/Documents/InstallGuides.htm>

- With the **PC USB** cable connected to a free USB port on your PC and the drivers installed, the PC should recognize and register the interface.
- Using Windows Device Manager (Via Control Panel\System) click on the Ports (Com and LPT) section. Your new interface should be listed as a USB Serial Port and associated with a Port number. Make a note of this port number as you will need to set the same port in your Digimode Software.

PTT Set Up

The interface allows for the RTS signal of the virtual comm port to control PTT keying. Set your Digimode software to operate the PTT via the appropriate comm port **RTS** signal.

Audio Set Up

Most Digimode software comes with set-up instructions for transmit and receive audio levels and so you will need to refer to the instructions that came with your software of choice. However, I will offer some pointers.

Receive Audio Level

Most manufacturers have chosen to standardize the Audio levels (AF detector output) from the accessory sockets on their radios and this will be unaffected by the volume control the radio. The level is more than adequate to drive the "Line Input" or "Microphone Input" of your soundcard.

At this point I am assuming you use Microsoft Windows. To enable the input feature of your soundcard, run up the "Sound" application from "Control Panel" and ensure that the Line or Microphone inputs are enabled and the audio levels set accordingly. There are so many variations of audio drivers and applications, it would be impossible to cover all aspects in this set-up document. However, many PC audio applications have an input level meter and you need to adjust the Line in or Microphone input level such that your decoding application has enough received audio level to operate without clipping the audio input. If you choose to use the Microphone input, you may need turn off any "boost" or "gain" function.

Transmit Audio Level

Your average PC sound card is quite capable of delivering over 1v which gives plenty of scope to get the correct drive level to the transceiver.

Now let us consider the PSK31 mode. It is effectively a 2-tone signal which in theory occupies 31.25kHz worth of bandwidth. However, because it is a 2 tone signal you need your transmitter output stage to be operating in a linear mode to limit the possibility of inter-modulation distortion. I suggest that you set the Mic gain mid-way and turn off any audio/speech processing if your radio has this feature.

I have done a fair bit of experimentation and research into the optimum drive level and came across a truly excellent article by N1NKM. Have a look at the following web-link and it explains very well the pitfalls of getting the modulation and power levels wrong.
(<http://www.mymorninglight.org/ham/psk.htm>).

If you follow this procedure from N1NKM, you should produce a nice clean signal.

1. Set the output power of your transceiver to 50% of nominal.
2. Set the Line output level of your soundcard to zero.
3. Put your preferred PSK or Digi-Mode application to transmit mode.
4. Raise the line output audio level of your soundcard so that you start to produce output power and your transmitter ALC meter is "just" moving off the bottom of the scale. At this point, make a note the transmitter output power.
5. Now turn down the line output level from your soundcard to reduce the transmitter output power by 20%

This will ensure that your transmitter is not crushing the signal and that the ALC is not having any effect.

On my Icom IC-718, this gives me approximate 40w of output which is more than adequate for PSK31.

You need to bear in mind that PSK is a very narrow band mode and by using the DSP functionality of a modern PC and soundcard, it is the equivalent of having a VERY narrow filter in your receiver. This means that even the lowest output powers can result in very useable PSK communication.

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