

Trio Kenwood CAT and Digimode Interface Guide

First of all, thank you for purchasing my Trio Kenwood USB CAT and Digimode interface cable. Hopefully, this guide will allow you to get your PC connected to your Radio with the minimum of effort. Your Interface comes with a 30 Day No Questions Satisfaction Guarantee and full 12 Month warranty 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 cable you will need a PC with an available USB port and suitable control software. The interface connects directly between the USB port of your PC and the 6 Pin Din Remote/CAT jack of your radio.

This Interface is compatible with the following Trio Kenwood Radios

TS-450s, TS-790s, TS-850s, TS-950s, TS-140s, TS-440s, TS-680 and TS-940

Important. Radios highlighted in red require optional CAT modules or CAT chipsets such as the IC-10, IF-10A, IF-10B or IF-10C. Please ensure you have one fitted to use this CAT interface. Refer to the instruction manual for the correct module for your transceiver.

USB Interface Drivers

The interface uses the highly reliable FTDI Chipset and is compatible with most versions of Microsoft Windows including Windows 2000, Windows XP, Windows Vista and Windows 7. 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>

Software

There is plenty of suitable software available on The Net, some being free and others paid for. Have a look at:

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| • Ham Radio Deluxe | Download from | http://hrd.ham-radio.ch/ |
| • FTBCAT | Download from | http://www.g4hfq.co.uk/download.html/ |
| • TRX-Manager | Download from | http://www.trx-manager.com/ |
| • MixW | Download from | http://www.mixw.net/ |
| • N1MM | Download from | http://pages.cthome.net/n1mm/ |

Here is a simple guide to ensure you get your interface up and running 1st time.

- Firstly, connect the USB interface cable to a free USB port on your PC. If the PC does not already have the FTDI Drivers installed, please follow the FTDI installation guide and download the appropriate driver for your operating system. Once installed, connect to the 6 pin din CAT/Remote port of your transceiver.
- 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 CAT Control Software.
- Ensure your software of choice is set for the correct Com Port as above, Radio Manufacturer/Type and that the Baud Rate matches that pre-configured on your radio. (If you are having problems,

some software allows you to "Auto Detect" the Com Port and Baud Rate settings and so it will do the searching for you)

PTT Set Up

Kenwood Transceivers allow for PTT control over the CAT commands. Once you have the CAT interface set up and connected to your transceiver, pressing the PTT icon in your chosen software will toggle the transceiver between Transmit and Receive.

Audio Cable Connection and Set Up

Connection of the audio cable is simple. The **GREEN** coded 3.5mm jack connects to your PC soundcard's Line Output Socket. The **BLUE** coded 3.5mm jack connects to your PC soundcard's Line or Microphone input socket.

The 13 pin Din plug on the audio cable connects to the Accessory socket on the rear of the transceiver.

Most Digi-Mode 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

Kenwood have chosen to standardize the Audio levels (AF detector output) from the accessory sockets on their radios. The detected audio level will be between around 300mv and will be unaffected by the volume control on the front of the radio. This 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

The modulator level in on Kenwood transceivers varies from around 20mv to 100mv.

Your average PC sound card is quite capable of delivering over 1v which gives plenty of scope to reduce the audio drive level on the soundcard output level controls but in general, you will not need to turn the level up too much.

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 Line output level of your soundcard to zero.
2. Put your preferred PSK or Digi-Mode application to transmit mode.
3. 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.
4. 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 own transceiver, this gives me approximate 40w of output which is more than adequate for PSK. This will of course depend on where you have your output power setting adjusted to on the transceiver. 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.

Ground Loops

The reason why Rig-Blaster and Signal Link Interfaces are expensive in comparison to this product is that they offer either total or partial isolation of the audio and PTT paths between your PC and Radio to remove all possibility of ground loops. However, in my experience, as long as you keep cabling to a minimum, use good quality cable with appropriately short lengths between your Radio, PSU, PC and Mains supply then ground loops are not generally an issue.

How do I recognize it I have a ground loop problem?

Well, if you have a ground loop issue, it will most likely be also present in receive mode as well as transmit. Whilst in receive mode, if you look at the waterfall image in your favoured digi-mode application, you will see solid vertical lines appearing at 60Hz, 120hz, 180 Hz and so on across the display. (These will be 50Hz, 100Hz, 150Hz etc if you use 50Hz a.c power). When you transmit, these 60/50Hz products will also mix with your outgoing PSK signal causing potential signal errors and undesired increase to your radiated signal bandwidth. If you do see these products in receive mode, try a different grounding strategy between your PC, Radio and PSU.

**For more products, contact details or Help, please visit
www.xggcomms.com**