

Yaesu CAT and Digi-Mode Kit Guide

First of all, thank you for purchasing my Yaesu CAT and Digimode Interface Cable Kit. Hopefully, this guide will allow you to get your PC connected to your Yaesu Radio with the minimum of effort. Your Interface comes with a 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.

This unit is compatible with the CAT Interface on the following radios

FT-100	FT-817	FT-857	FT-897
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So what does the interface kit do for me?

You will be provided with 2 cables in the interface kit.

- The first cable consists of a 9 pin DB9 connector and an 8 pin mini din connector. This cable connects between you PC's RS232 port and the 8 pin CAT socket on the rear of your transceiver allowing remote control of your radio when using suitable software.
- The second cable consists of a pair of 3.5mm stereo jacks and a 6 pin mini din plug. This cable routes the audio to/from your PC's soundcard to the DATA jack on the rear of your transceiver. This allows you to operate modes such as PSK31, SSTV, WEFAX or any AFSK mode that requires audio interfacing to and from your PC.

How does it work?

Built into the 9-pin D-Type RS-232 shell on the CAT cable is a level shifter which converts the RS-232 signals into the TTL levels compatible with the CAT port on your radio. The level shifter circuit is powered by the DTR signal on your PC's RS232 port and so no external PSU is needed.

The audio cable is a simple connection to and from your PC's soundcard to the DATA jack on the rear of the radio. This carries the fixed audio output from the receiver and the input to the transmitter modulator allowing you to send and decode AFSK modes when using suitable software.

Connecting it all up

1. Before connecting the interface, I suggest you turn both your PC and Radio off.
2. First, connect up the CAT cable.
 - At the PC, plug the 9 Pin D-Type into a free RS-232 port. If your PC does not have an RS-232 port then the interface works well when used in conjunction with USB to RS-232 adapters.
 - At the radio, connect the 8 pin mini din connector into the “CAT” socket on the rear of your transceiver.
3. Connect up the Audio Cable.
 - At the PC, plug the 3.5mm Stereo Jack with the **Green Identifier** into the “Line Out” or “Speaker Out” jack of your soundcard.
 - Plug the 3.5mm Stereo Jack with the **Blue Identifier** into the Line Input of your soundcard. You can also use the “Microphone Input” but be aware that the Microphone input on soundcards can have a “boost function”. If you do decide to use the Microphone input, I suggest that you turn any available “boost” option to minimum until you have checked the levels into your preferred decoding software.
 - At the radio, connect the 6 pin mini din plug into the “Data” socket on the rear of your transceiver.
4. Once you are happy that all the connections are secure, you can turn your equipment back on.

Software

There is plenty of suitable software available on The Net, some being free and others paid for. To get maximum benefit from this interface, you need software that combines the remote control ability of your radio via the CAT interface and the Coding and Decoding of the AFSK audio to and from you radio. The most popular software is:

- Ham Radio Deluxe <http://hrd.ham-radio.ch/>
- MixW <http://www.mixw.net/>
- N1MM (via MMVari) <http://pages.cthome.net/n1mm/>
- MMVari <http://mmhamsoft.amateur-radio.ca/MMvari/>
- MultiPSK <http://multipsk.eqth.info/>

Software Configuration (CAT Interface)

1. If your PC has an RS-232 port, ensure it has been turned on in the BIOS
2. You may run into connection problems if you have another application running that requires access your serial port. Ensure these applications are closed when using this interface.
3. **Important:** When configuring your software of choice, ensure that the option to provide interface power via the “DTR” signal **IS** enabled. Some software will also give you the option to power the interface from the “RTS” signal. The RTS function is not used on this interface and so it does not matter if it is turned on or off.

4. Ensure your software of choice is set for the correct Com Port, 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) The interface is designed to work at all baud rates supported by your radio. For best performance, I suggest you use the highest speed available.
5. Ensure that your software has the correct type of radio selected. Not all Yaesu Radios use the same CAT commands to achieve the same function and so it is important that your radio type is correct in the software configuration.

Audio Set Up

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

Yaesu have chosen to standardize the Audio levels (AF detector output) from the Data sockets on their radios. This level is fixed and unaffected by setting the radio volume control. 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 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 to turn off any “boost” or “gain” function. Many decoding packages such as DM780, PSK31 Deluxe etc, use a receive level bar-graph display to assist in getting the levels correct into the soundcard.

Transmit Audio Level

Again, Yaesu have standardized the audio level to apply to the Modulator input pin on the transceivers Data socket.

Your average PC sound card is quite capable of delivering over 1v peak to peak of line output and so careful use of the output level control on your soundcard is needed to prevent over modulation.

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 Tranceiver 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%
5. Remember that modes such as PSK31 are narrow band and very akin to CW. Your soundcard is also acting as a very narrow band filter by utilizing the DSP facilities in the software. You do not need much power to operate these modes and I have had very good contacts with just 20w or so.

Following these simple guidelines will ensure that your transmitter is not crushing the signal and that the ALC is not having any effect and your transmission is nice and linear.

Ground Loops

The reason why Rig-Blaster and Signal Link Interfaces are expensive in comparison to this product is that they offer total or partial isolation of the audio and PTT paths between your PC and Radio. This is 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 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**