Yaesu USB CAT and PSK Interface Guide

First of all, thank you for purchasing my Yaesu USB CAT and PSK interface cable. 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 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 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 RS232 CAT jack of your radio and your PC soundcard and the Packet/Data jack on the radio. For the Packet/Data input, some radios use the 5 pin Din connector and others, the 6 pin Mini Din.

This Interface set is compatible with the following Yaesu Radios
FT-450, FT-450D, FT-950, FT-1000MP, FT-1000 Mk5 Field, FT-2000, FT-DX5000, FT-DX9000

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, Windows 7 and Windows 8. If your PC does not have he 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. The most popular software seems to be:

- 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 RS232 CAT 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.
- 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.

- 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)

Setting up the audio cable

The cable consists of a pair of 3.5mm stereo jacks and a 5 Pin Din or 6 Pin Mini Din plug dependant on your radio. This cable routes the audio to/from your PC's soundcard to the Packet/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 when using suitable software.

How does it work?

The cable is a simple connection to and from your PC's soundcard to the Packet/DATA jack on the rear of the radio. This carries the fixed audio output from the receiver and the audio input to the transmitter modulator allowing you to send and decode AFSK modes when using suitable software. It is designed to be used with the USB CAT cable so that the radio can be PTT keyed by your chosen software.

Connecting the audio cable up

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 or Mic input of your soundcard.

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 5 Pin DIN or 6 pin mini din plug into the "Packet" or "Data" socket on the rear of your transceiver.

Software

There is plenty of AFSK Codec Software available on The Net, some being free and others paid for. Some of the more popular packages are:
DM780 (Part of Ham Radio Deluxe Suite) http://hrd.ham-radio.ch/
Digipan http://www.digipan.net/
MMVari http://mmhamsoft.amateur-radio.ca/MMvari/
MultiPSK http://multipsk.eqth.info/

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

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.

If you refer to your Yaesu Transceiver set-up menus, you are will usually find settings for the gain to the modulator stage. This may be referred to TGEN V GAIN or DIG GAIN to give you a further element of control of the Transmit level.

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 Transceiver Digital gain mid-way as a starting point.

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. Understand how to swap the metering function of your transceiver between Power Output and ALC metering.
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%
6. 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 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.

A good starting point with shack grounding is to ensure that all equipment (PC Included) are grounded to one common earth point. Do not be tempted to "daisy chain" equipment as this is almost guaranteed to give you ground loop issues.

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