

USB-Digimode-4-SAT Interface Guide

First of all, thank you for purchasing The USB Digimode-4-SAT 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 Satisfaction Guarantee and full 12 Month warranty against material failure.

Please note: Although I have never had an interface damage a Radio or associated Computer, you use this item entirely at your own risk. We 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. You should pay particular attention to your equipment grounding regime. Your PC should also be considered part of your shack set-up and so should also be appropriately grounded to your main shack ground point.

To use this interface you will need a PC with an available USB port and suitable control software. Your Icom transceiver requires an accessory/data/packet port that presents Tx/Rx audio & PTT and a CAT control is via a USB Type-B socket.

At the time of writing this document, the interface is compatible with the Icom IC-7300, IC-7610, IC-7850, IC-7851, IC-9100 and IC-9700.

Interface description and connection

This interface is a bespoke version of our Digimode-4 interface to allow you to use the C.S.N Satellite Antenna Tracker with your radio. As you will be aware, the C.S.N Tracker "steals" the Icom CI-V CAT port on your radio to tune the radio during satellite passes. This means that any other software that needs CI-V CAT control of the radio loses access to the 3.5mm CI-V port.

However, Icom Radios above also have a USB Type B port on the rear which gives you an alternative port to issue CAT commands.

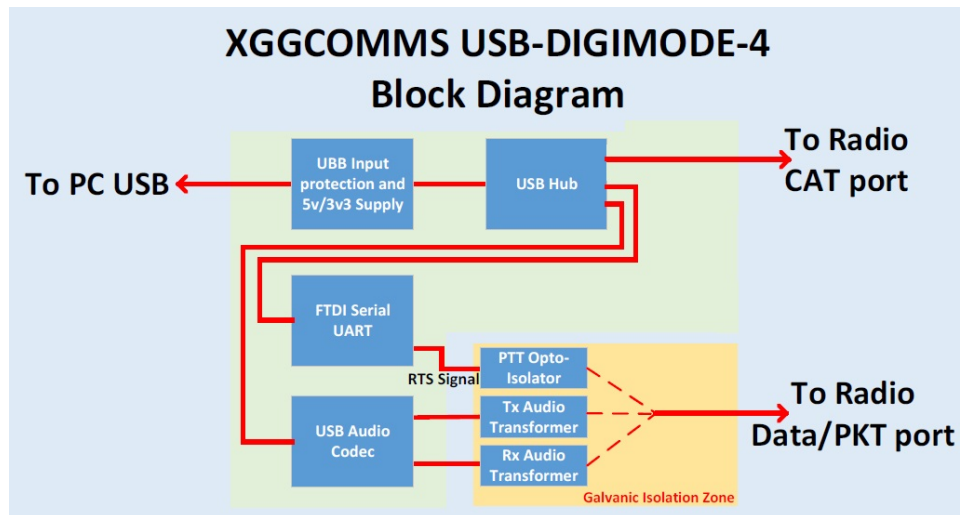
Taking the IC-7300 as an example, via the radios SETMODE menu, the USB CAT port and Legacy 3.5mm CAT jack can be set to "Link" where the USB and 3.5mm CIV CAT ports are internally connected, or they can be "Unlinked" where the USB CAT and the 3.5mm CI-V CAT ports operate independently.

The Digimode-4-SAT allows both the C.S.N Satellite tracker and the Digimode-4 to access the CAT control functions of your radio as well as giving you an external fully isolated USB Sound card with Hardware PTT keying for Digimode operation.

The interface is simple to connect and set-up. The interface box has a label on the lid explaining the function of the 3 cables connected to the interface.

1. **PC USB.** This cable connects to an available USB port on your PC.
2. **Radio Data.** This cable connects to the 8 or 13 pin accessory port on on your Icom transceiver. At purchase, you will have specified your transceiver type and so this connector will be appropriate to your set-up.
3. **Radio CAT.** This is a USB Pass-through terminating in a USB Type-B plug to connect to the built-in CAT port on your Icom Radio.

How does the USB-Digimode-4 work?



Internally, the interface has a 4 port USB Hub where 3 of the ports are utilized. The first port is the ongoing USB Pass-Through to connect to the radios USB-B CAT connector.

The second port connects to the FT232R USB UART IC to provide Opto-isolated PTT control via a virtual COMM port RTS signal.

The third port connects to a C-Media CM108 audio codec for the Tx/Rx audio interfacing.

The opto-isolated RTS controlled PTT and the Tx/Rx audio connect to the radio via the 8 or 13 pin Accessory port.

The CMedia CM108 audio codec operates as an independent external sound card allowing you to off-load the Digimode activities from your PC's internal sound system. This means that you have fully independent audio level setting of your digital mode activities.

Both the Transmit and Receive audio plus the hardware PTT are galvanically isolated from the rest of the interface. The audio isolation is via 600:600 Ohm transformers and the PTT isolation is via an opto-coupler. This reduces the risk of ground-loops and pick-up.

Interface Drivers Set-up

The instructions below are based on Microsoft Windows set-up. However, the USB Hub, FTDI UART and CMedia codec drivers are built into most Windows, Linux and MAC OS distributions. You may need to download the FTDI UART drivers and for Windows, this is covered in this section.

A quick word on Linux Setup

If you do wish to set the interface up on Linux (on a Raspberry Pi for instance), Paul Dordal K2PMD has written a superb set-up guide for using the interface with the Xiegu G90. Many of the Linux OS settings in Paul's guide are still relevant for any radio type. Paul's setup guide is here: [Xiegu G90 Pi-4 WSJT-X Set-up w-XGGComms USB Digimode-4 Sound Card \(v 1.2\) \(k2pmd.blogspot.com\)](http://k2pmd.blogspot.com/2014/07/xiegu-g90-pi-4-wsjt-x-set-up-w-xggcomms-usb-digimode-4-sound-card-v1.2.html)

Windows Setup

You will need access to Windows Device Manager to check the installation. To access Device Manager, type in “Device Manager” in the windows search and run the application. Or from your “My Computer” icon, right-click on it to open the Computer Management window. From here you will see “Device Manager” which you can open.

Plug the interface directly into a free USB port your Windows PC.

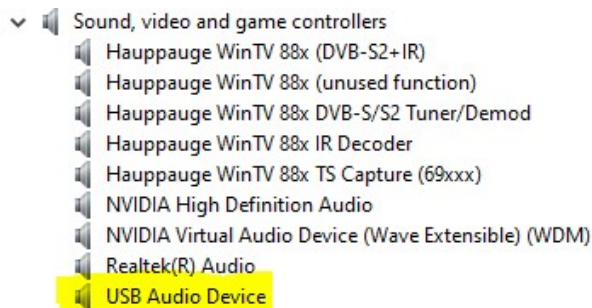
We recommend you do not connect the interface to your PC via a USB hub. The power provision on USB hubs can be an issue and by adding in a USB hub, you can compromise grounding and open yourself up to all sorts of RF pickup and noise issues. You may “get away with it” on a powered hub but the warning on pickup and noise still stands.

When you plug the interface into your PC, a few new devices will appear into the Windows Device Manager. The interface USB hub should just appear as a Generic USB Hub or similar in the Universal Serial Bus controllers. I have highlighted what you are looking for below.



Next check that CMedia codec has loaded. In the Sound, video and game controllers section, you should see a USB Audio Device as below.

The CM108 audio codec drivers are “generic” in-box in most Windows operating systems and so are termed driver free.

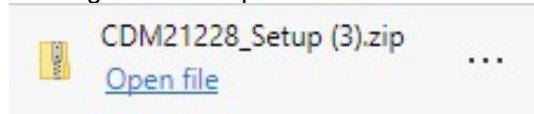


Finally, we need to install the FTDI UART Drivers for the hardware PTT interface function which are available from here: <http://www.ftdichip.com/Drivers/VCP.htm>

From the Windows section of the drivers set-up page, you will see a “setup executable” link in the comments section highlighted below.

Operating System	Release Date	x86 (32-bit)	x64 (64-bit)	PPC	ARM	MIPSII	MIPSIV	SH4	Comments
Windows*	2017-08-30	2.12.28	2.12.28	-	-	-	-	-	WHQL Certified. Includes VCP and D2XX. Available as a setup executable. Please read the Release Notes and Installation Guides.

Clicking on the setup link will download the CDM21228_Setup driver package to your PC.



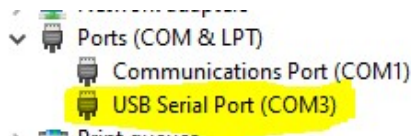
From the downloaded zip file, open it and run the CDM21228_Setup.exe to install the drivers. Follow the on-screen instructions to complete this installation. You may need to restart your PC at the end.



Once the drivers have installed open up Device manager and check in the Ports (COM & LPT) section. You should see that a new USB Serial Port has been found.

You need to make a note of the COM port number

You will need this number in your Digimode setup. In the example below, the interface was given COM3. Yours may be different.



Digimode Software Resources

I will cover the most popular (and free) packages below which are WSJT-X and FLDigi especially if you want to work modes such as FT8 or PSK31. But if you refer to these setup details, it will give you the idea on how you are supposed to set up other packages. These instructions are to guide you in the set-up of the software. Not to use it. Please refer to the instructions for the individual software package for how to get the most out of it.

WSJT-X can be downloaded from here:

<https://physics.princeton.edu/pulsar/K1JT/wsjsx.html>

FLDigi can be downloaded from here:

<https://sourceforge.net/projects/fldigi/>

Other applications (some paid for).....

Ham Radio Deluxe: <https://www.hamradiodeluxe.com/>

MixW: <http://mixw.net/>

N1MM: <https://n1mmwp.hamdocs.com/>

Software Setup

In the following sections, we will cover how to set up the most popular Digimode packages (WSJT-X and FLDigi) on your PC. However, many of the settings in other packages are similar and so by referring to the instructions below, it should give you a good idea how to set up for other software.

This document does not describe how to install the Digimode software onto your PC. For this, refer to the latest installation documents from the software download sites.

At the end of this document, we also have an audio setup and trouble-shooting section.

It is critical you have the transmit audio levels appropriately set to ensure you do not over-drive your PA and cause interference. Also, there are settings that can be applied to the sound card via Windows which can cause you difficulty in receive. If you follow the instructions below for your particular PC and Radio settings and it does not work out, then refer to the trouble-shooting guide.

In the setup instructions below, we are using the following example settings:

- The radio type is the **Icom IC-718 or Yaesu FT-950**
- The interface FTDI UART was allocated **COM3** when checked in Windows Device Manager
- The IC-718 had the CAT baud rate set to **19200** in the radio's menu settings
- The USB Audio Codec was given the name **USB Audio Device** in Windows Device Manager

Setting up WSJT-X

Ok, let's start with the current mode of choice which is FT8. WSJT-X is the most popular software for FT8 and not only utilizes the Digimode-4 audio codec to send/receive signals but also makes use of the built-in CAT control for band changing and passing your frequency/mode details into the built-in logging function. For the installation of WSJT-X, please refer to the instructions on their download site.

Keeping your PC clock in check

The first you need to know about WSJT-X is it operates on 15 second time-slots so your PC's clock needs to be accurate to ± 1 second. If not, you will be unable to transmit or decode signals. There are lots of methods and apps to do this automatically for you. Have a look at this excellent link.

<https://www.groovypost.com/howto/synchronize-clock-windows-10-with-internet-atomic-time/>

Dimension 4 is an excellent Freeware application to keep your PC time in sync.

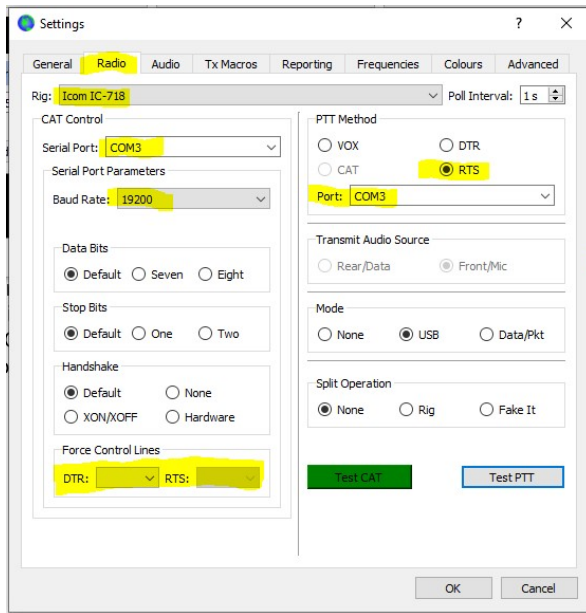
<http://www.thinkman.com/dimension4/>

WSJT-X Settings

Below I have highlighted in the "Settings – Radio" tab that you need to be aware of. Once you have the settings applied, click the "Test CAT" button. It will change bands (and back) and if all OK, will light the button green as below. If it does not do this, check your settings.

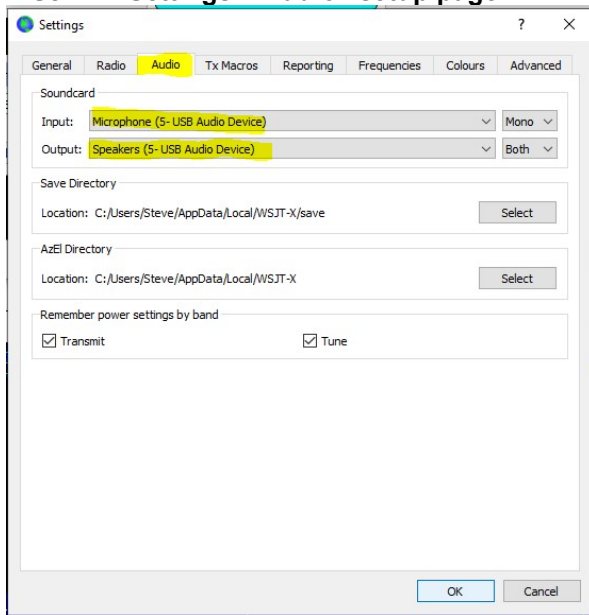
Depending on your radio, you can PTT key via the RTS signal or via the CAT signal. In the example below, the CAT option in the PTT Method is "greyed out". This is because the IC-718 does not support this feature. However, most radios do allow for both CAT and hardware (RTS) PTT.

WSJT-X "Settings – Radio" setup page



- Use the **Rig:** drop-down to select your transceiver.
- Use the **Serial Port:** drop-down list to select Icoms USB COM port presented from the radio.
- Use the **Baud Rate:** drop-down list to select your radios CAT rate
- In PTT method, I recommend using Digimode-4 **RTS** for PTT. So choose the Digimode-4's FTDI COM port here and set to RTS.
- Do not select any options in the **Force Control Lines** drop-downs.
- Click on **Test CAT** to see if you have contact with the radio.
- Click on **Test PTT** to see if the settings allow the radio to key up.

WSJT-X “Settings – Audio” setup page



- Use the **Input:** drop-down to select the sound card USB Audio device. It may inherit a number at the start if you have had multiple similar sound cards installed in your PC. You can leave the end option set to “Mono”
- Use the **Output:** drop-down to select the sound card USB Audio device as above. The Digimode-4 uses the Right channel audio to drive the radio. You can set the end option at “Both” or “Right”.

With the settings above, you should have the CAT control, Tx/Rx audio and PTT functioning in WSJT-X. You need to refer to the WSJT-X instruction documentation for how to get the most out of the software.

If you run into difficulties with the CAT control, PTT setup or audio settings/performance, refer to the trouble shooting guide at the end of this document.

Setting up FLDigi

FLDigi is another popular application for a multitude of AFSK modes but PSK31 is probably the most popular.

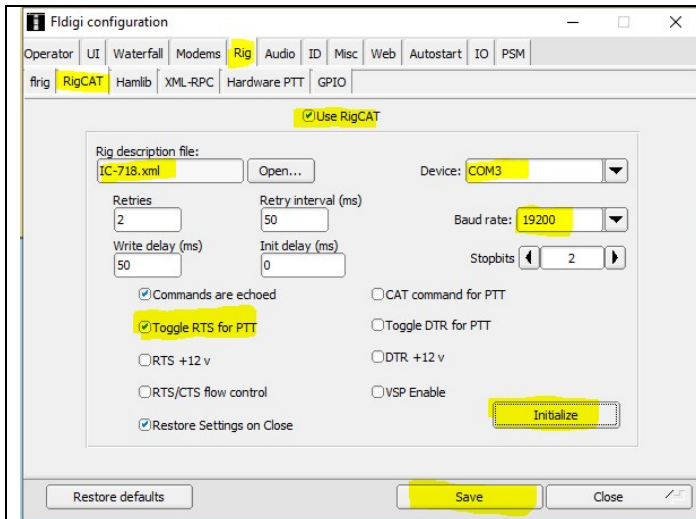
The application does hook into other ham radio control Libraries such as Hamlib. Your choice of CAT setup in FLDigi will depend on your radio type and if it can PTT key via the CAT commands or if it needs to be keyed in hardware to activate the Tx audio pin on the data input port. So you have the choice of RigCAT or Hamlib.

If you use RigCAT, you will need to download the appropriate Rig definition .xml file for your radio from here <https://sourceforge.net/projects/fldigi/files/xmls/> and save it in an appropriate folder such as the FLDigi application directory.

As many radios will only activate the data port Tx audio pin when the hardware PTT line is pulled low, then we recommend using RigCAT as you will run into fewer difficulties. But we will cover the setup if both RigCAT and Hamlib below.

FLDigi “Rig – RigCAT” setup page

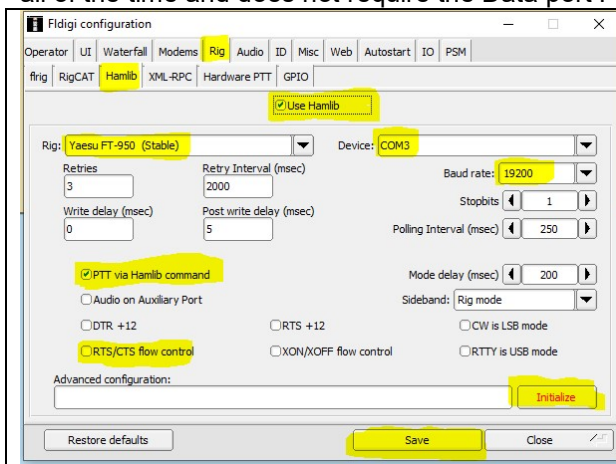
Use RigCAT if your radio does not support CAT command for PTT or your radio requires hardware PTT to enable the data port Tx audio input line.



- Check the “Use RigCAT” option
- In the Rig description file: box, point to where you stored your radios .xml file
- Use the **Device:** drop-down list to select the Icoms USB CAT COM port.
- Use the **Baud Rate:** drop-down list to select your radios CAT rate
- Check the “Toggle RTS for PTT” option
- Click on “Initialize” and then “Save”

FLDigi “Rig – Hamlib setup page

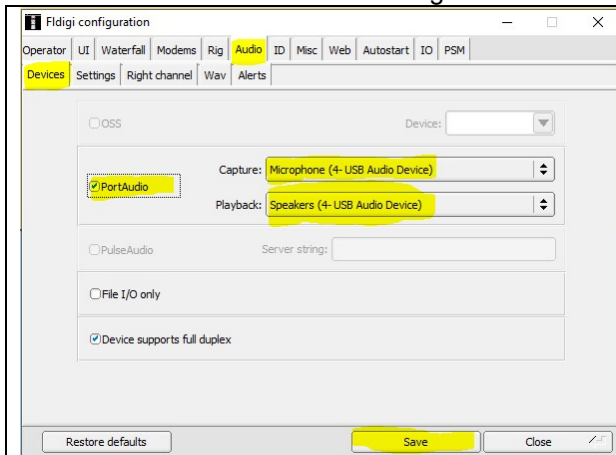
Use Hamlib if your radio support CAT commands for PTT and the Data port Tx audio line is active all of the time and does not require the Data port PTT line to be keyed.



- Check the “Use Hamlib” option
- Use the **Rig** drop-down list to select your radio
- Use the **Device:** drop-down list to select the FTDI UART COM port
- Use the **Baud Rate:** drop-down list to select your radios CAT rate
- Check the “PTT via Hamlib” option
- Uncheck “RTS/CTS flow control” option.
- Click on “Initialize” and then “Save”

FLDigi “Audio – Devices” setup page

We use this screen to select the Digimode-4 as an input/output audio device.



- Use the **Capture:** drop-down list to select the Microphone function of the USB Audio Device
- Use the **Playback:** drop-down list to select the Speakers function of the USB Audio Device
- Click on “Save”

With the settings above, you should have the CAT control, Tx/Rx audio and PTT functioning in FLDigi. You need to refer to the FLDigi instruction documentation for how to get the most out of the software.

If you run into difficulties with the CAT control, PTT setup or audio settings/performance, refer to the trouble shooting guide at the end of this document.

Shack setup, Audio Setup and Trouble Shooting

This trouble shooting guide is intended to be generic for any of the interfaces that we sell. Please refer to the relevant section below for the specific problem you have with the cable or interface you purchased from us.

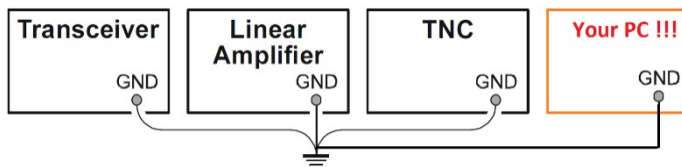
Equipment Grounding



Before I get too far into the trouble-shooting section, I will take a brief look at shack grounding. Poor grounding, is the cause of many issues when connecting your PC to your Radio.

Ideally, you should have a ground rod with a short run of heavy duty cable to your main shack ground bar with all equipment grounded to it.

When you add equipment into the shack “system” such as a PC, ideally this also needs to be connected to your main shack ground point. You will often see a drawing such as the one below in the first few pages of your transceiver handbook. However, you need to consider your PC as part of the system so I have added this at the end.



Our interfaces connect between your PC and your transceiver and so if the PC is not properly grounded, you can potentially run into all sorts of issues with RF pickup, ground loops and power supply leak-through from the cables associated with the PC etc. What can happen is the interface can become the link between your main shack ground point and your PC and a route for any potential leakage currents from the PC's power supply.

Although the audio and Opto-PTT circuits are galvanically isolated in our USB Digimode products, the CAT circuitry is not and so you can get pickup and noise issues via the USB/CAT circuit unless you adhere to good grounding techniques.

Grounding your PC is not always straightforward. Most desktop PCs use a Class 1 internal PSU. The PC chassis will be at mains supply ground by nature of the class 1 PSU being bolted to the PC case. You can normally find a screw or stud to run a wire to the main shack ground point.

However, laptop PCs can be more of a challenge. Often they have double-insulated Class 2 PSUs with no earth connection from the mains supply side. On double-insulated PSUs, a Y-Rated capacitor is normally wired from the mains neutral to the negative output rail for EMC suppression purposes.

This does have the effect of creating a small amount of leakage from the AC side. This can cause the DC rail to sit mid-point between the AC rails if you were to measure reference to mains earth. This is at very low current but this AC component can be induced into your system.

For example on our test Dell laptop, the power pack has 45v AC on the DC output jack with respect to the shack ground. So this can cause undesirable effects unless you have proper grounding of your shack equipment.

Finding a place to ground a modern laptop you may think is not easy. If you are lucky, you might get on a serial port or VGA securing stud.



However, one option for grounding a laptop or PC is to use a USB Grounding lead. This will connect the screen/0v line of a USB Plug to a crocodile clip which you can attach to your station ground bar. Pop one of these into a spare USB port and then to your station earth and they can work wonders.

These are available from eBay and Amazon but most folk have a spare USB cable to cut up and so they are really easy to make in your shack. If you make your own, check you are connecting to the 0v line and cable screen. Don't try to ground the data lines or +5v !!

So my advice is that if you can ground your PC chassis, to your main shack ground point then it is a good idea to do so. If you have a less than optimal shack ground system or cannot ground your PC, then lady luck and a bag full of clamp-on ferrites may have to be your friend.

Flex Radio have produced a superb document on shack grounding and I encourage you to have a read.

<https://helpdesk.flexradio.com/hc/en-us/articles/204779159-Grounding-Systems-in-the-Ham-Shack-Paradigms-Facts-and-Fallacies>

CAT and PTT Control Problems



One of the first features you set up is CAT control PTT control so that your Digimode software can set and get the frequency and mode of your radio and make it transmit. First you need to ensure that you have the right driver installed.

We use the highly reliable FTDI chipset in our interfaces that offer CAT control and you will need to ensure your PC has the latest FTDI Drivers.

The Microsoft Windows driver pack is here:

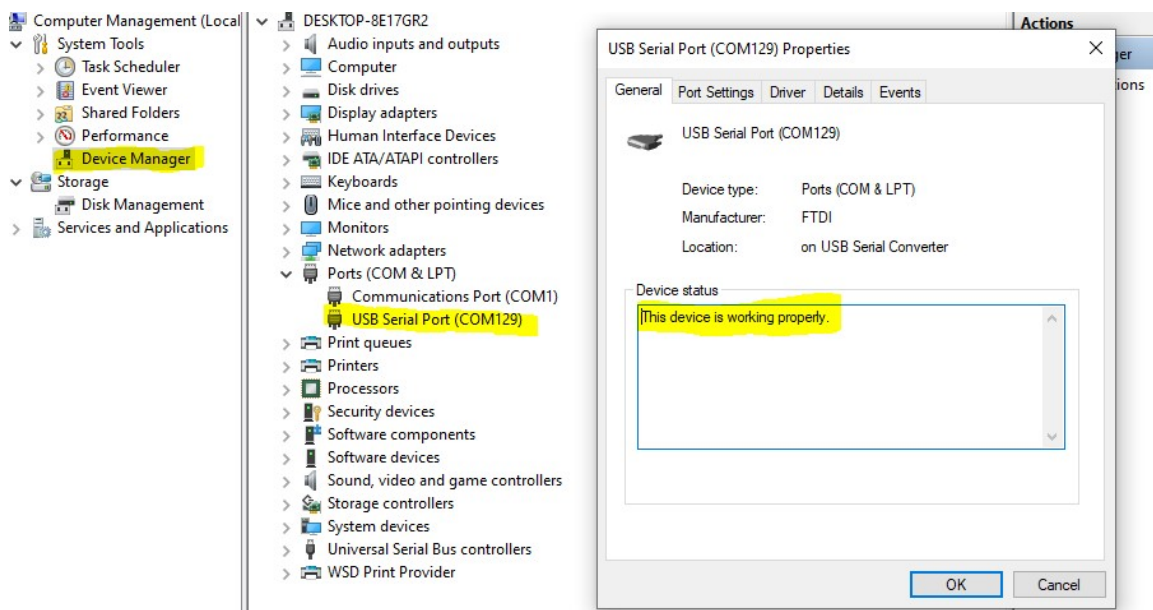
https://www.ftdichip.com/Drivers/CDM/CDM21236_Setup.zip

For MAC OS and Linux, refer to the latest Driver updates from the FTDI Website here:

[VCP Drivers - FTDI \(ftdichip.com\)](http://www.ftdichip.com/VCP_Drivers)

Once you have the drivers installed, plug in your interface in and it should be recognized by your Operating system. Below is Windows Device Manager showing the interface connected. Note that this one has inherited COM129. It is unlikely your interface will get such a high number. Our test PC sees lots of interfaces connected!

Note the number down your interface is given as you will need this to set up your CAT or Digimode software.



We see a common set of CAT and PTT set-up issues which I will try to cover here.

- **Baud Rate mismatch**

Make sure the CAT Baud Rate in your Digimode software matches what is set in your radio. Some older radios are fixed. Early Kenwood and Yaesu Radios had a rate of 4800 baud. Most radios these days can be set to 19200 baud or higher. If the radio has no menu option to change the CAT baud rate, assume 4800 baud. If there is a menu option for the CAT baud rate, see what the radio is set to in the menu and make your software the same.

On a Yaesu FT-857/FT-897, if you are using an LDG tuner in CAT pass-through, then you must set the CAT baud rate in the Radio and your Software to 4800 baud. The LDG tuner ONLY offers 4800 baud.

- **COM Port number mismatch**

Make sure the COM port the interface was given in Device manager is the same one you have set in your Digimode software.

- **ICOM Default CI-V address**

For Icom CAT communications, the Digimode software needs to send the CAT data to the correct radio address. It will expect the radio to be on its default CAT (CI-V) address. Make sure in the radio menus that the default CI-V Address is set. It may have been changed. The manual will tell you what the default CI-V address should be.

- **Use the correct CAT socket on the radio**

It's an obvious thing to say but over the years we have had many customers who had plugged the CAT connector into the wrong port. On some Kenwoods there is a port called "Remote". This is NOT the CAT port. On some Kenwood Radios, the CAT port is in the left-hand side of the radio and not on the rear panel. If in doubt, check your manual and see where Kenwood tell you where their own IF-232 interface plugs into.

Similarly, on the Xiegu G90, the CAT port is on the left-hand side of the radio below the headphone jack and not on the rear panel as you might expect.

On Icom radios, the CAT (CI-V) jack is a standard 3.5mm socket and so can be confused with many other 3.5mm sockets on the rear of the radio. Make sure you plug into the correct one.

On Radios such as the Yaesu FT-100, the CAT control and ATU control share the same 8 pin mini-din socket Pig-Tail cable from the rear of the radio. You need to set the function of the 8 pin Mini-din on the cable to CAT. This is done in Menu 61 of the FT-100 by setting the Tuner/ATA S mode to "Off".

- **Make sure you have the correct radio type set in the Digimode Software drop-down menu**

For CAT setup, be quite specific about the model you have. E.g. The CAT setting for an IC-706 is different from the IC-706 Mk2G.

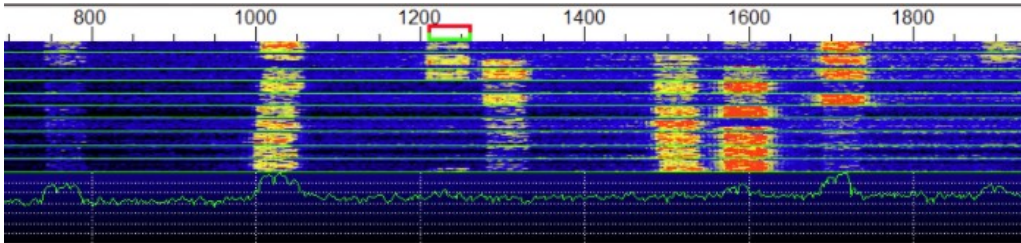
The Xiegu G90 and X5105 claim to emulate the Icom IC-7000 for CAT control. However, we have come across issues where they do not work with the IC-7000 emulation but work perfectly with the IC-7100 emulation. So try either.

We have noted that WSJT-X v2.2.2 gives a Hamlib error for the **Yaesu FT-817** and **FT-818**. Setting WSJT-X so that it thinks you have an FT-857 resolves the issue. This is a

bug in WSJT-X or the Hamlib definition file.

- [Radio is “stuck” in PTT permanently when the Digimode Software is run up.](#)
Our Digimode interfaces use the USB Comm Port RTS signal for hardware PTT keying. Some software (such as HRD) have check-boxes to enable the RTS and DTR signals 100% of the time. Make sure that these check boxes are turned off as the RTS must only be enabled by your PTT function.

Receive Audio Problems



Most manufacturers have chosen to standardize receive audio levels from the data sockets on their radios and this will generally be unaffected by the volume control on the radio.

Some Digimode applications use the Windows recording level sliders for receive level, some have their own controls built into the Digimode software GUI. Please refer to your chosen Digimode software manual to understand how to change the receive levels into the interface.

But I will give some receive audio tips which have caught many out.

- [“I don’t see any receive audio on the waterfall”](#)

On later Windows 10 updates, Microsoft have changed the privacy settings on sound card microphone inputs.

In the Windows search box, type in “Microphone Privacy” and run up the Microphone Privacy settings app. Make sure the “Allow apps to access your microphone” is turned on. A recent Windows update may have turned it off.

Allow apps to access your microphone

If you allow access, you can choose which apps can access your microphone by using the settings on this page. Denying access blocks apps from accessing your microphone.

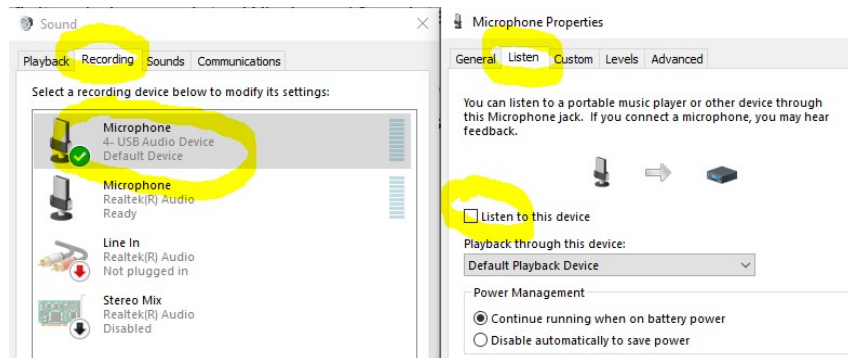


Other issues can be related to menu setting within the radio. For example, on the **Kenwood TS-2000** you need to set Menu 50E to select the external modem to be active on the main/sub bands.

- [“I am getting a howl-round problem”](#)

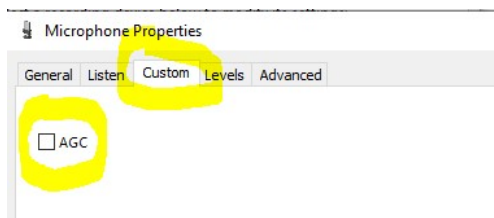
Quite often, you can have the “Listen to this device” option enabled where receive audio is being sent back to the radio on the Tx audio input. This can cause issues if you are using any built in Digivox on the radio.

Run up the Windows Sound Control Panel app. In the “Recording” tab, double click on the Microphone input related to the audio device. In the Listen tab, make sure that the “Listen to this device” option is **not** checked. In the example below, this was one of our external USB Sound card interfaces but you may be using your PC’s internal sound card on some of our products.

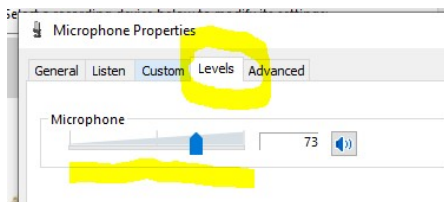


- “I still can’t optimise the receive levels. They are too high and I have no control”

Again, run up the Windows Sound Control Panel app. In the “Recording” tab, double click on the Microphone input related to the audio device you are using for input. This time click on the “Custom” tab. Make sure the AGC is turned off if it is available.



This will allow you to correctly use the Levels slider to optimise the Mic input level for your Digimode software.



- “WSJT-X will not decode FT8 but I see signals in the waterfall”

This mode uses 15 second time-slots for receive and transmit sequencing. Your PC clock needs to be accurate to within ± 1 second. You need to synchronize your PC clock to a time server as covered in the WSJT-X setup section above.

But we highly recommend Dimension 4 as an app to keep your PC clock in check.

<http://www.thinkman.com/dimension4/>

Transmit Problems



Before I get too deep into setting up transmit audio, there are some regular transmit problems that we see, the most common being no (or too low) output power. This could be due to the default sound card you have set in Windows or the radio not being in the correct mode to enable the audio input pin on the data port.

Windows Sound Card Selection

One of the main benefits of the in the Digimode-4 interfaces built-in USB sound card is it has its own output and input audio level controls. Any change in your master Windows volume setting will not change the levels you have carefully set up to the radio and hence your output power.

However, for this to work, don't make the Digimode-4 interface your default Windows Sound Device. If you do this, the master Windows volume setting will override the settings in your Digimode Software.

Instead, set your Windows Default Sound Card to be your PC's normal internal sound device. Then any changes you make to your system sounds, listening to music, YouTube etc will not impact the levels you set on the Digimode-4 interface in your Digimode application.

Transceiver PTT and Tx Audio settings

I cannot possibly cover all manufacturer radios but have a look down the list below and it may point you in the right direction. As always, if in doubt, check your transceiver manual in the Digital Mode or AFSK section.

Icom Tips

- Many earlier Icom radios do not allow for PTT over the CAT commands. Radios as recent as the **IC-706** family all have this limitation. For these early Icom radios, the PTT must be set in hardware on the 8 or 13 pin Din accessory port PTT pin via the COMM port RTS

signal.

- Some Icom radios (eg **IC-756**) have a USB-D mode for digital operation. Unless you are in USB-D you may not see any output power.
- On the Icom radios with the 13 pin Din accessory port, we wire the hardware PTT to pin 2. On radios such as the **IC-706 Mk2G**, there are separate PTT pins for HF (H-Send) and VHF/UHF (V-Send). You may find that the interface will not PTT key the radio on the VHF and UHF bands. You need to change SETMODE menu 30 (VSEND SEL) to "off". This links all the PTT functions to the H-Send pin.

Yaesu Tips

- Many **Yaesu Radios** need to be in DIG or DATA mode to enable the Data audio input otherwise you will get no output power. When in DIG/DATA mode, you may have to set a menu option in the radio to select which side-band injection to use such as PSK31-U or USER-U.
- Some radios will only accept the Data port audio input when the Data port hardware PTT line is operated. Examples are the **Kenwood TS-2000** or the **Yaesu FT-847**. So you need to PTT key via the interface hardware PTT signal to activate the transmit audio. (This may be via COM port RTS or the interface built-in VOX depending on the interface you purchased. If you PTT key via the CAT commands, you may not see any output power.
- On our cable only interfaces such as the FT-Cable-7, many radios have a DIGVOX mode. Turn this on in the radio menu and the radio will PTT key when it sees incoming audio on the Data port.
- The **Yaesu FT-1000MP** series need some subtle settings. The PKT mode defaults to LSB but we need to be in USB. Thanks to S53RM for these settings.
Program USER mode 8-6 for the following settings.
mode – PKT
disp offset – 0
RX PLL – 1450
RX CAR – 453.450
TX PLL – 1500
TX CAR – 453.400
RTTY offset – 0
EASY set – off

Enter the USER mode by holding the PKT button for 2 seconds and you are in PKT-USB. The radio may still say LSB on the display but you are working USB.

- In some Yaesu Radios such as the **FT-817**, you need to set the PKT rate to 1200 baud. This is the setting default but if you have changed menu setting to 9600 baud, you will not get any receive signal. Other Yaesu such as the **FT-897** have similar settings.
- Some radios such as the **Yaesu FT-920** have a physical switch to select between FSK and AFSK modes. You need to be in AFSK mode. Also on the FT-920, menu U46 defaults to LSB and needs changed to USB.

Kenwood Tips

- Some radios such as the **TS-2000** will only accept the Data port audio input when the Data port hardware PTT line is operated. So you need to PTT key via the Digimode-4 RTS signal to activate the transmit audio. If you PTT key via the CAT commands, you may not see any output power.
- On the **Kenwood TS-480** Series Radio's, take a look at Menu 60. This selects the audio input from the Data terminal (Digimode interface) rather than the Mic.

Xiegu Tips

- Do you have the Data port Tx audio input enabled? Some radios such as the **Xiegu G90** have a menu that sets if the Mic or the Data port is used for transmit audio. From the G90 System menu, select "Aux Line In" to enable the Data port for use rather than the Mic.

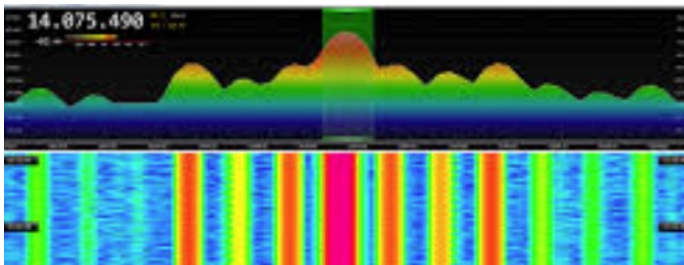
Transmit Audio Set-up



Depending on the interface version, they have been optimized up to around 500mV RMS of audio into your radio with the USB Audio Device level sliders at maximum. This should be more than adequate for most radios and you can reduce the level using the windows level sliders as appropriate.

Again, depending on your Digimode software, you may need to use the Windows level sliders or the Transmitter drive may be in the Digimode software GUI. Please read the manual for your preferred software.

Keeping Your Transmit Signal Clean



The key to clean signals in Digital modes is to have your output stage nice and linear. You do not want the radio running into ALC and causing intermodulation. It will not do your output stage any favours and will make you unpopular on the bands.

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 page and it explains very well the pitfalls of getting the modulation and power levels wrong.
(<http://www.mymorninglight.org/ham/psk.htm>).

The article details PSK31 but the same rules apply for FT8 and many other modes. 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.

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