

USB Rig Interface

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I needed a new Rig Interface for portable operations with the FT-817 and a laptop. I had been using the interface from my FT-847 with the addition of a USB-to-Serial adaptor for the PTT - modern laptops no longer have an RS-232 port. However, in the field, this meant lots of wires and boxes. Was there a better way?

I looked at incorporating the USB-to-Serial interface in a box with the traditional audio interface (i.e. transformers). However, this didn't reduce the tangle of wires. There are a number of USB audio cards around. Combining the two USB devices into one box with one USB cable to the laptop seemed to make a lot of sense.

I looked on the "net" for such a solution. However, the ones I found failed to hit the mark in one way or another:

- **Rigblaster** – only a USB PTT interface. Audio is via transformers
- **SignalLink USB** – PTT is via a VOX circuit, so can't just key up the rig
- **US Interface Navigator** – Does everything (and much more) but was \$US 440!

I then looked at building a USB Rig Interface. What I needed was:

- USB soundcard
- USB to Serial adaptor
- USB hub to combine them into one USB connection

Back on the "net", I found lots of USB soundcards at various price/performance points. What caught my eye was a very compact "dongle" version – little bigger than a USB memory key with audio in/out through 3.5mm jacks at the end.



The main question was how it would perform. While the digital modes I would be using (WSJT mostly) are not overly affected by audio performance, it would be good to have a flat response and good frequency accuracy. The "3D Sound" was a concern, if it meant that special audio processing was being done onboard.

It turns out that the "3D Sound" referred to add-on software – the dongle itself was just a straight audio interface. The audio performance proved to be quite acceptable – I don't have anything to measure this, but the response looked reasonably flat on Spectran and the output looked clean on a CRO.

Frequency accuracy has been an issue in the past with some soundcards, thought to be caused by the poor implementation of sample rate conversion routines in software/firmware. Errors of up to 10 Hz have been measured. I fed an accurate 1000 Hz signal (GPS-derived) into the dongle and Spectrum Lab gave a reading of 1000.0135 Hz – more than acceptable for my needs.

USB-to-Serial interfaces have caused some issues in the past. Some don't allow control of the hardware handshake lines (e.g. RTS/CTS), which are used in Rig Interfaces for PTT control. Those using the Prolific chipset normally work fine. There are many different ones, but this is the one I chose to use.



The reason for the selection was that I was intending to put everything in one box. This particular USB-to-Serial interface has all the electronics in the plastic case, which is simply clicked together. So, the board was very easy to remove, compared to many that have the electronics moulded into the plug. Below is the board.

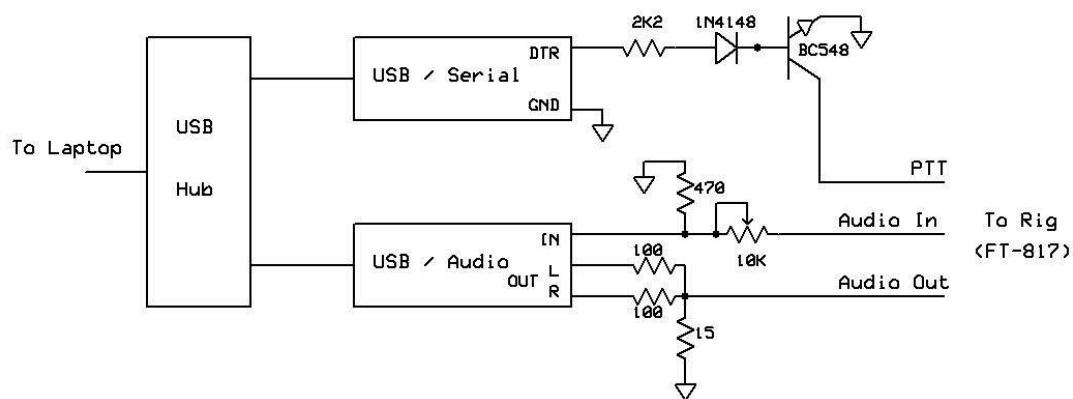


The final item required was a USB hub to combine the two USB devices through one cable to the laptop. Make sure the one you use is USB 2.0, otherwise it may be too slow for the job. This is the one I selected.



So now to put it all together. I decided not to add isolation between input and output initially (i.e. transformers on the audio and an opto-isolator on the PTT) because in my previous setups, I have never found that to be necessary. However, your results might vary.

The circuit diagram is quite simple.



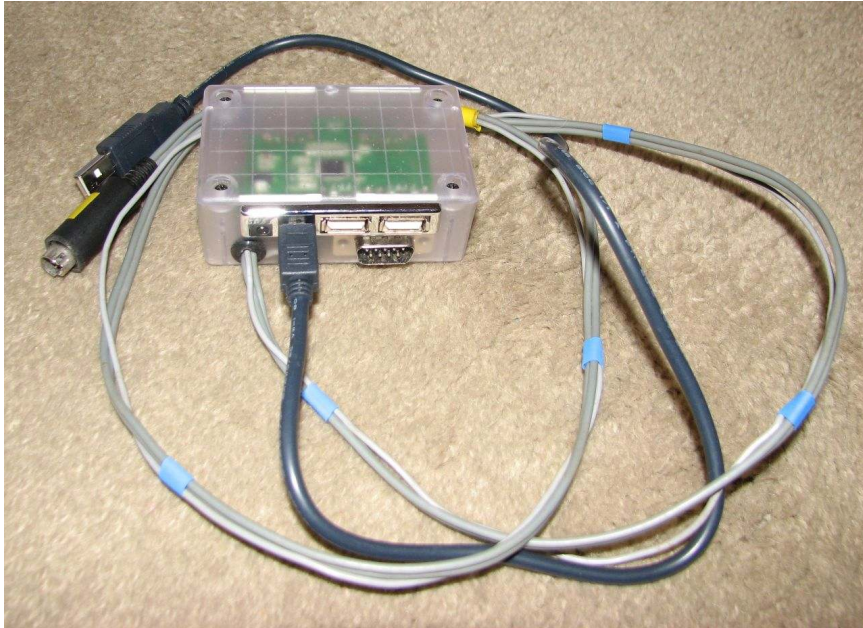
For packaging in a box, I decided to remove all of the USB devices from their existing enclosures, remove the USB connectors and hard-wire the boards together. Then the additional resistors etc. were simply soldered to the boards. I used a clear plastic jiffy box from Jaycar to hold all the bits as shown on the following pictures.



The audio and serial cards can be seen under the hub with short lengths of ribbon cable interconnecting the USB side. The hub is held up by a long 2mm bolt and is also wedged in place when the lid is screwed down.



The full RS-232 port is available for rig control, provided the software does not clash with the PTT control software. As a bonus, there are two additional USB ports that can be used for other purposes.



The interface in all its glory still has a few wires, but nowhere near the tangle of the previous set up.

On the laptop side of things, I have used this interface with both Windows XP and Vista. The USB soundcard is automatically recognised as a “SSS USB Headphone Set” in to both versions of Windows. The USB-to-Serial interface was recognised by Vista. However, I had to install the drivers from the supplied CD before it would work with XP. The COM port to which it is assigned can be found in the Device Manager.

One hint. If your laptop has multiple USB ports, try to always plug the interface into the same port. If you use a different port, Windows assumes it is a different device and allocates another COM port number to it.

If you shop around and visit the PC Swap Meets, you can pick up the USB devices quite cheaply. The total outlay for all the parts was around \$40.

I have now used the USB Rig Interface for a number of microwave contacts, and have been very happy with its performance. About the only minor issue is that when the unit is first plugged into the USB port, or when the laptop is restarted, the PTT is keyed up a number of times as Windows gets its act into gear. My solution is to not plug the interface into the FT-817 until everything is running on the laptop side.