# Build an OPC-478U Clone

I recently obtained an ICOM V8000 rig from a fellow ham and decided to change the channel programming that he had been using to match that of my other rigs. Of course, this meant that I needed to look into how to do this without punching a lot of buttons on the rig.  I pretty quickly figured out that I needed a new cable and some software.  The Candy Store had the software in stock (Dear ICOM: why can't I buy this software and download it on-line?) so that was easy.  But, they wanted $45 for the cable.  $45 for a cable?  Well, that dog won't hunt!  So, back to the web and my best friend, Google.  I quickly found a plethora of schematics for clone cables.  The schematics all indicated that this $45 cable was nothing more than a RS232 to TTL level converter, so I decided "I can build that".

I played with the idea of building a straight-forward RS232 converter but decided that this wouldn't be elegant since the laptop I use for Ham operations does not have a RS232 port and thus I would need a USB to RS232 converter on top of the level converter.  That led to a decision to use a common USB to TTL serial converter, also known as a "FTDI Friend" (see the parts list for sources).  Figure 1 is the resulting schematic.
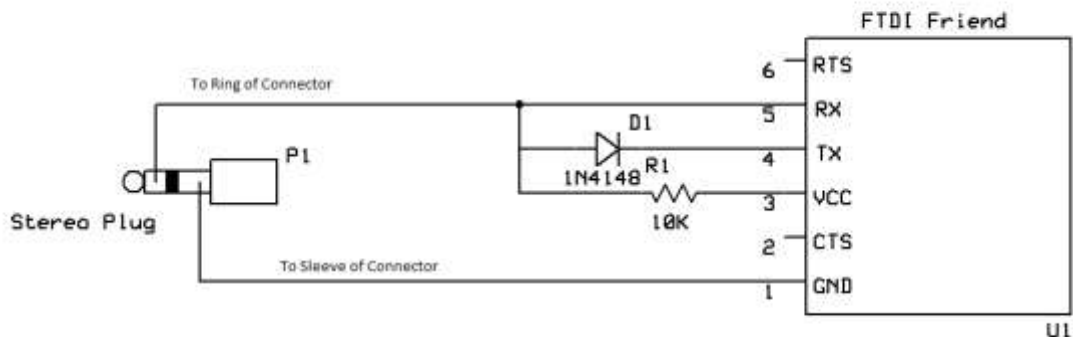


**Figure 1 OPC 478U Clone Schematic**

At first, I bread-boarded this to make sure that it worked but, due to the age of the cloning software that ICOM provides (Windows 95/98 based!), it did not recognize my USB serial port at first.  Older software such as this did not allow for more than a small number of Com ports, 4 in this case, so I had to manually reconfigure the USB serial port to one that it did recognize.  If you run into this kind of problem, here is how to change it in Windows.  First, go into Device Manager; select the serial port that you need to change. Click on Properties and then click on Advanced Properties.  There will be a drop-down box available

there to change the Com port to something in the range of 1 to 4. If they are all taken, select one that you know is not connected and ignore the resulting error message.

After getting the breadboard version working, I decided to make a more permanent version that I can keep in the toolbox for use when I change my mind about what frequencies to have stored. Figure 2 shows what that finished project looks like. The stereo cable connects to the rig and the micro-USB connector, as seen in Figure 4, provides the USB/serial connection to the laptop.



**Figure 2 The Finished Project**

## *Parts Used*

The FTDI Friend is available from:
- Frys OSEP FTDI, p/n 6997547, for ~$20
  https://www.frys.com/product/6997547
- Online from SparkFun p/n DEV-09 718 for ~$18
  https://www.sparkfun.com/products/9718
- Online from Adafruit p/n 284 for ~$15
  https://www.adafruit.com/product/284
- Microcenter FTDI Adapter for ~$8
  https://www.microcenter.com/product/486570/-ftdi-adapter-usb-controller

- eBay! Search for "ftdi usb to serial"

Lastly, one reader pointed out that the FTDI Friend has 2 voltage options, 3.3V and 5V.  I used 5V to interface to my ICom V8000, but if you aren't sure, start with 3.3V and if that doesn't work, change to 5V.  A great trouble-shooting guide has been posted by DF4OR at http://www.plicht.de/ekki/civ/civ-p21.html

The rig connector can be from a cut-up stereo cable such as I used, like a Radio Shack 42-223 (https://www.radioshack.com/products/3-ft-1-8-stereo-plug-cable), or you can use a 274-284 connector from Radio Shack and wire it up yourself.

The box used was a Radio Shack 270-283A, which includes a PCB that can be used to mount the circuit such as in Figures 3 and 4.  This specific project box is discontinued and may be unavailable, so choose something similar.

Use a 10K resistor or something close for the pull-up resistor R1.  The diode I used was a 1N4148, but just about any diode should work.
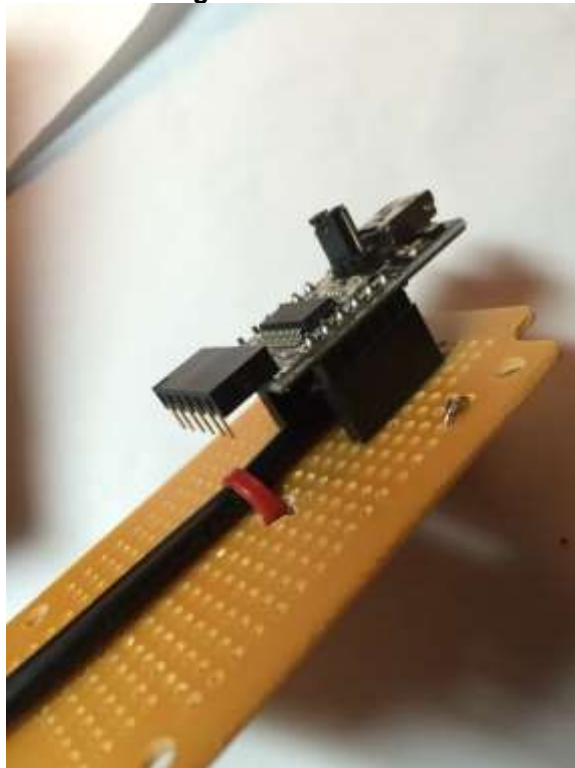
Enjoy!

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**Figure 3 Inside the Box**

**Figure 4 Front View**



**Figure 5 Component Side View**