



Everything You Need to Know About USB and Serial Interfaces

by N6TV

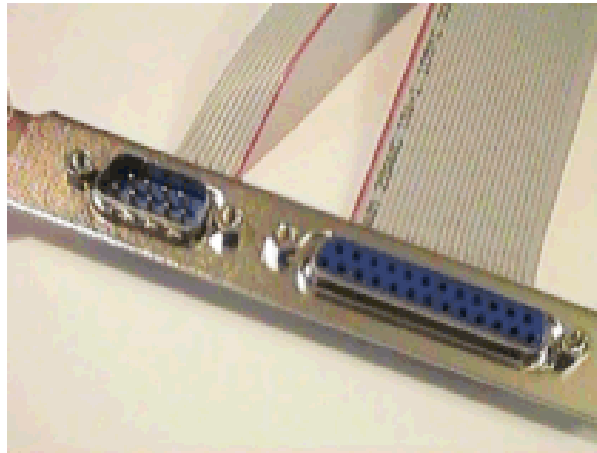
For FRC
June 8th, 2021

Presentation Overview

- Legacy PC Serial Ports
- USB Ports and Devices
- USB-to-Serial Adapters
- Using the Windows Device Manager
- Managing Serial Port Numbers
- Using Serial Ports for CW / FSK / PTT Keying
- Sharing Serial Ports
- USB Sound Cards
- Q & A

Legacy PC Serial Ports

- Originally a 25-pin male D-SUB connector (DB-25M), used with dial-up modems
- Smaller 9-pin male serial connector became standard (DE-9M) for serial, DB-25F for printers



Life was Simple

- One or two male DE-9 connectors on PC
- Accessed as COM1: or COM2:
- One DE-9 “CAT” or “RS232” connector on radio
 - Female: Elecraft IC-7700 & IC-7800



- Male: Yaesu Kenwood



Computers “Improved”

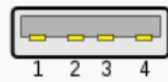
- “Real” serial and parallel ports disappear, replaced by USB ports
- Radios (until recently) still had 9-pin serial ports
- Peripherals are still using 9-pin serial ports
 - RemoteRig boxes, Rotator controllers, SteppIR antenna controllers, some band decoders, etc.
- Common Solution: USB-to-Serial adapters

USB 2.0 and 3.0 Ports

- Standard connector on most PCs and MACs

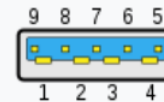
PC:

Type A



Type-A

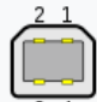
Type A



Type-A
SuperSpeed

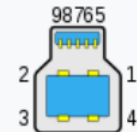
Radio:

Type B



Type-B

Type B



Type-B
SuperSpeed

USB-to-Serial Adapters

Reliability and Compatibility Varies Greatly

1. Edgeport – Excellent, stable, supports MMTTY directly
2. Eltima – Included with microHAM interfaces
3. FTDI – very good, stable, requires EXTFISK for MMTTY. Used internally by Elecraft K3 & K4.
4. Silicon Labs (built in to Icom, Kenwood, Yaesu)
5. Prolific – **AVOID!** Uninstall drivers, recycle.

Digi International Edgeport/4



- One USB 2.0 Type B connector
- Four independent DE-9M serial ports
- Windows automatically finds and installs drivers

Digi International Edgeport/8



- One USB 2.0 Type B connector
- Eight independent DE-9M serial ports
- Windows automatically finds and installs drivers

StarTech.com ICUSB2324I 4-Port FTDI



- One USB 2.0 Type B connector
- Four independent FTDI DE-9M serial ports
- Separate 5V Power Supply

StarTech.com ICUSB2328I 8-Port FTDI



- One USB 2.0 Type B connector
- Eight independent FTDI DE-9M serial ports
- Separate 5V Power Supply

microHAM uses Eltima drivers

microHAM MK2R+



- One USB Type B connector
- Custom Eltima serial port device drivers
- Custom cables for transceiver ports
- Virtual serial ports created by microHAM “Router”

Recommended FTDI USB-to-Serial Adapters

FTDI CHIP-1-X10 - \$17



GearMo 2-port - \$30



GearMo 4-port - \$40



Prolific USB-to-Serial Adapters

- Widely available, cheap (but many counterfeits)
- Prolific Device Driver does *not* play well with others
- Please DO NOT USE them, ever
- **Uninstall** any Prolific device drivers with Device Manager
- Devices often look like this:





Connecting USB-to-Serial Adapters

- Connect FTDI, Elecraft, or Edgeport device to PC
- Windows (usually) locates and installs appropriate device driver(s)
- COM port numbers assigned sequentially
- Use [Windows Device Manager](#) to view assigned COM Port number
- COM port number will change if you connect a device to a different USB Hub (e.g. from USB 2.0 port to USB 3.0 port)

Connecting USB Radios / Devices

- Important: Install the manufacturer's device driver first, *then* connect the device
 - Icom, Kenwood, Yaesu, microHAM
 - (Usually not required for Elecraft / FTDI)
- If you forget and connect radio first, use Device Manager to uninstall "Unknown Device", then start over
- COM port numbers assigned sequentially
- COM port numbers can be changed

Using the Windows Device Manager

- **Right click** on Windows **Start** Button 
- Click **Device Manager**
-or-
- Windows Key  + R (Run): **devmgmt.msc**
- Important Tip (before Windows 10):
Always set the System Environment Variable
devmgr_show_nonpresent_devices to **1**

Setting System Environment Variable

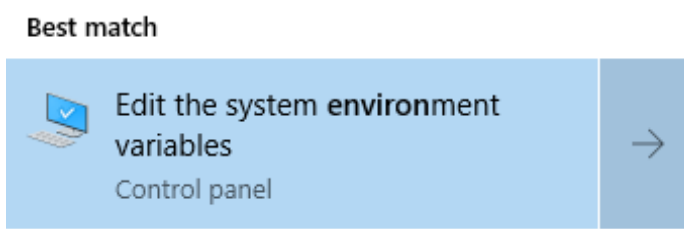
- Type “Environment” in Windows Search box or Windows Settings Search box



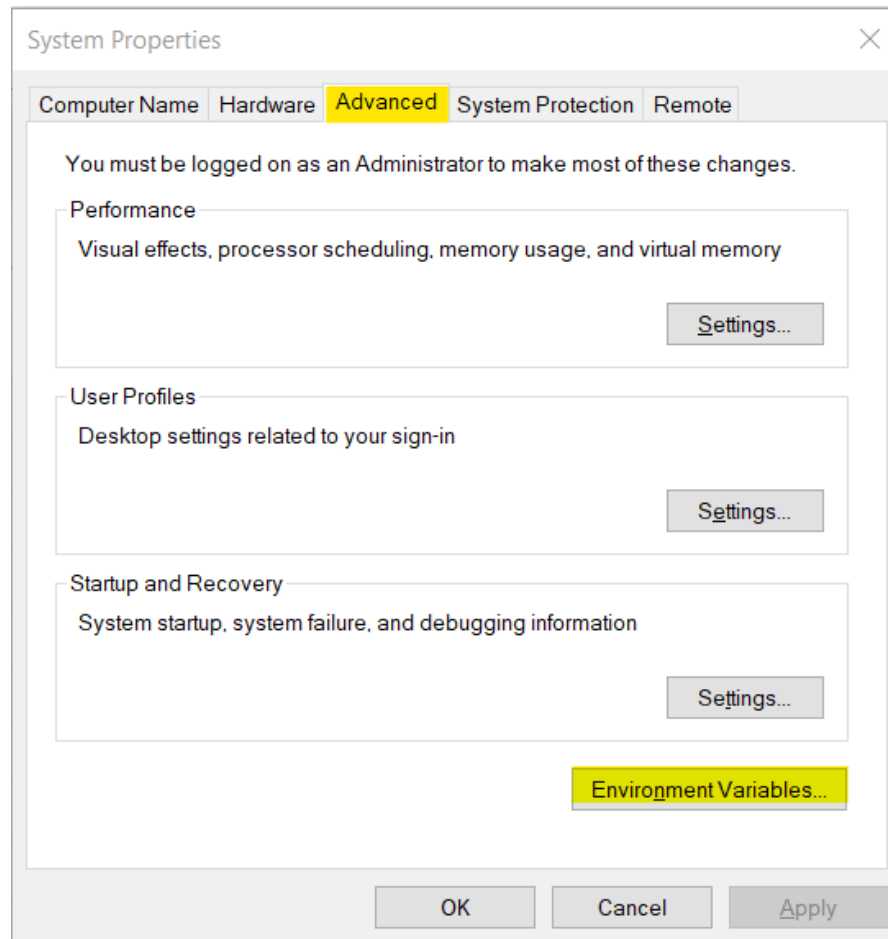
Windows Settings

Find a setting

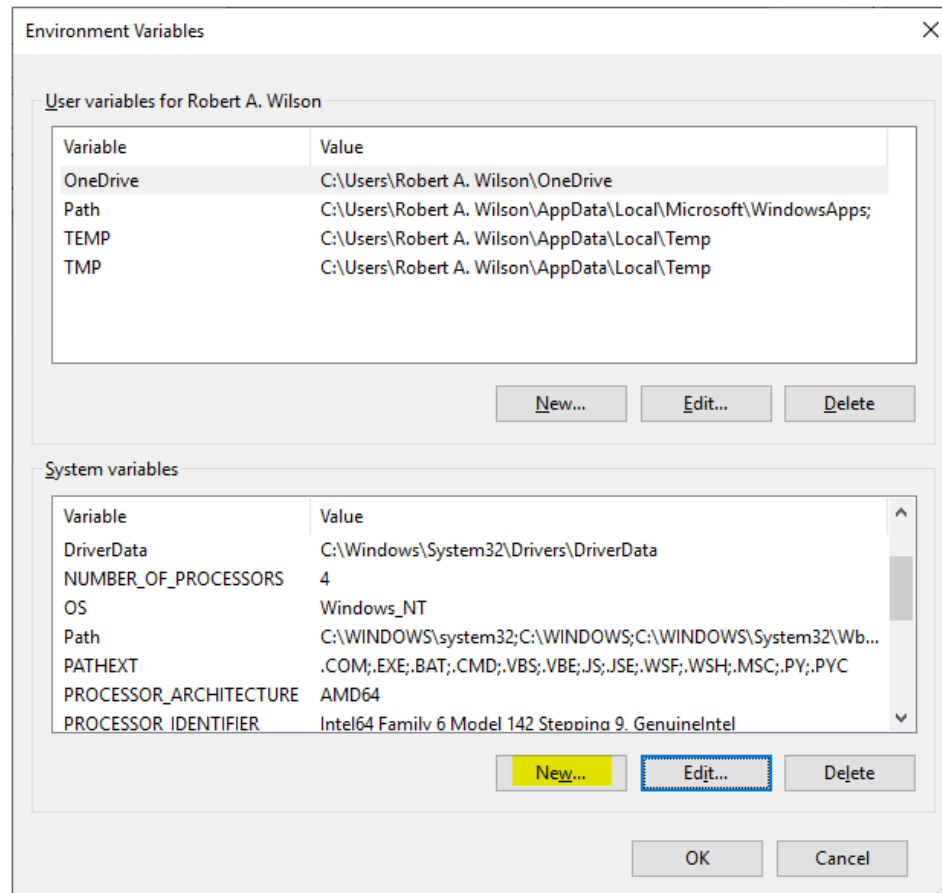
- Click “Edit the System Environment Variables”



Step 1 – Under Advanced tab click Environment Variables...



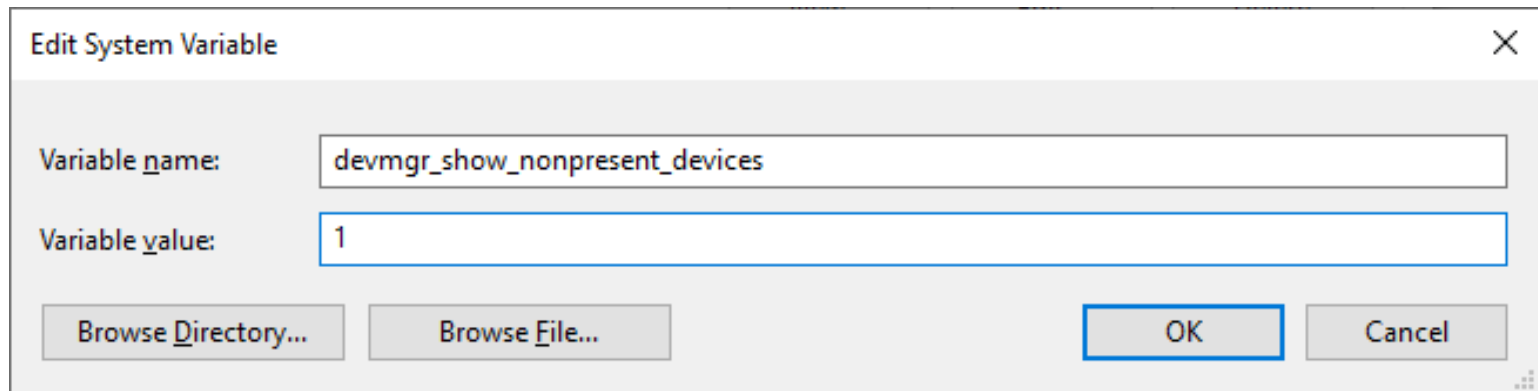
Step 2 – Under System variables, click New...



Step 3 – Add the new environment variable

Name: **devmgr_show_nonpresent_devices**

Value: **1**

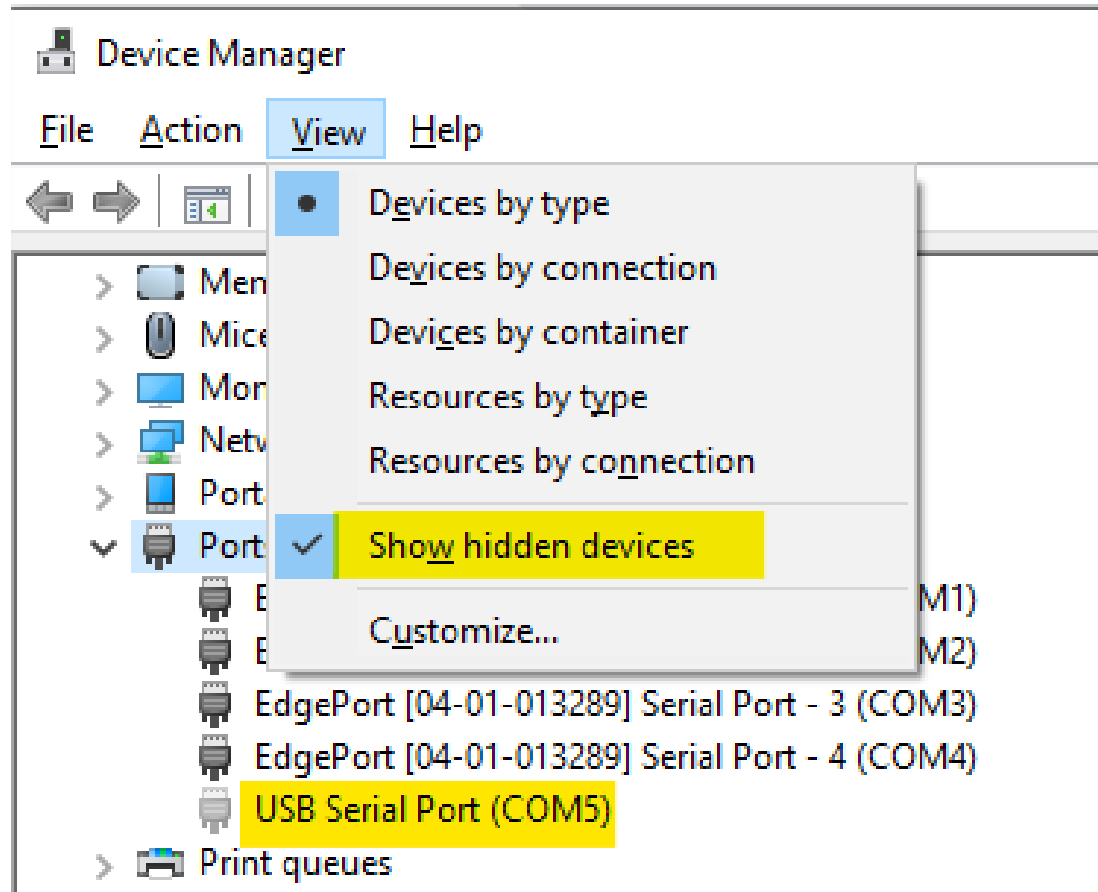


The screenshot shows a standard Windows dialog box titled "Edit System Variable". It has a close button (X) in the top right corner. The dialog contains two text input fields: "Variable name:" with the text "devmgr_show_nonpresent_devices" and "Variable value:" with the text "1". Below these fields are four buttons: "Browse Directory...", "Browse File...", "OK", and "Cancel". The "OK" button is highlighted with a blue border, indicating it is the recommended action.

Click **OK**, *then* start Windows Device Manager

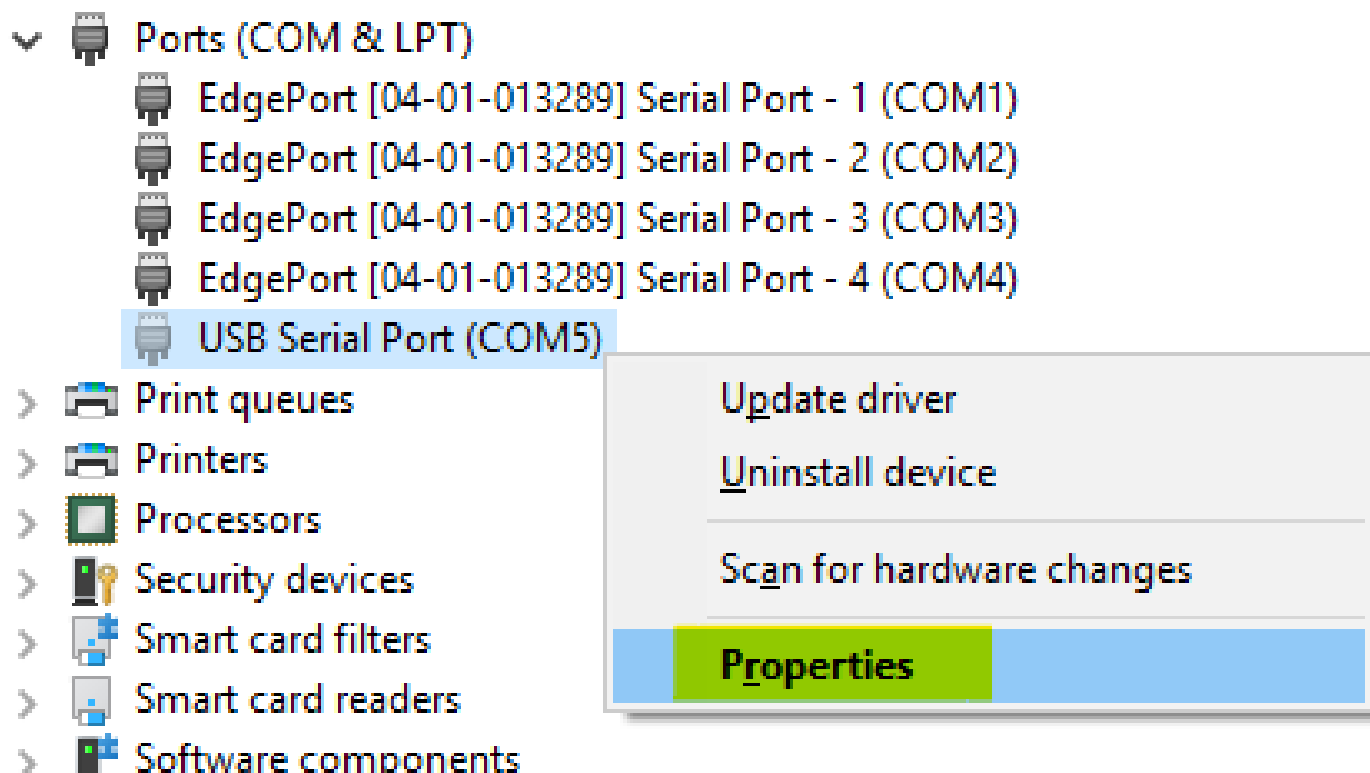
Windows Device Manager

Always select **View** → **Show hidden devices**



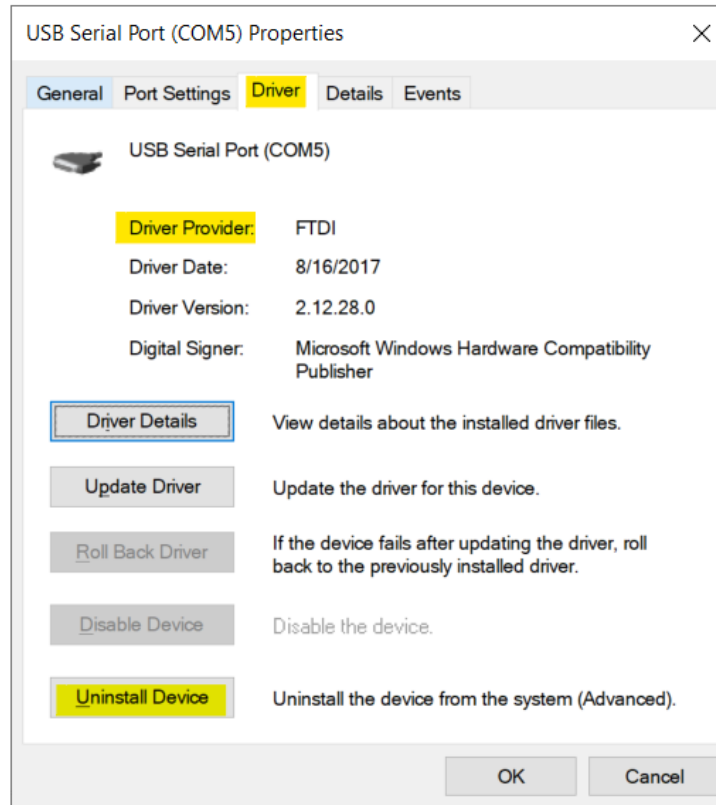
Expand Ports section

Right click gray (offline) devices, Properties



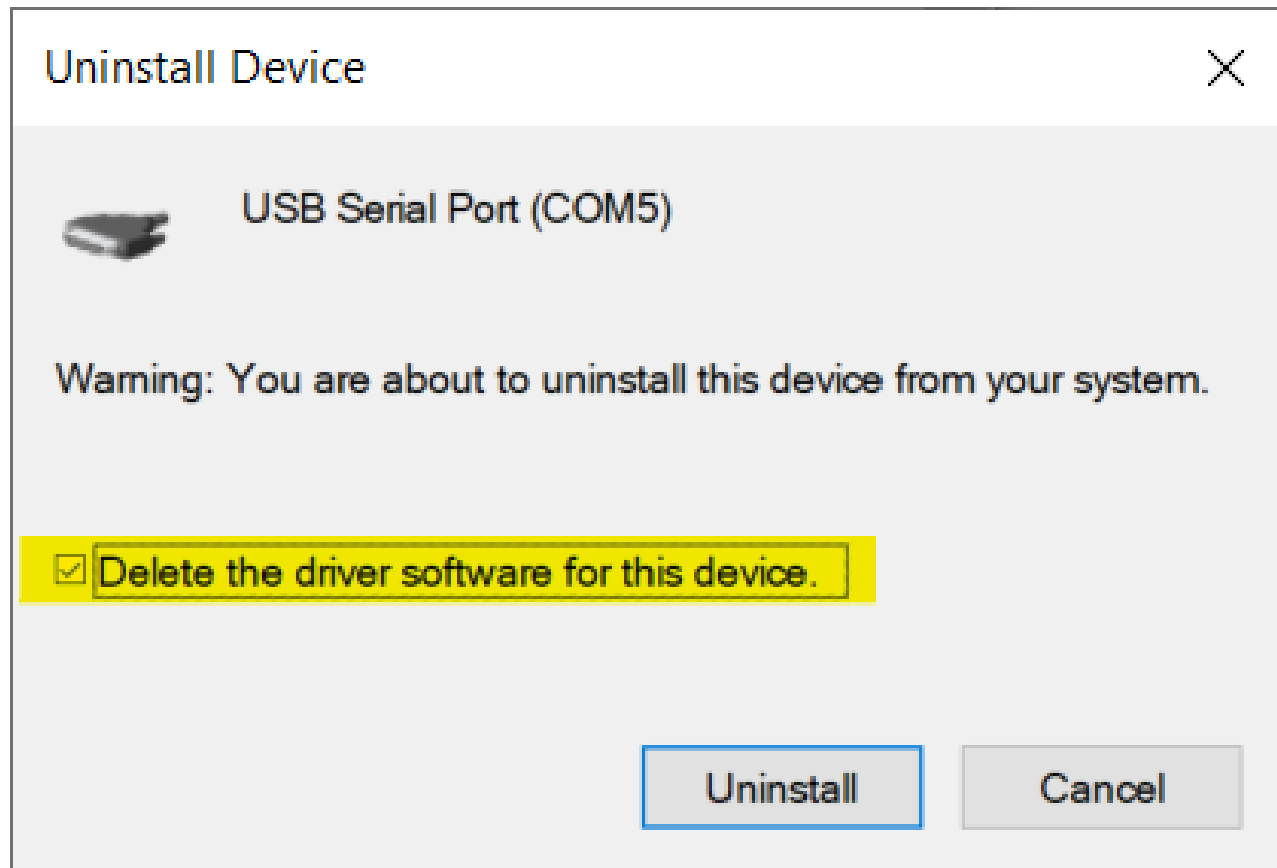
Click Driver Tab

Check that Driver Provider is *not* Prolific

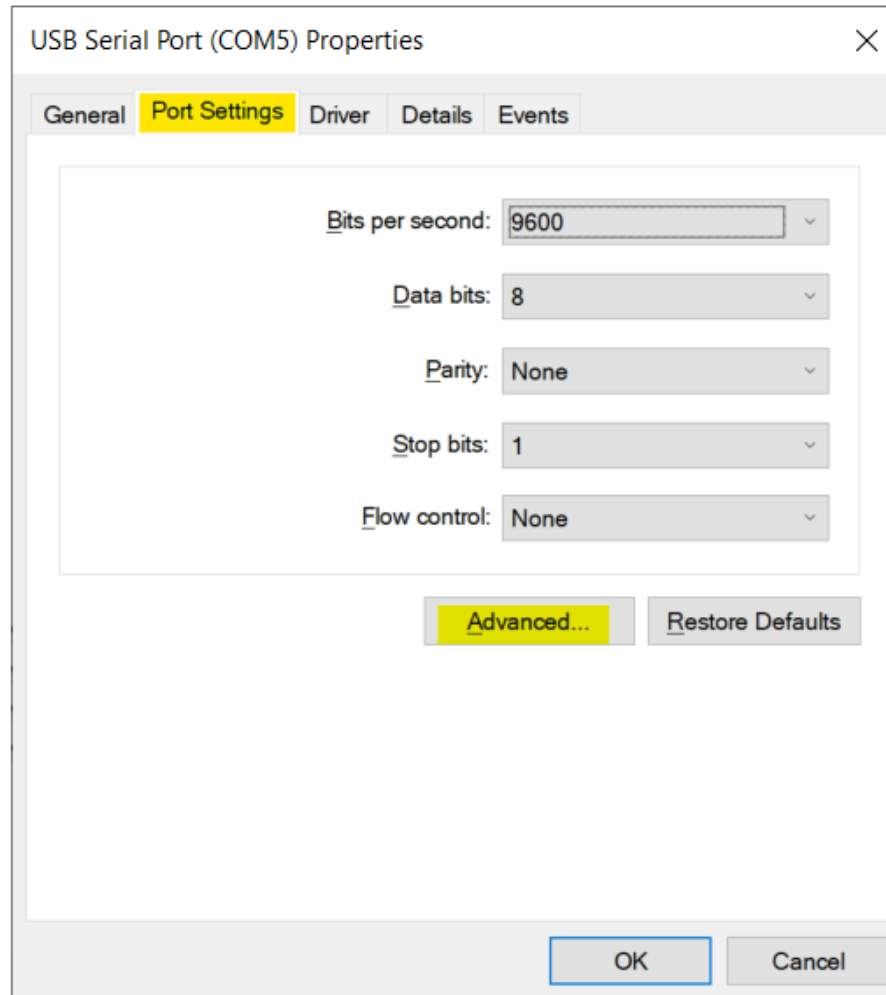


- If you see **Prolific**, click **Uninstall Device**

Uninstall the Prolific Device *and* Delete the Driver Software for this device



If Driver is FTDI, go to Port Settings tab
Click Advanced... button



FTDI Default Options – not good, keys radio

Advanced Settings for COM5

COM Port Number: COM5

OK

Cancel

Defaults

USB Transfer Sizes
Select lower settings to correct performance problems at low baud rates.
Select higher settings for faster performance.

Receive (Bytes): 4096

Transmit (Bytes): 4096

BM Options
Select lower settings to correct response problems.

Latency Timer (msec): 16

Timeouts

Minimum Read Timeout (msec): 0

Minimum Write Timeout (msec): 0

Miscellaneous Options

Serial Enumerator ☒

Serial Printer ☐

Cancel If Power Off ☐

Event On Surprise Removal ☐

Set RTS On Close ☐

Disable Modem Ctrl At Startup ☐

Enable Selective Suspend ☐

Selective Suspend Idle Timeout (secs): 5

Change the FTDI Options To This:

Miscellaneous Options

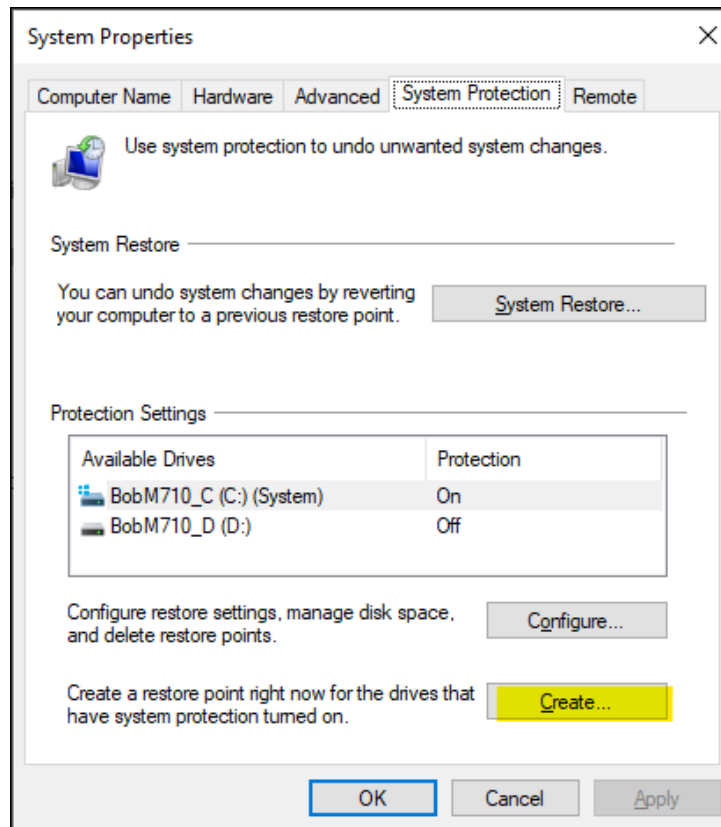
| | |
|--|-------------------------------------|
| Serial Enumerator | <input type="checkbox"/> |
| Serial Printer | <input type="checkbox"/> |
| Cancel If Power Off | <input type="checkbox"/> |
| Event On Surprise Removal | <input type="checkbox"/> |
| Set RTS On Close | <input type="checkbox"/> |
| Disable Modem Ctrl At Startup | <input checked="" type="checkbox"/> |
| Enable Selective Suspend | <input type="checkbox"/> |
| Selective Suspend Idle Timeout (secs): | <input type="text" value="5"/> |

Disabling Serial Enumeration (unwanted keying) on Legacy Serial Ports (COM1:, COM2:)

- Requires Registry Edit (run regedit)
- Create a System Restore Point to allow recovery, just in case
- Locate “UpperFilter” key under
HKEY_LOCAL_MACHINE\SYSTEM\
CurrentControlSet\Enum\ACPI\PNP0501\0
(or similar)
- Rename key to OldUpperFilter
- No more unwanted keying

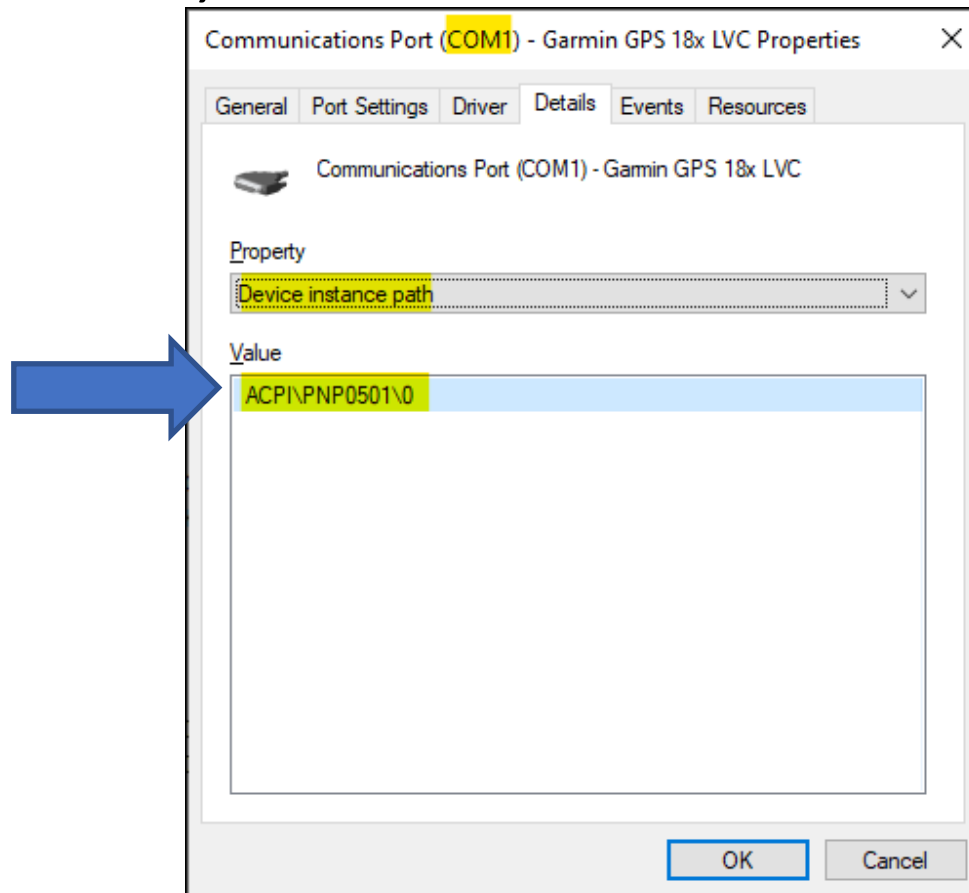
Creating a Restore Point

- System Properties, System Protection, Create (or use Windows Search box)



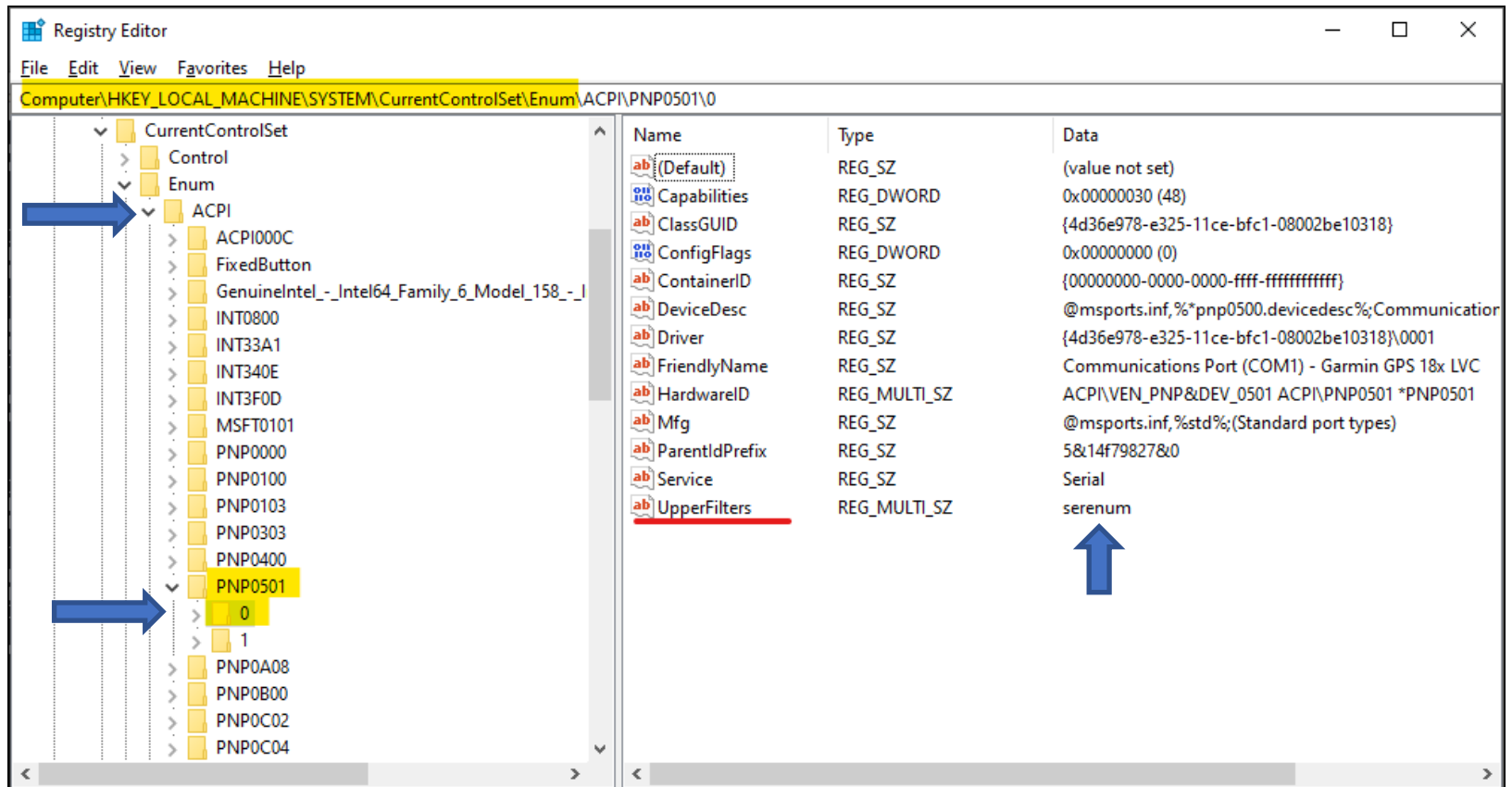
Locate Device Instance Path in Device Manager

- Device Manager (devmgmt.msc), COM1:, Properties, Details

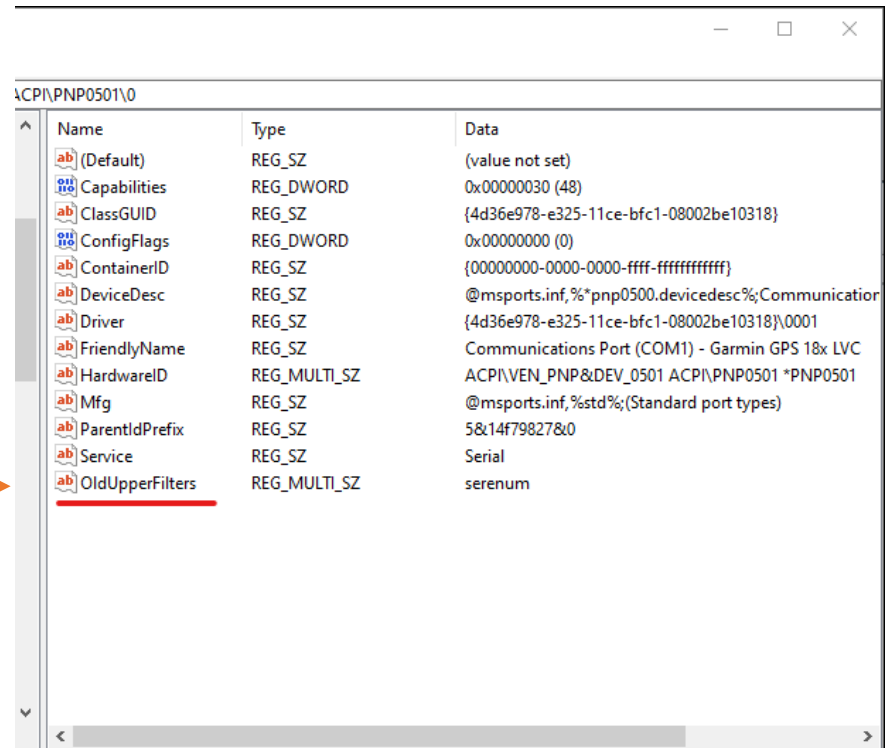
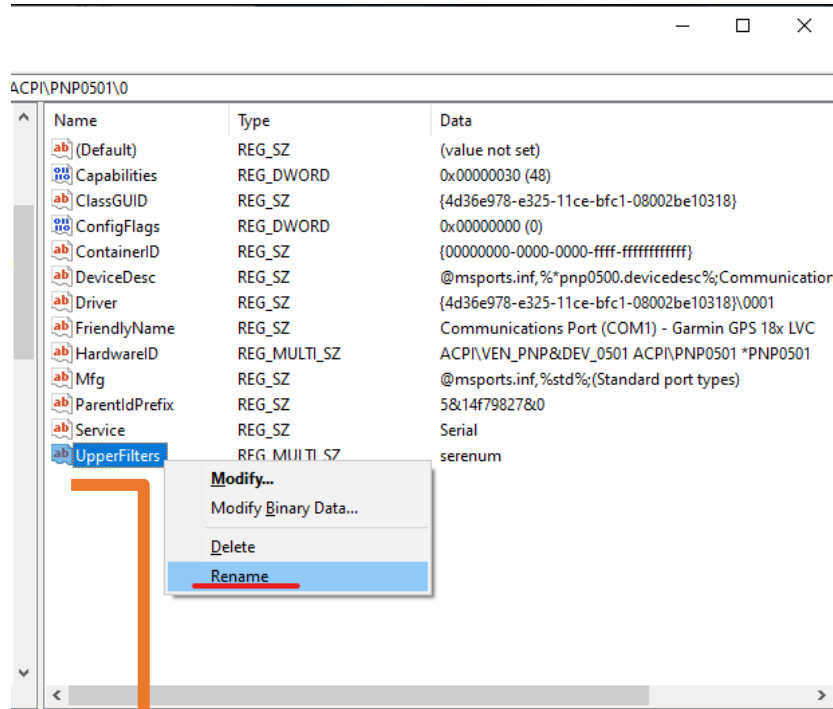


Locate Device Instance Path in Registry

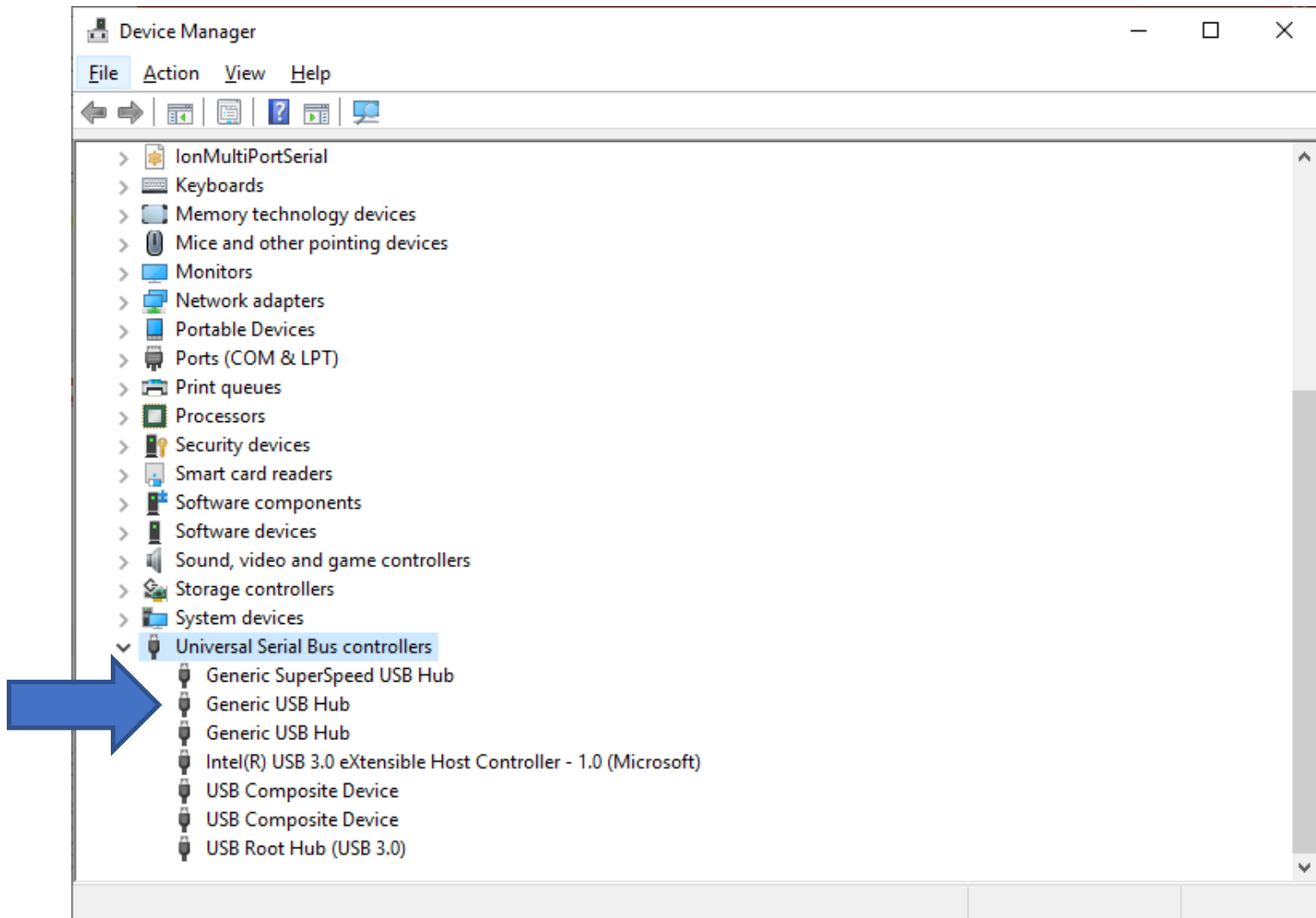
- Regedit, HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Enum\



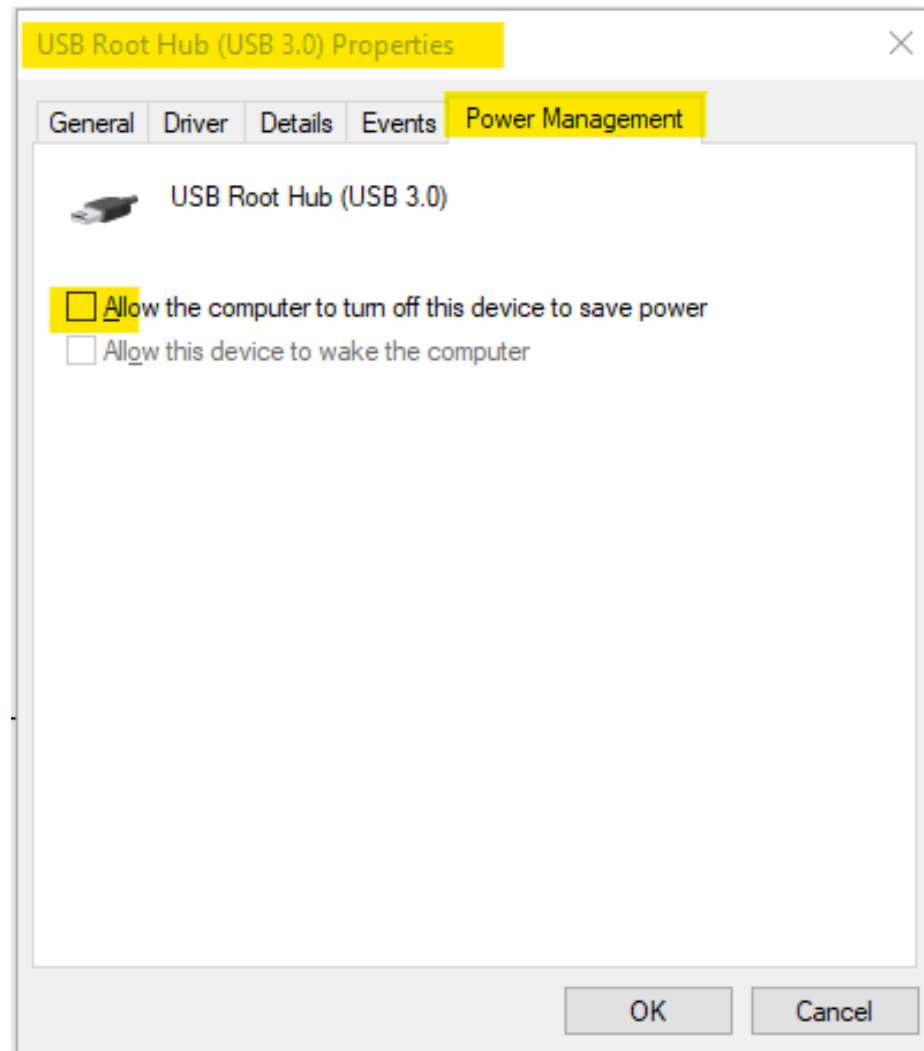
Right Click, Rename Key to OldUpperFilters



Under USB Serial Bus Controllers: Right-Click each “Hub” device, Select Properties



Look for Power Management Tab
Do *not* allow computer to turn off this device



Another USB Dev. Management Tool: NirSoft's USBDeview

- Stands for USB Device View
- https://www.nirsoft.net/utils/usb_devices_view.html
- Scroll way down to the “Feedback” section to find download link:


Feedback

If you have any problem, suggestion, comment, or you found a bug in my utility, you can send a message to nirsofer@yahoo.com

[Download USBDeview](#)

[Download USBDeview for x64 systems](#)

USBDeview Screen Shot



USBDeview

File Edit View Options Help

| Device Name | Description | Device Type | Connected | Saf... | Dis... | US... | D.. | Serial Number | Created Date | Last Plug/Unplug Date |
|--|---------------------------------|------------------------------|-----------|--------|--------|-------|-----|----------------|-----------------------|-----------------------|
| 0000.0014.0000.001.000.000.000.000.000.000 | USB Input Device | HID (Human Interface Device) | No | Yes | No | No | | | 5/7/2020 11:00:47 PM | 5/7/2020 11:00:47 PM |
| 0000.0014.0000.001.000.000.000.000.000.000 | USB Audio Device | Audio | No | Yes | No | No | | | 5/7/2020 11:00:47 PM | 5/7/2020 9:51:37 PM |
| Port_#0001.Hub_#0001 | USB Composite Device | Unknown | No | Yes | No | No | | | 5/7/2020 11:00:47 PM | 5/7/2020 9:51:37 PM |
| Port_#0001.Hub_#0001 | OLYMPUS E-M1 USB Device | Mass Storage | No | Yes | No | No | E: | BHP250024 | 5/6/2020 9:09:11 PM | 5/6/2020 9:09:11 PM |
| Port_#0001.Hub_#0001 | SanDisk U3 Cruzer Micro U... | Mass Storage | No | Yes | No | No | | 4317130EE50... | 5/2/2020 5:21:59 PM | 5/2/2020 5:21:59 PM |
| Port_#0001.Hub_#0001 | USB Serial Converter | Vendor Specific | No | Yes | No | No | | FT0F52FP | 5/1/2020 1:39:05 PM | 5/1/2020 1:39:05 PM |
| USBPS2 | USB Input Device | HID (Human Interface Device) | Yes | Yes | No | No | | | 4/24/2020 3:44:22 PM | 4/24/2020 3:44:22 PM |
| USBPS2 | USB Input Device | HID (Human Interface Device) | Yes | Yes | No | No | | | 4/24/2020 3:44:22 PM | 4/24/2020 3:44:22 PM |
| Port_#0001.Hub_#0001 | USB Serial Converter | Vendor Specific | No | Yes | No | No | | FT2014DO | 4/18/2020 12:03:29 PM | 4/18/2020 12:03:29 PM |
| Port_#0001.Hub_#0001 | USB Serial Converter | Vendor Specific | No | Yes | No | No | | FT2018BX | 4/18/2020 11:50:49 AM | 4/18/2020 11:50:49 AM |
| Port_#0013.Hub_#0001 | USB Attached SCSI (UAS) ... | Mass Storage | No | No | No | No | | MSFT30NA4B... | 4/15/2020 11:11:37 PM | 4/15/2020 11:11:37 PM |
| Port_#0001.Hub_#0001 | OLYMPUS E-M1 USB Device | Mass Storage | No | Yes | No | No | | BHP266099 | 5/3/2020 5:00:20 PM | 4/4/2020 4:52:19 PM |
| 0000.0014.0000.006.000.000.000.000.000.000 | USB Input Device | HID (Human Interface Device) | No | Yes | No | No | | | 3/2/2020 7:32:26 AM | 3/2/2020 7:32:26 AM |
| 0000.0014.0000.006.000.000.000.000.000.000 | USB Input Device | HID (Human Interface Device) | No | Yes | No | No | | | 3/2/2020 7:32:26 AM | 3/2/2020 7:32:26 AM |
| Port_#0001.Hub_#0001 | Sony Storage Media USB D... | Mass Storage | No | Yes | No | No | | 0905092114695 | 9/8/2019 8:24:07 AM | 9/8/2019 8:24:07 AM |
| 0000.0014.0000.006.000.000.000.000.000.000 | Remote NDIS based Interne... | Remote NDIS | No | Yes | No | No | | | 3/2/2020 7:32:26 AM | 9/5/2019 11:45:14 AM |
| Port_#0006.Hub_#0001 | USB Composite Device | Unknown | No | Yes | No | No | | UML2956995... | 3/2/2020 7:32:26 AM | 9/5/2019 11:45:14 AM |
| Port_#0003.Hub_#0003 | USB Printing Support | Printer | No | Yes | No | No | | NKO2104051... | 5/3/2020 10:59:09 PM | 7/16/2019 6:16:58 PM |
| Edgeport/4 | Edgeport/4 | Vendor Specific | Yes | Yes | No | No | | 04-01-013289 | 4/24/2020 3:44:23 PM | 7/15/2019 10:24:11 AM |
| 0000.0014.0000.008.000.000.000.000.000.000 | Integrated Camera | Video | Yes | Yes | No | No | | | 4/24/2020 3:44:22 PM | 7/15/2019 10:24:10 AM |
| Port_#0005.Hub_#0001 | Alcor Micro USB Smart Car... | Smart Card | Yes | Yes | No | No | | | 4/24/2020 3:44:21 PM | 7/15/2019 10:24:09 AM |
| Port_#0007.Hub_#0001 | Intel(R) Wireless Bluetooth(... | Bluetooth Device | Yes | Yes | No | No | | | 4/30/2020 5:41:44 AM | 7/15/2019 10:24:08 AM |
| Port_#0009.Hub_#0001 | Synaptics WBDI | Vendor Specific | Yes | No | No | No | | 35d084ed148a | 7/15/2019 10:24:08 AM | 7/15/2019 10:24:07 AM |
| Port_#0004.Hub_#0001 | Generic USB Hub | Unknown | Yes | Yes | No | No | | | 4/24/2020 3:44:21 PM | 7/15/2019 10:23:22 AM |
| Port_#0004.Hub_#0003 | Generic USB Hub | Unknown | Yes | Yes | No | No | | | 4/24/2020 3:44:22 PM | 7/15/2019 10:23:22 AM |
| Port_#0008.Hub_#0001 | USB Composite Device | Unknown | Yes | Yes | No | No | | | 4/24/2020 3:44:21 PM | 7/15/2019 10:23:22 AM |
| Port_#0016.Hub_#0001 | Generic SuperSpeed USB H... | Unknown | Yes | Yes | No | No | | | 4/24/2020 3:44:20 PM | 7/15/2019 10:23:22 AM |
| USB-PS/2 Optical Mouse | Logitech USB Wheel Mouse | HID (Human Interface Device) | Yes | Yes | No | No | | | 4/24/2020 3:44:22 PM | 7/15/2019 10:23:22 AM |
| USBPS2 | USB Composite Device | Unknown | Yes | Yes | No | No | | | 4/24/2020 3:44:22 PM | 7/15/2019 10:23:22 AM |

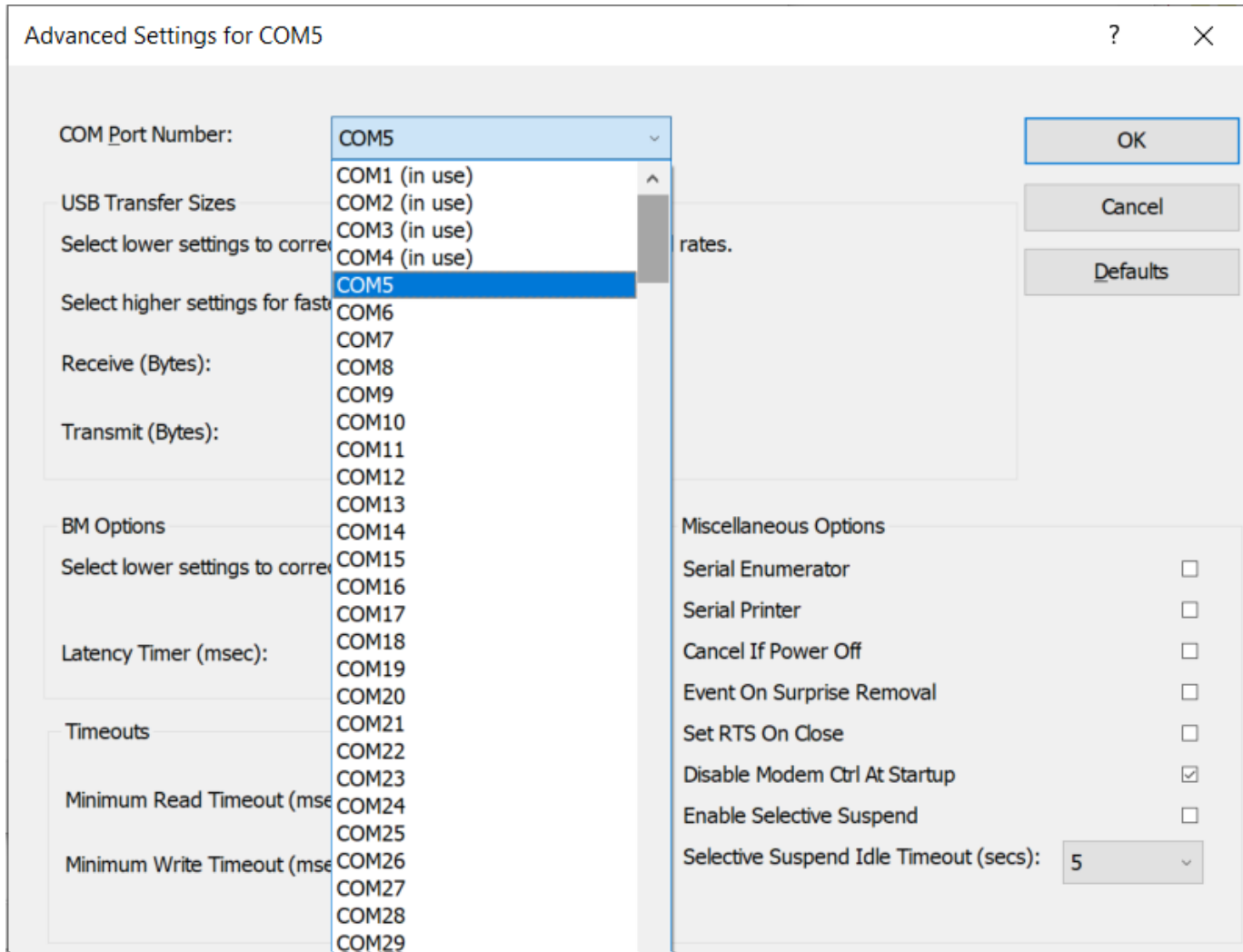
29 item(s), 1 Selected

NirSoft Freeware. <http://www.nirsoft.net> usb.ids is not loaded

Managing COM Port Numbers

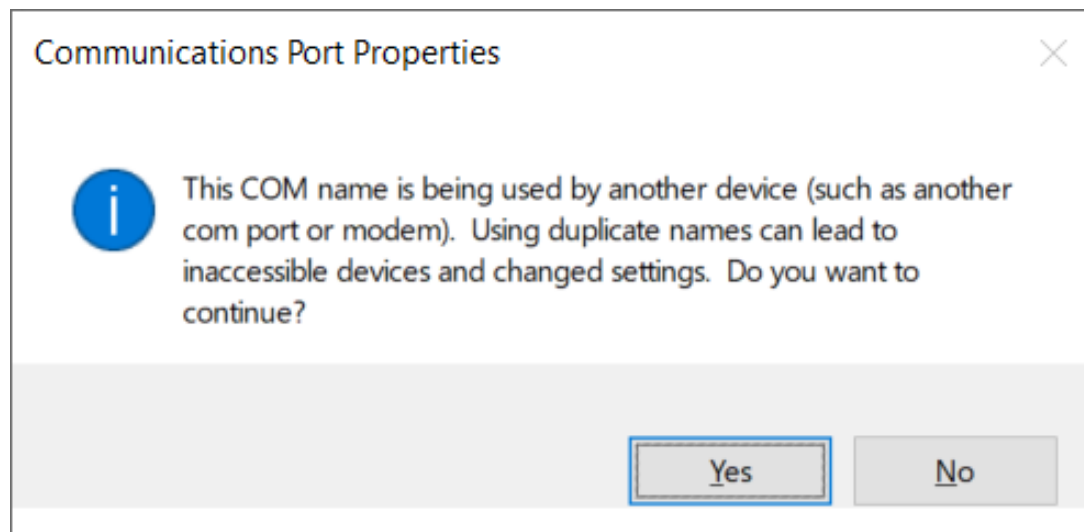
- Over time, ever increasing unique COM port numbers are assigned by Windows, difficult to keep track
- Some software doesn't support COM13: or higher
- Suggestion: renumber serial ports "left to right" to match your station layout, starting with transceivers
- First, use Windows Device Manager to uninstall all serial devices that you no longer use
- Right click on remaining COM ports, Properties, **Port Settings** tab. Click **Advanced...** button
- Renumber ports sequentially, COM3:, COM4:, COM5:, etc., "left to right"

Renumbering Serial Ports – Use Advanced Settings



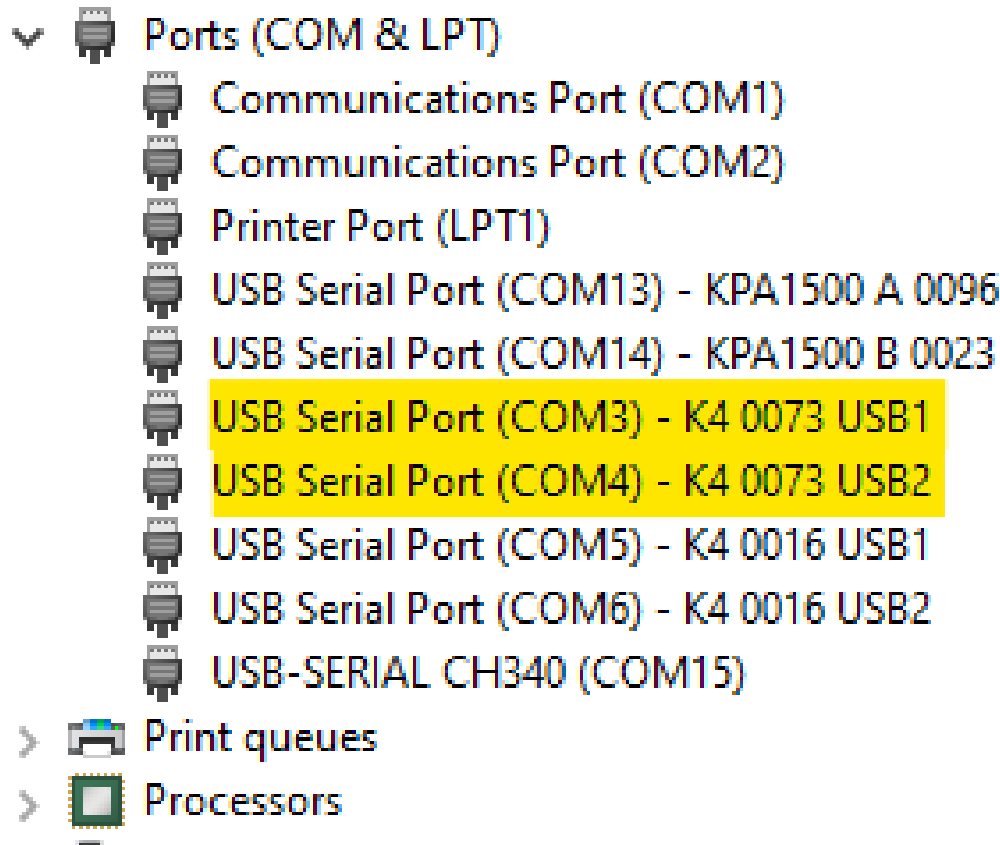
What does “In Use” Mean?

- It means this COM port number was assigned to some device, maybe years ago
- It usually does *not* mean that you can't use it during reassignment, especially if it is “grayed out” (hidden)
- Uninstalling disconnected devices first will help
- *Usually* safe to ignore this warning and click YES:



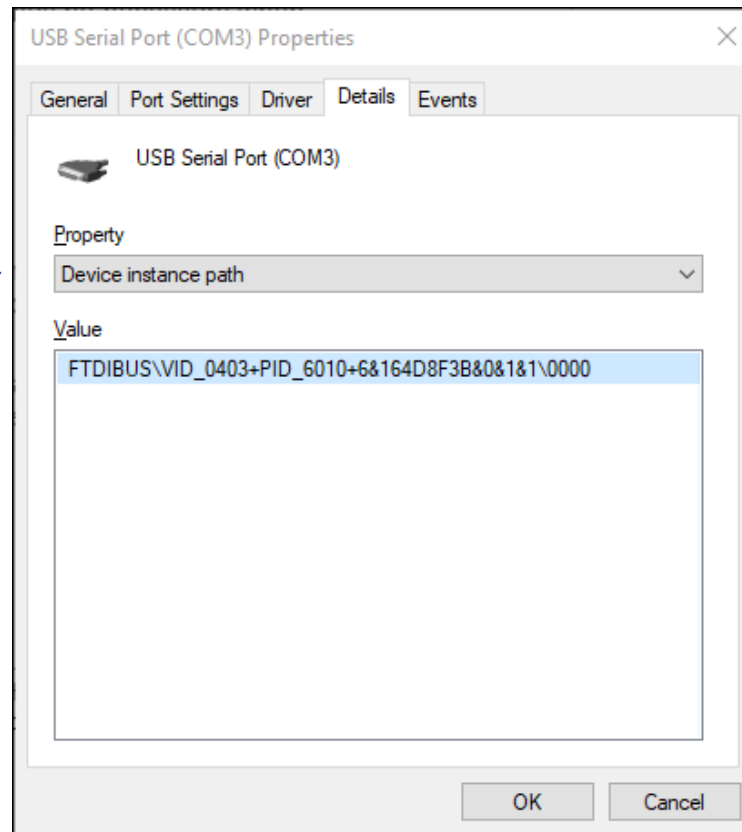
Labeling Serial Ports

- Example:



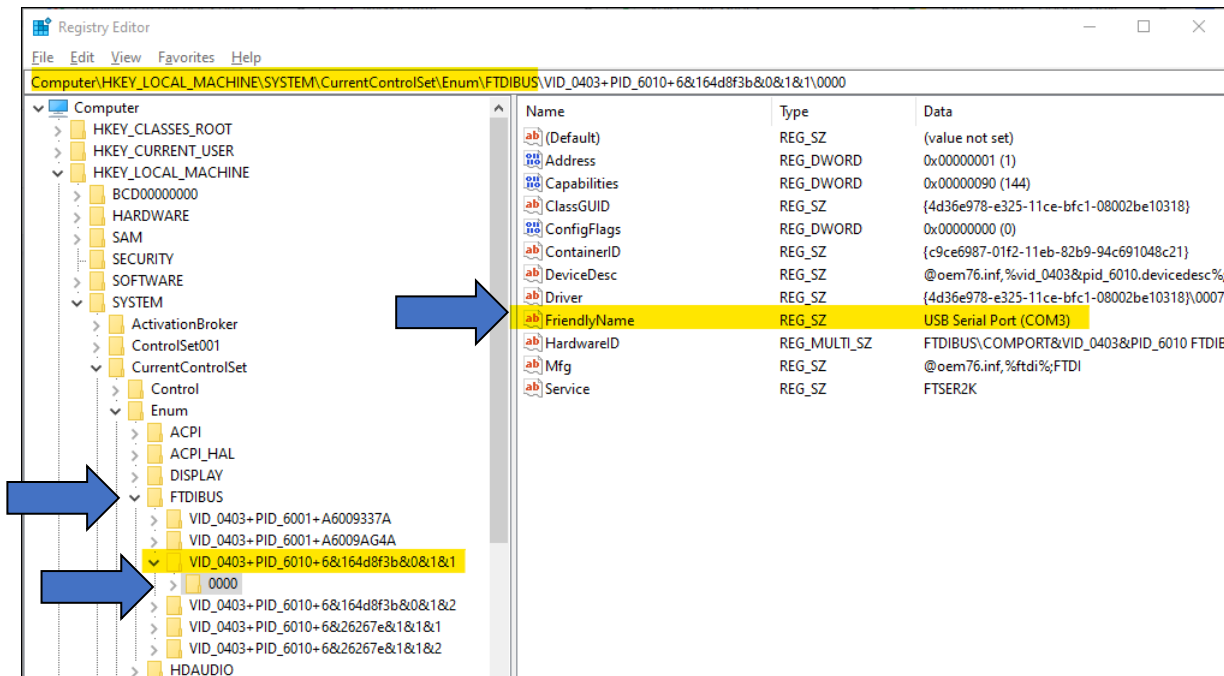
Step 1 – Note the “Device instance path”

- Right click on Serial Port, select Properties, select Details
- Tap “D” on keyboard to jump to “D” section of drop-down list:



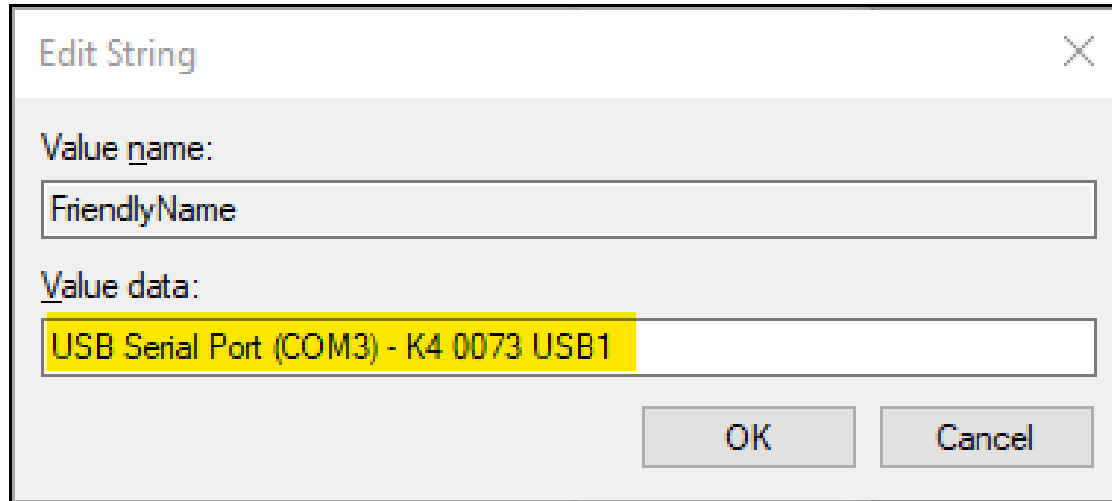
Step 2 – Use Registry Editor (regedit)

- Navigate to
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Enum
- Device Instance Path, Subkey 0000 will have the
FriendlyName



Step 3 – Change the FriendlyName

- Double-click on **FriendlyName** (or Right-click, **Modify...**)
- Edit the FriendlyName value and click **OK**



- Note: If you renumber a serial port, Windows will change the name back to the default, so renumber first, then rename

What program is currently using my serial port?

- Use Windows Process Explorer
- <https://docs.microsoft.com/en-us/sysinternals/downloads/process-explorer>
- On Windows 10, run **procexp64.exe** as **Administrator**
- Click Search button (binoculars icon)
- Enter one of the following partial search strings:

\Device\VCP – FTDI virtual serial ports

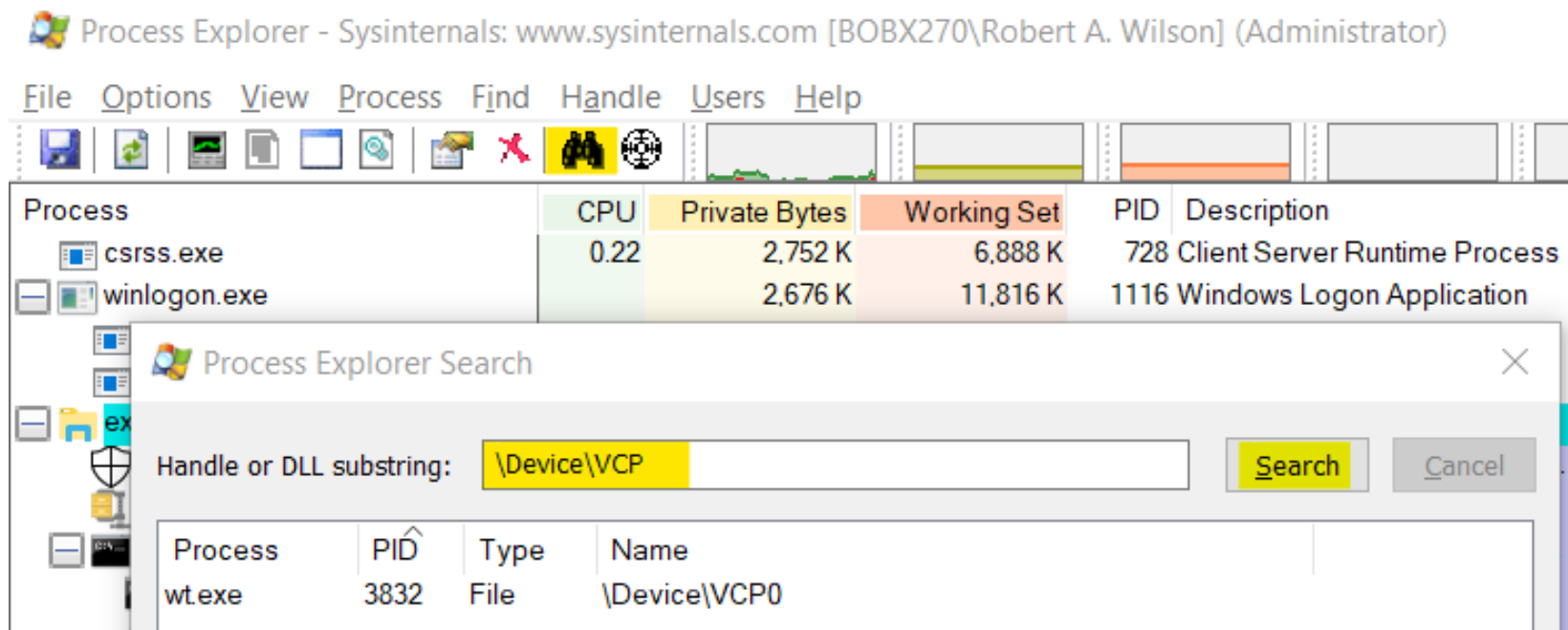
\Device\Edg – Edgeport virtual serial ports

\Device\Ser – Hardware serial ports / CH340 (Mortty)

\Device\Sil – Icom / Kenwood / Yaesu Silicon Labs ports

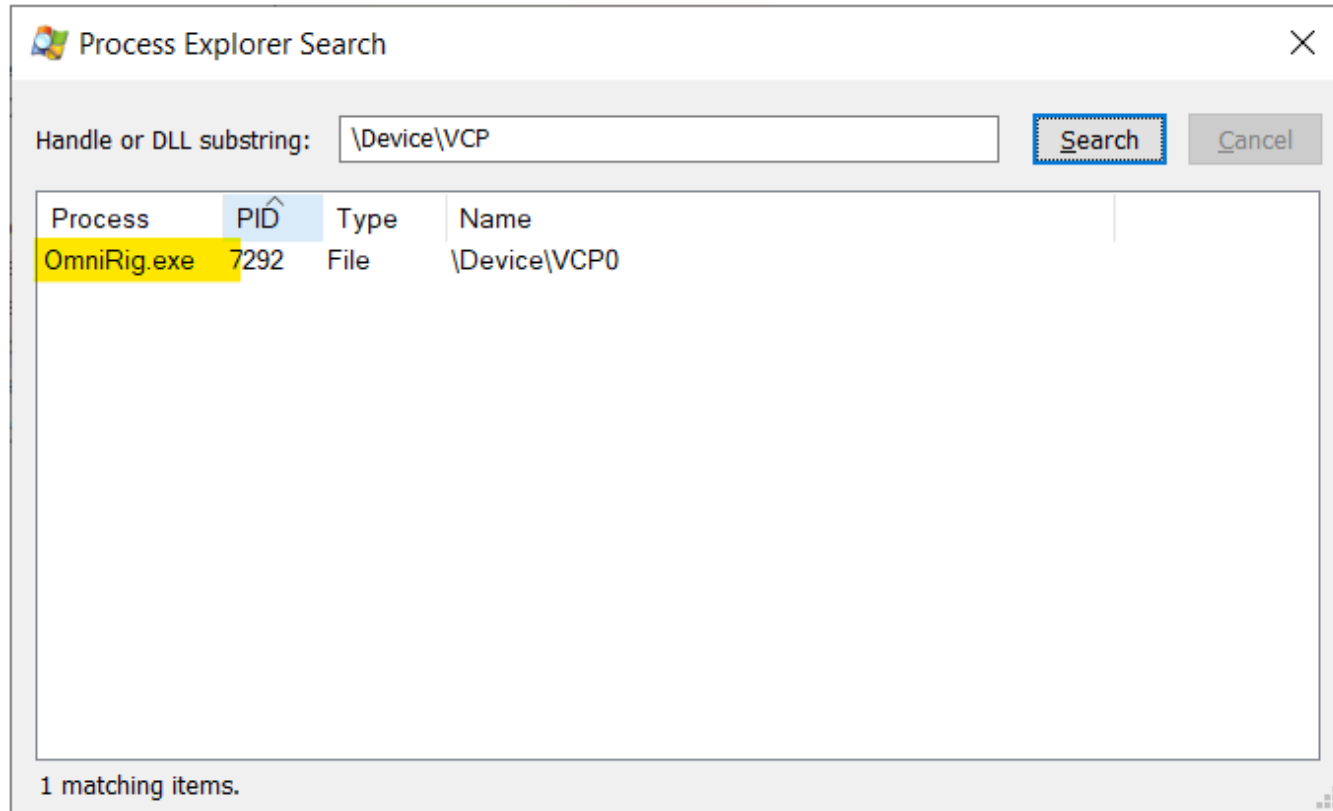
\Device\VSer – Eltima / vspMgr virtual serial ports

Process Explorer Search – Example 1



Win-Test (**wt.exe**) has opened the FTDI Virtual COM Port (VCP)

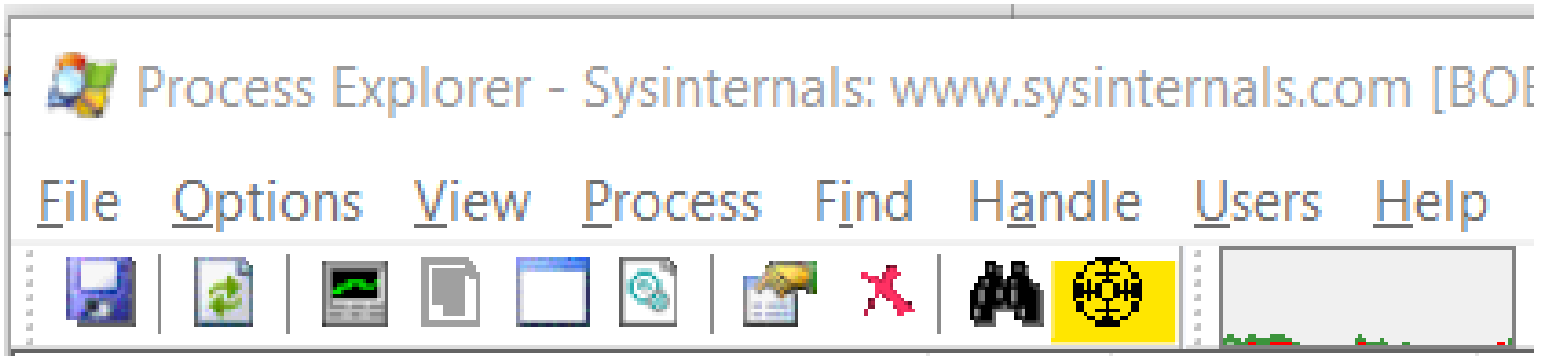
Process Explorer Search – Example 2



OmniRig.exe (e.g. WSJT-X, Log4OM) has opened the FTDI VCP

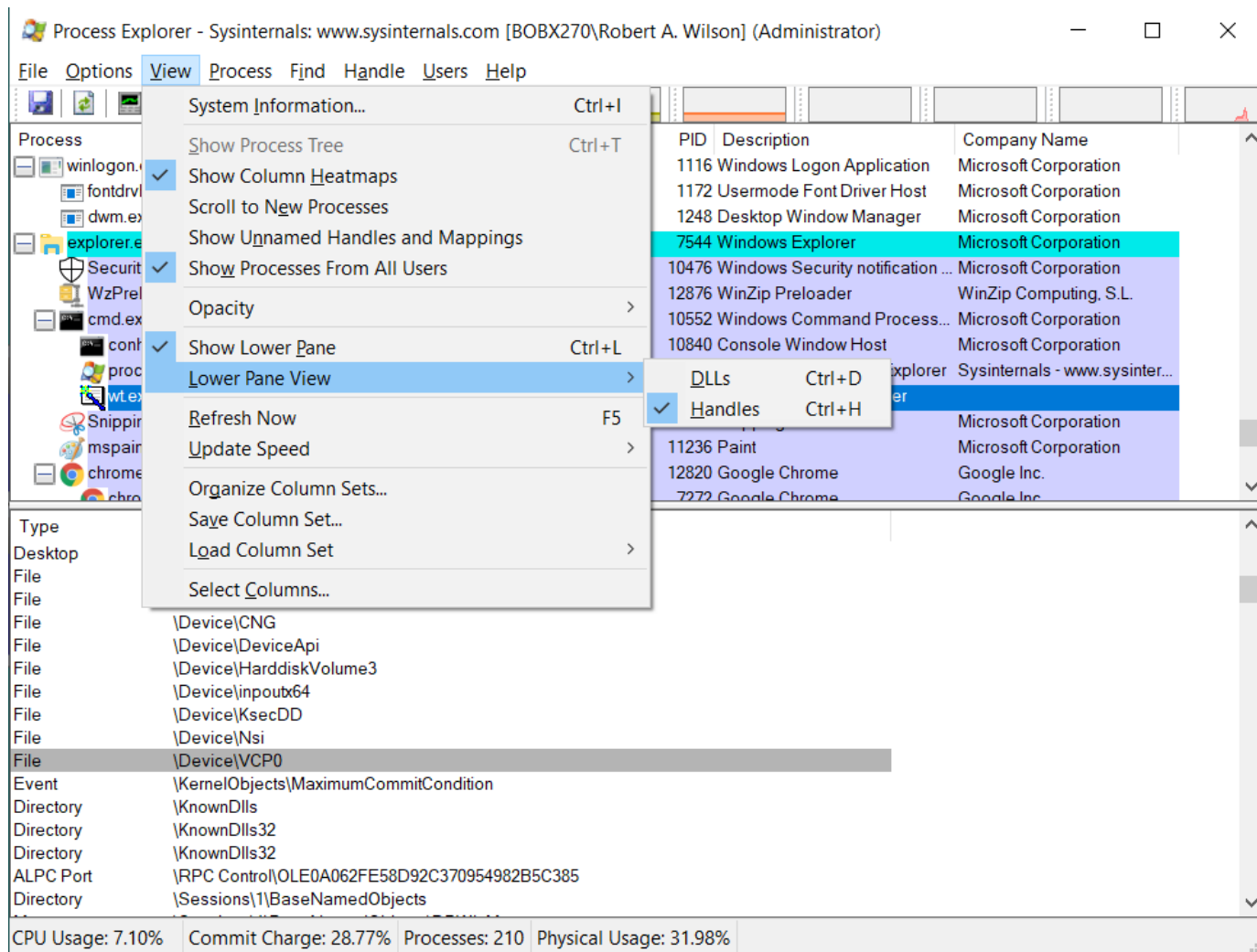
Not sure what to search for?

- Open a program known to use a particular serial port
- In Process Explorer, *drag* the “Find Windows Process” icon on top of the program window



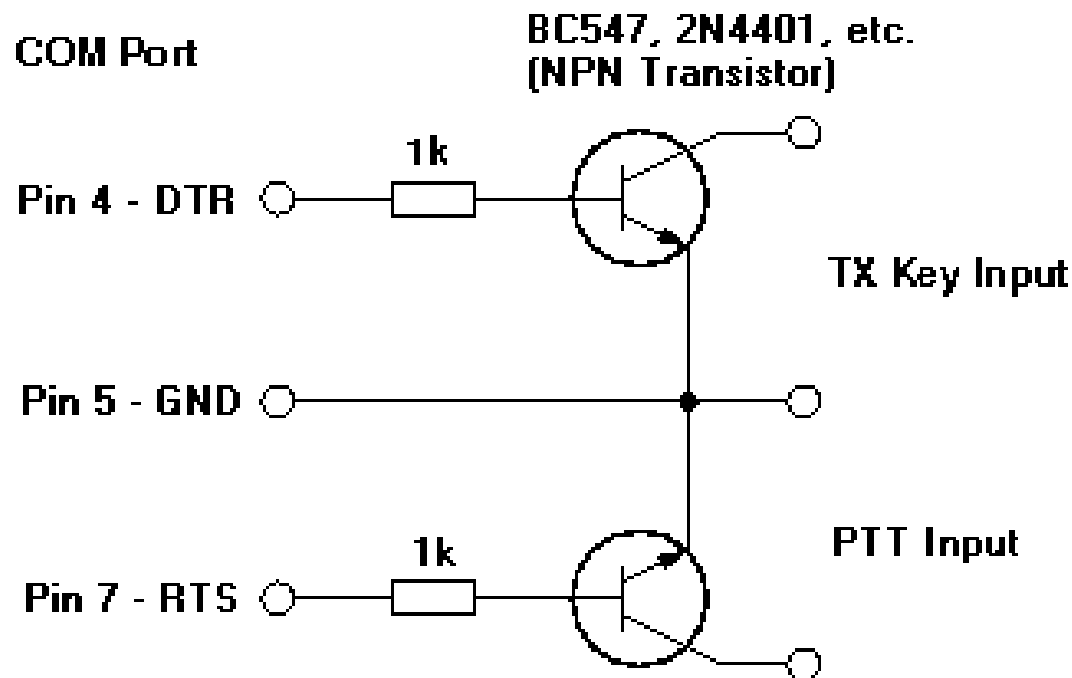
- Process Explorer will jump to the process corresponding to that program window

Select View, Lower Pane View, Handles, then sort by Name



Computer-generated CW, PTT, and FSK RTTY Keying Using Serial Port pins (DTR=CW or FSK, RTS=PTT)

- A simple hardware keying circuit, used for decades:

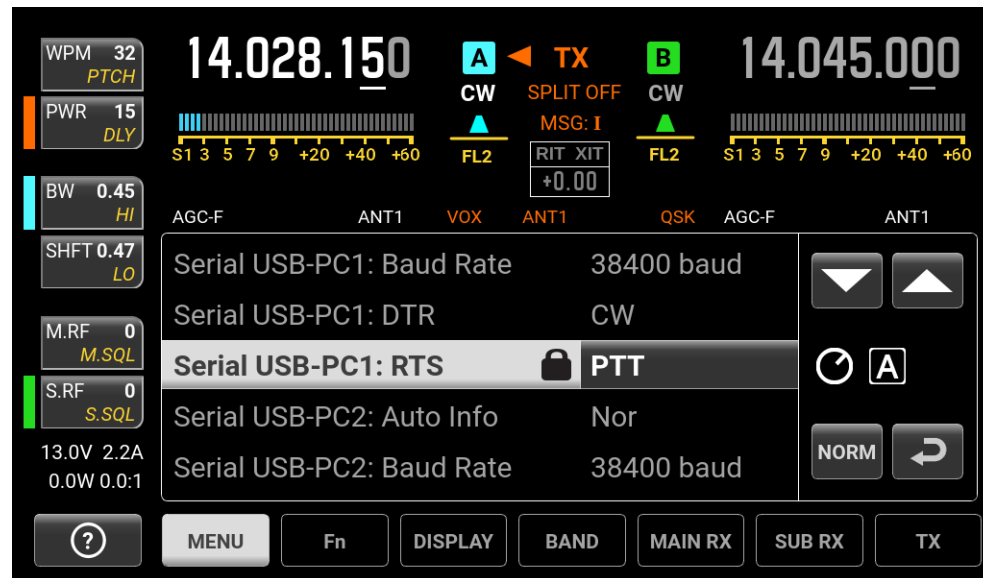


Elecraft K3 / K3S keying via serial port

- First transceiver to include computer keying circuit *inside the radio*
- Does not use RTS and DTR pins for RS232 “Handshaking”, freeing them for other purposes
- In K3, set **CONFIG:PTT-KEY** to **RTS-DTR** (vs. **OFF-OFF**)
- Works the same over a standard serial cable
(CONFIG:RS232 = 38400)
-or- the K3S USB connection
(CONFIG:RS232 = USB)
- To prevent unwanted transmissions when PC reboots, change FTDI Port Settings:
 - Uncheck “Serial Enumerator”
 - Check “Disable Modem Ctrl At Startup”

Elecraft K4 keying via virtual serial port(s)

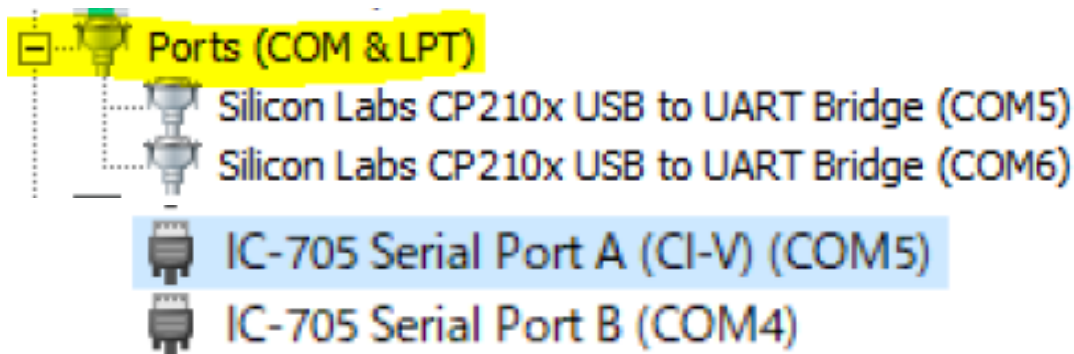
- Same as K3, but THREE (3) serial ports available for CW, PTT, and FSK keying and rig control
- In K4 menu, scroll to the **Serial**, entries, modify as shown:



- Change FTDI Port Settings:
 - Uncheck “Serial Enumerator”
 - Check “Disable Modem Ctrl At Startup”

ICOM Copies Elecraft K3, Adds FSK Keying

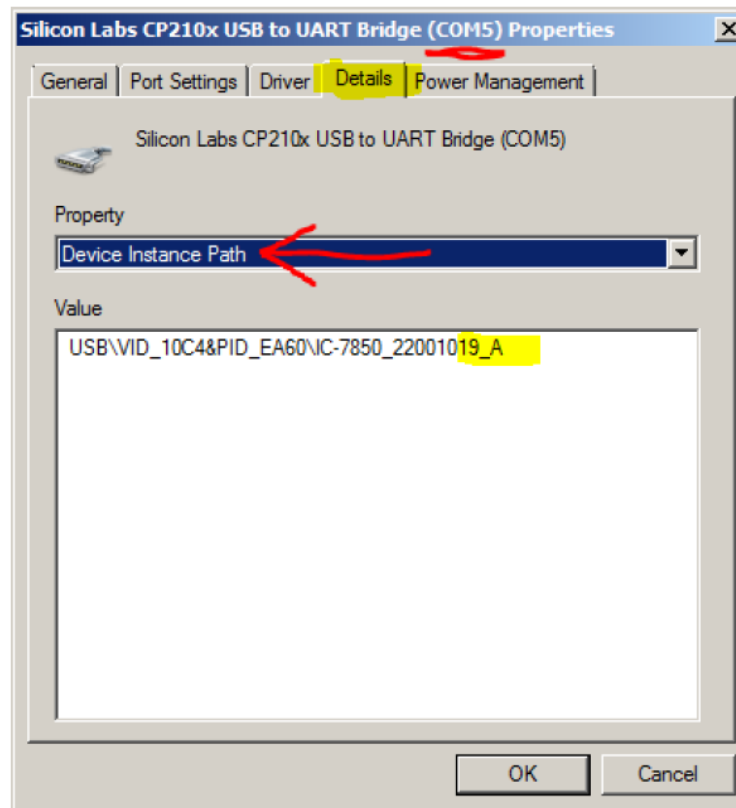
- CW, PTT, and FSK keying OK over USB virtual serial port
- Supported by IC-705, IC-7300, IC-7610, IC-7850, IC-7851
- IC-7300 generates just one virtual serial port
- IC-705, IC-7610, IC-7850, IC-7851 generate *two* virtual serial ports:



- To keep it simple use DTR pin for keying, RTS pin for PTT
- Use port "B" for MMTTY exclusively
- Mnemonic: CW : DTR : FSK • PTT : RTS : Send

ICOM: Determining COM Port A and B

- Use Windows Device Manager, right click on first COM port, Properties, Details tab, Device Instance Path, check last letter



ICOM IC-7300 Keying via USB Cable

- USB cable provides *one* virtual serial port
- In IC-7300 **SET > Connectors** menu:
Set **USB Keying (CW)** to **DTR**
-or-
Set **USB Keying (RTTY)** to **DTR**
- Set **USB Send** to **RTS**
- Logging Software, rig control Port (USB), set DTR=CW, RTS=PTT
- In MMTTY, use **EXTFSK** or **EXTFSK64** to select COM port.
- **Cannot use logger at same time; rig has just one serial port.** But you can use the REMOTE (CI-V) connector with CT-17 or equivalent for rig control.

ICOM IC-705 Keying via USB Cable

- USB cable provides *two* virtual serial ports
- In IC-7610 **SET > Connectors > USB Send/Keying:**
Set **USB Keying (CW)** to **USB (A) DTR**
Set **USB Keying (RTTY)** to **USB (B) DTR**
Set **USB Send** to **USB (A) RTS** or **USB (B) RTS**
- In Logging Software, rig control COM Port (A):
DTR=CW, RTS=PTT
- In MMTTY, use **EXTFSK** or **EXTFSK64** to select second COM Port (B):
FSK=DTR, PTT=RTS
- Cannot set *both* ports to use hardware PTT, so use “Software PTT” on Rig Control Port (A) if necessary.

ICOM IC-7610 Keying via USB Cable

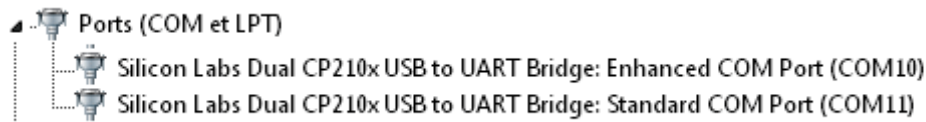
- USB cable provides *two* virtual serial ports
- In IC-7610 **SET > Connectors > USB Send/Keying:**
Set **USB Keying (CW)** to **USB1(A) DTR**
Set **USB Keying (RTTY)** to **USB1(B) DTR**
Set **USB Send** to **USB1(A) RTS** or **USB1(B) RTS**
- In Logging Software, rig control COM Port (A):
DTR=CW, RTS=PTT
- In MMTTY, use **EXTFSK** or **EXTFSK64** to select second COM Port (B):
FSK=DTR, PTT=RTS
- Cannot set *both* ports to use hardware PTT, so use “Software PTT” on Rig Control Port (A) if necessary.

ICOM IC-7850, IC-7851 Keying via USB Cable

- USB cable provides *two* virtual serial ports
- In IC-785x **SET > Others** menu:
Set **USB Keying (CW)** to **USB1 DTR**
Set **USB Keying (RTTY)** to **USB2 DTR**
Set **USB Send** to **USB1 RTS (CW)** or **USB2 RTS (RTTY)**
- In Logging Software, rig control COM Port (USB1)
set DTR=CW, RTS=PTT
- In MMTTY, use **EXTFSK** or **EXTFSK64** to select second COM port (USB2)
FSK=DTR, PTT=RTS
- Cannot use *both* ports for hardware PTT, so use “Software PTT” on Rig Control Port (USB1) if necessary.

Yaesu FT-991 Keying via USB Cable

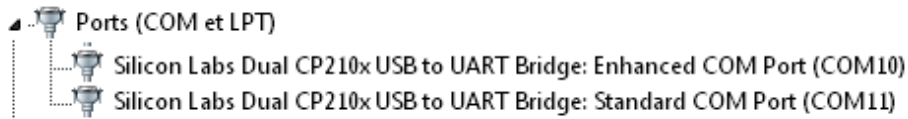
- USB cable provides *two* Silicon Labs virtual serial ports:



- In Yaesu Menu, set
030 232C TOT: 1000 msec (default is only 10 msec)
033 CAT RTS: Disable (Turns off RS232 handshaking)
060 PC Keying: DTR
071 DATA PTT SELECT: RTS
098 RTTY SHIFT PORT: DTR
110 SSB PTT SELECT: RTS
- In Logging Software, rig control is via the “Enhanced” COM Port, CW / PTT via “Standard” COM Port: DTR=CW, RTS=PTT
- In MMTTY, use **EXTFSK** or **EXTFSK64** with the “Standard” COM port: FSK=DTR, PTT=RTS

Yaesu FTdx101D or FTdx101MP Keying via USB

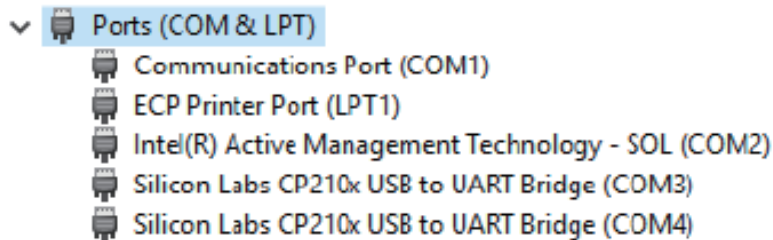
- USB cable provides *two* Silicon Labs virtual serial ports:



- In Yaesu Menu, set
 - OPERATION SETTING / GENERAL:
232C TIME OUT TIMER: 1000 msec (default is only 10 msec)
CAT RTS: OFF (Turns off RS232 handshaking)
 - RADIO SETTING / MODE SSB, RTTY, and PSK/DATA:
RPTT SELECT: RTS (FSK will be by **DTR**)
 - RADIO SETTING / MODE CW:
PC KEYING: DTR (PTT will be by RTS)
- In Logging Software, rig control is via the “Enhanced” COM Port, CW / PTT via “Standard” COM Port: DTR=CW, RTS=PTT
- In MMTTY, use **EXTFSK** or **EXTFSK64** with the “Standard” COM port: FSK=DTR, PTT=RTS

Kenwood TS-890 Keying via USB Cable

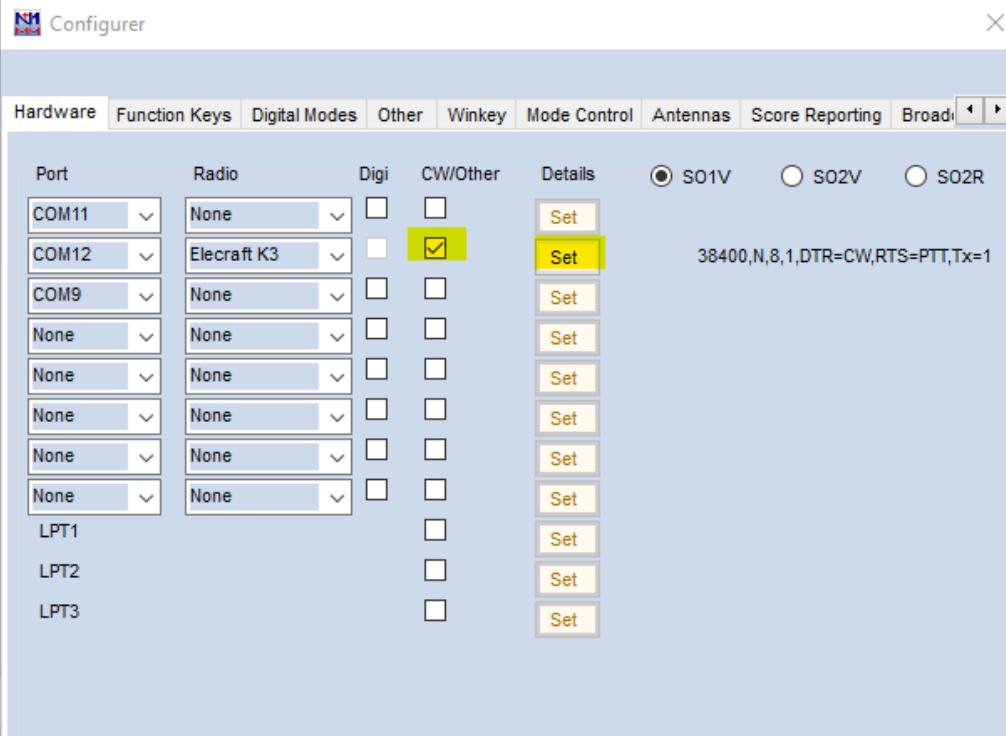
- USB cable provides *two* Silicon Labs virtual serial ports:



- Right click, Properties, Details tab, Location Path:
USB1 is “Standard” Serial Port, USB2 is “Enhanced”
- In Logging Software, rig control is via the “Standard” COM Port
CW / PTT / FSK keying may be assigned to DTR or RTS of either port
- **Menu 17 Virtual Standard COM Port RTS: PTT**
Menu 18 Virtual Standard COM Port DTR: CW Keying
Menu 19 Virtual Enhanced COM Port RTS: PTT
Menu 20 Virtual Enhanced COM Port DTR: RTTY Keying

N1MM+ Contest Software Configuration

- Select Config, Configure Ports, view Hardware Tab
- Check CW/Other box next to Rig's Serial Port
- Click Set button




The screenshot shows the 'Configurer' window with the 'Hardware' tab selected. The window contains a table for configuring serial ports and a 'Details' section on the right.

| Port | Radio | Digi | CW/Other | Details |
|-------|-------------|--------------------------|-------------------------------------|---------|
| COM11 | None | <input type="checkbox"/> | <input type="checkbox"/> | Set |
| COM12 | Elecraft K3 | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Set |
| COM9 | None | <input type="checkbox"/> | <input type="checkbox"/> | Set |
| None | None | <input type="checkbox"/> | <input type="checkbox"/> | Set |
| None | None | <input type="checkbox"/> | <input type="checkbox"/> | Set |
| None | None | <input type="checkbox"/> | <input type="checkbox"/> | Set |
| None | None | <input type="checkbox"/> | <input type="checkbox"/> | Set |
| None | None | <input type="checkbox"/> | <input type="checkbox"/> | Set |
| LPT1 | | <input type="checkbox"/> | <input type="checkbox"/> | Set |
| LPT2 | | <input type="checkbox"/> | <input type="checkbox"/> | Set |
| LPT3 | | <input type="checkbox"/> | <input type="checkbox"/> | Set |

Details: ☒ S01V ☐ S02V ☐ S02R
38400,N,8,1,DTR=CW,RTS=PTT,Tx=1

N1MM+ Contest Software Configuration (cont'd)

- Set DTR (pin 4) = CW, RTS (pin 7) = PTT



The image shows a screenshot of the 'Com12' configuration window in N1MM+ Contest software. The window has a title bar with the N1MM+ logo and a close button. The settings are as follows:

| Speed | Parity | DataBits | Stop Bits |
|-------|--------|----------|-----------|
| 38400 | N | 8 | 1 |

| DTR (pin 4) | RTS (pin 7) | Radio Nr |
|-------------|-------------|----------|
| CW | PTT | 1 |

Below these are several checkboxes and a text field:

- PTT Delay (msec): 0
- ☐ Enable Both Hardware & Software PTT
- ☐ PTT via Radio Command SSB Mode
- ☐ PTT via Radio Command CW Mode
- ☐ PTT via Radio Command Digital Mode
- ☐ Allow ext interrupts

At the bottom, there are two more dropdown menus:

| Two Radio Protocol | FootSwitch (pin 6) |
|--------------------|--------------------|
| None | None |

Radio Polling Rate: Normal

Suggested Elecraft K3 Settings:
19200 - 38400, N, 8, 1, Always Off, Always Off

Buttons: Help, OK, Cancel

Win-Test Contest Software Configuration

- Set DTR (pin 4) = CW, RTS (pin 7) = PTT

COM5 properties [Alt+H for help] ✕

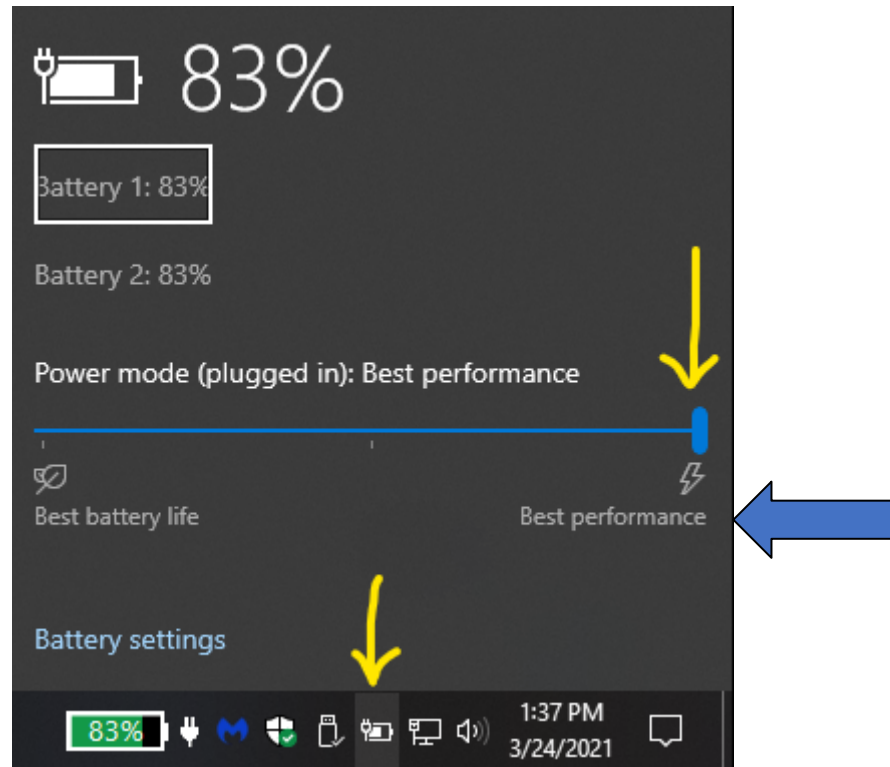
| Port properties | Options |
|---------------------------|----------------------------|
| Bits per seconds: 38400 ▾ | DTR (pin 4): CW ▾ |
| Data bits: 8 ▾ | RTS (pin 7): PTT ▾ |
| Parity: None ▾ | Active with: Both radios ▾ |
| Stop bits: 1 ▾ | |

K3 Elecraft default settings

OK Cancel

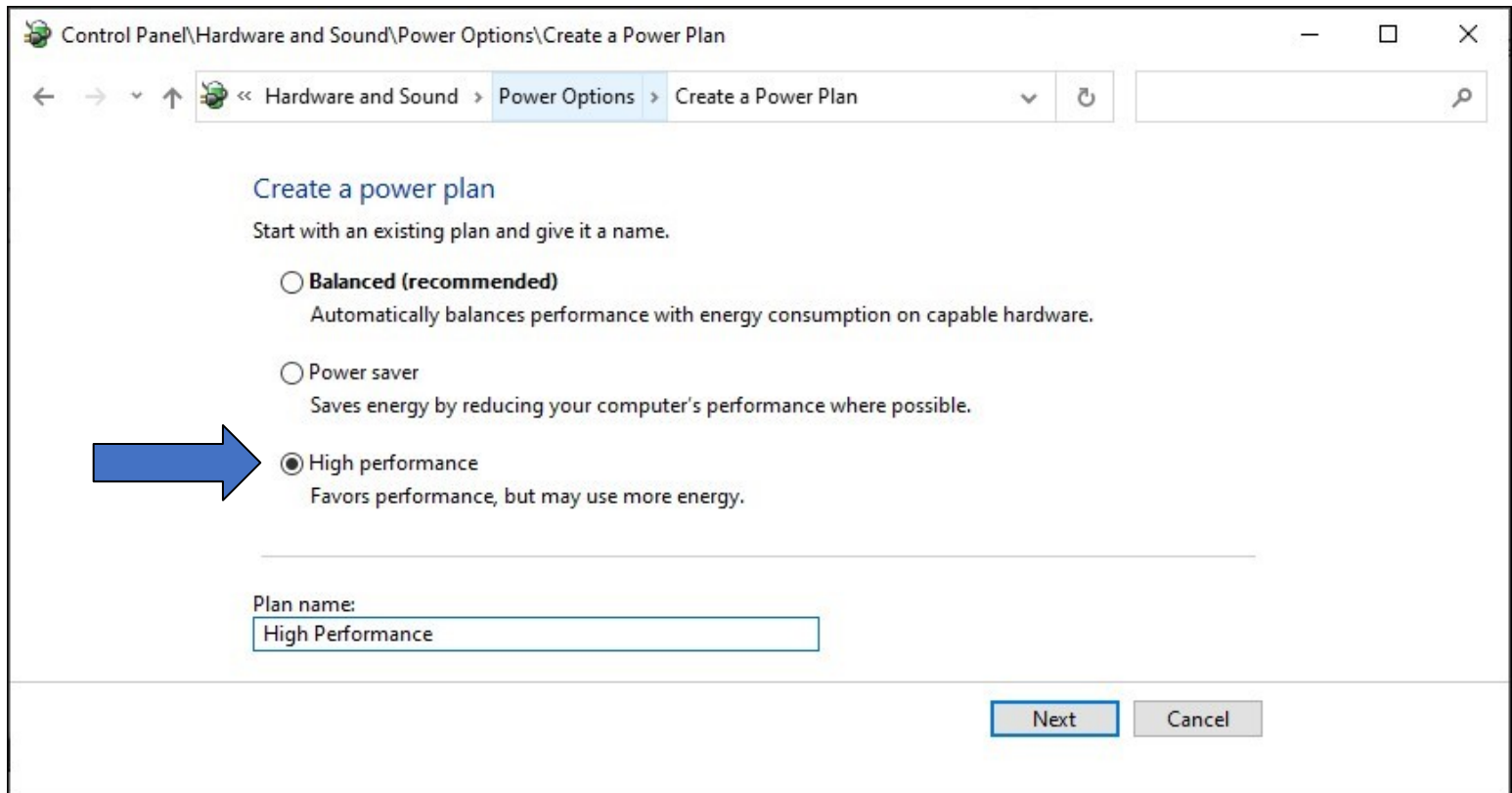
Notebook PC: Windows Power Mode Affects Timing

- CW Timing over USB is usually very good *if* you set Windows **Power Mode** to **Best Performance**:



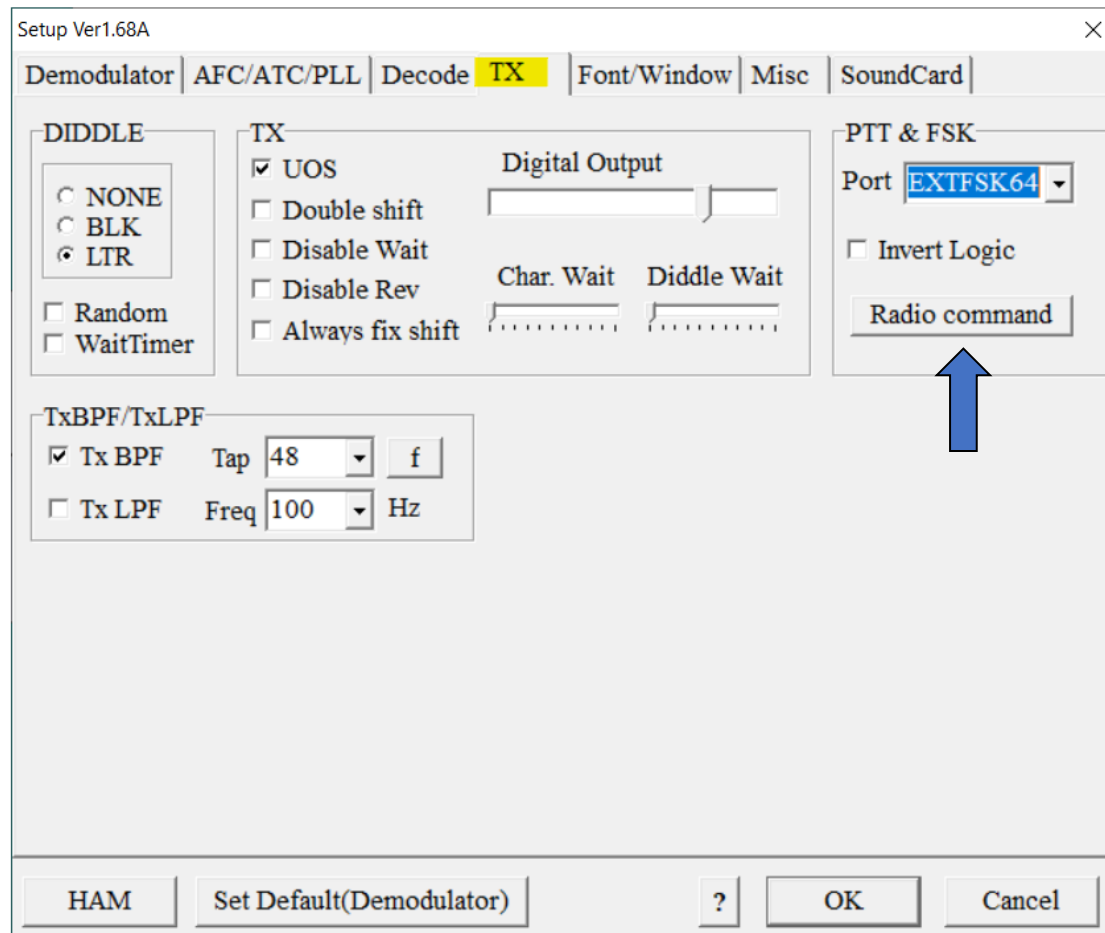
Desktop PC: Windows Power Options Affects Timing

- CW Timing over USB is usually very good *if* you set Windows **Power Options** to **High performance**:



FSK RTTY keying: MMTTY Setup Menu, TX Tab

- Set **Port** to **EXTFSK64**, then click **Radio Command** button



MMTTY Setup Menu, Radio command button

- Set **Port** to **NONE**, Group to **Clear**

Radio command

Port definition

Port **NONE** Baud 57600 Char. wait 0 ms

Data length
☐ 7bits
☒ 8bits

Stop
☒ 1bit
☐ 2bits

Parity
☒ None
☐ Even
☐ Odd

flow control
☐ XON/XOFF
☐ CTS

DTR/RTS
☐ PTT

Commands

Init
Rx
Tx

Model NONE Polling interval 1 secs

Frequency offset
☒ OFF ☐ LSB ☐ USB

Group **Clear** Load Save ? OK Cancel

MMTTY Setup Menu, Misc Tab

- Set TX Port to **COM-TxD(FSK)**, click **USB Port**

The screenshot shows the 'Misc' tab of the MMTTY Setup Ver1.68A window. The window has a title bar with 'Setup Ver1.68A' and a close button. The tabs at the top are 'Demodulator', 'AFC/ATC/PLL', 'Decode', 'TX', 'Font/Window', 'Misc' (selected), and 'SoundCard'. The 'Misc' tab contains several sections: 'Sound Card' with 'FIFO' settings (RX: 12, TX: 4) and 'Priority' (Normal, Highest, Higher (selected), Critical); 'Device Identifiers' with 'RX' and 'TX' set to 0; 'Source' (Mono, Right, Left (selected)); 'Clock' (11025 Hz, 0.00 Hz, Tx offset); 'Sound loopback' (OFF, Int. (selected), Ext.(SAT)); 'Tx Port' (Sound, Sound + COM-TxD (FSK), COM-TxD(FSK) (selected), USB Port); and 'System Font' (Window: Times New Roman, Fixed pitch: Courier New, Japanese, English buttons). At the bottom are buttons for 'HAM', 'Set Default(Demodulator)', '?', 'OK', and 'Cancel'.

Setup Ver1.68A

Demodulator AFC/ATC/PLL Decode TX Font/Window **Misc** SoundCard

Sound Card

FIFO

RX 12 TX 4

Priority

☐ Normal ☐ Highest

☒ Higher ☐ Critical

Device Identifiers

RX 0

TX 0

Source

☐ Mono ☐ Right

☒ Left

Clock

11025 Hz Adj

0.00 Hz

Tx offset

Sound loopback

☐ OFF

☒ Int.

☐ Ext.(SAT)

Tx Port

☐ Sound

☐ Sound + COM-TxD (FSK)

☒ COM-TxD(FSK) **USB Port**

System Font

Window Times New Roman Set 0

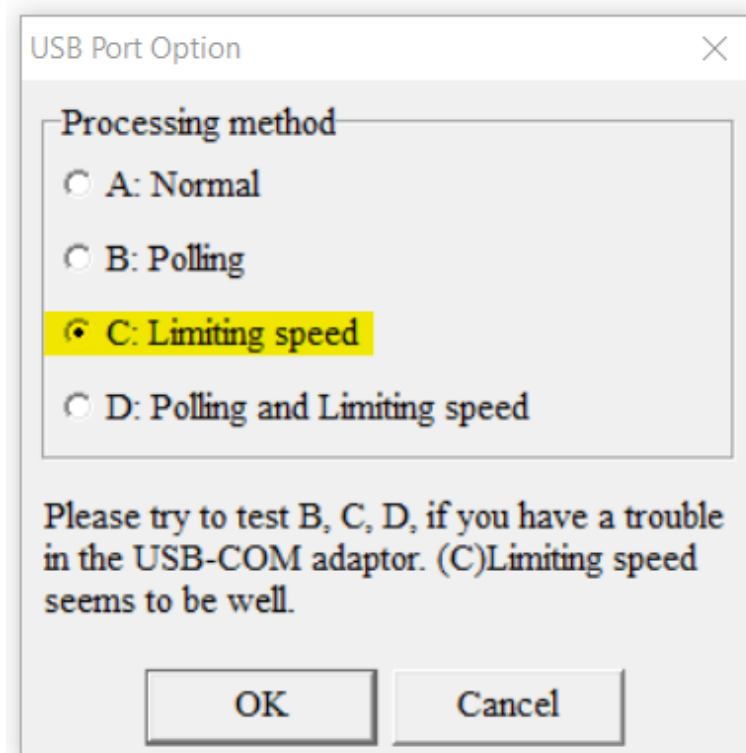
Fixed pitch Courier New Set 0

Japanese English

HAM Set Default(Demodulator) ? OK Cancel

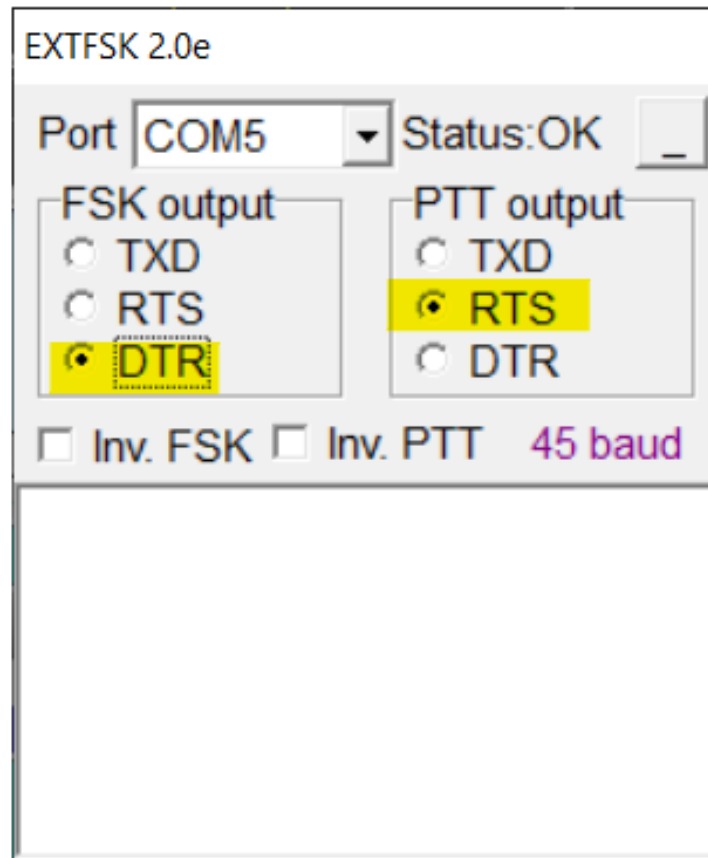
MMTTY USB Port Menu

- Set Processing Method to **C: Limiting Speed**



EXTFSK Pop-Up Menu

- Select second COM Port, FSK=DTR, PTT=RTS



Serial Port Sharing and Conflicts

- In RS232 protocol, only **one** TXD line (Pin 3) can be connected between a PC and a Radio
- No other device may connect to Pin 3 if a PC is connected
- PC polls radio using Pin 3 (TXD), Radio sends response using Pin 2 (RXD)
- AUTO INFO mode provides same output without PC polling
- Multiple devices (SteppIR & Baby Loop controllers, Band Decoders, Elecraft / ACOM / SPE amplifiers) may *monitor* the RXD line in parallel by only connecting to Pin 2
- RF-Kit amplifiers require connection to *both* Pins 2 and 3

Shameless Plug

- The N6TV “Serial Box” (S-BOX or S-BOX-USB with FTDI) provides parallel connections to RXD pin via standard D-SUB cables:

<https://bit.ly/S-BOX>



- It also includes *four* NPN keying circuits for rigs that do not support CW, PTT, or FSK keying via DTR or RTS, such as:
Elecraft **KX2 KX3**, Yaesu **FTdx3000 FTdx5000 FT-1000MP**,
Kenwood **TS-990s TS-590s**, ICOM **IC-7600 IC-7700 IC-7800**,
...

Software for Sharing Serial Ports

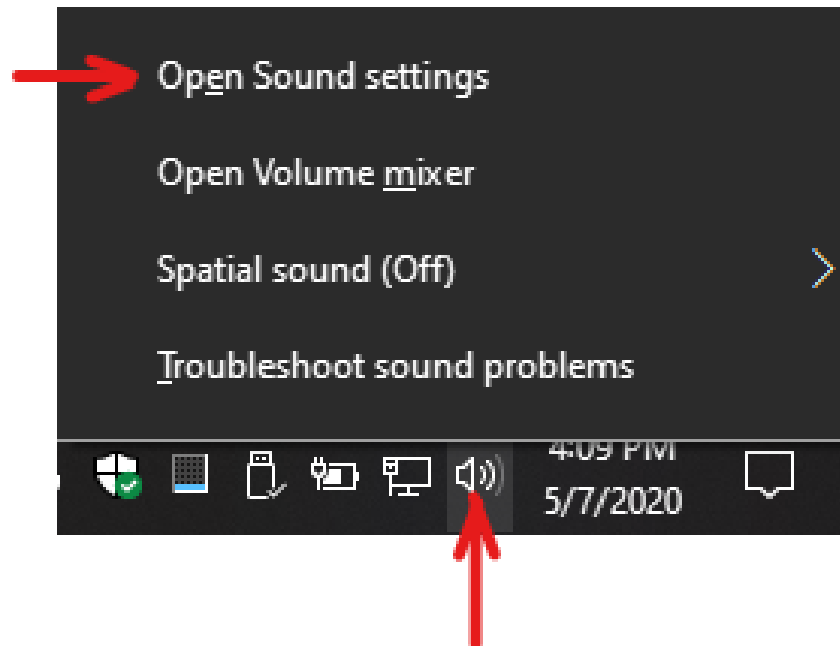
- Software sharing: multiple programs simultaneously access the radio's rig control serial port
- Implemented by VE3NEA's [OmniRig](#) software
- OmniRig may be used by Win-Test, Writelog, HDSDR, WSJT-X, Log4OM, etc. for rig control
- But OmniRig is NOT supported by N1MM+, N3FJP, others
- OmniRig owns the serial port, acts as traffic cop, no collisions or conflicts between applications
- CW / PTT / FSK Keying via OmniRig port is not supported
- Consider [N4PY Pegasus Plus](#)
Allows sharing of Radio COM port with up to five other applications
- Can I use VSPE instead? vspMgr? COM0COM?
Maybe, but command collisions or VCP driver conflicts may occur

Radios with both USB *and* DE-9 connectors

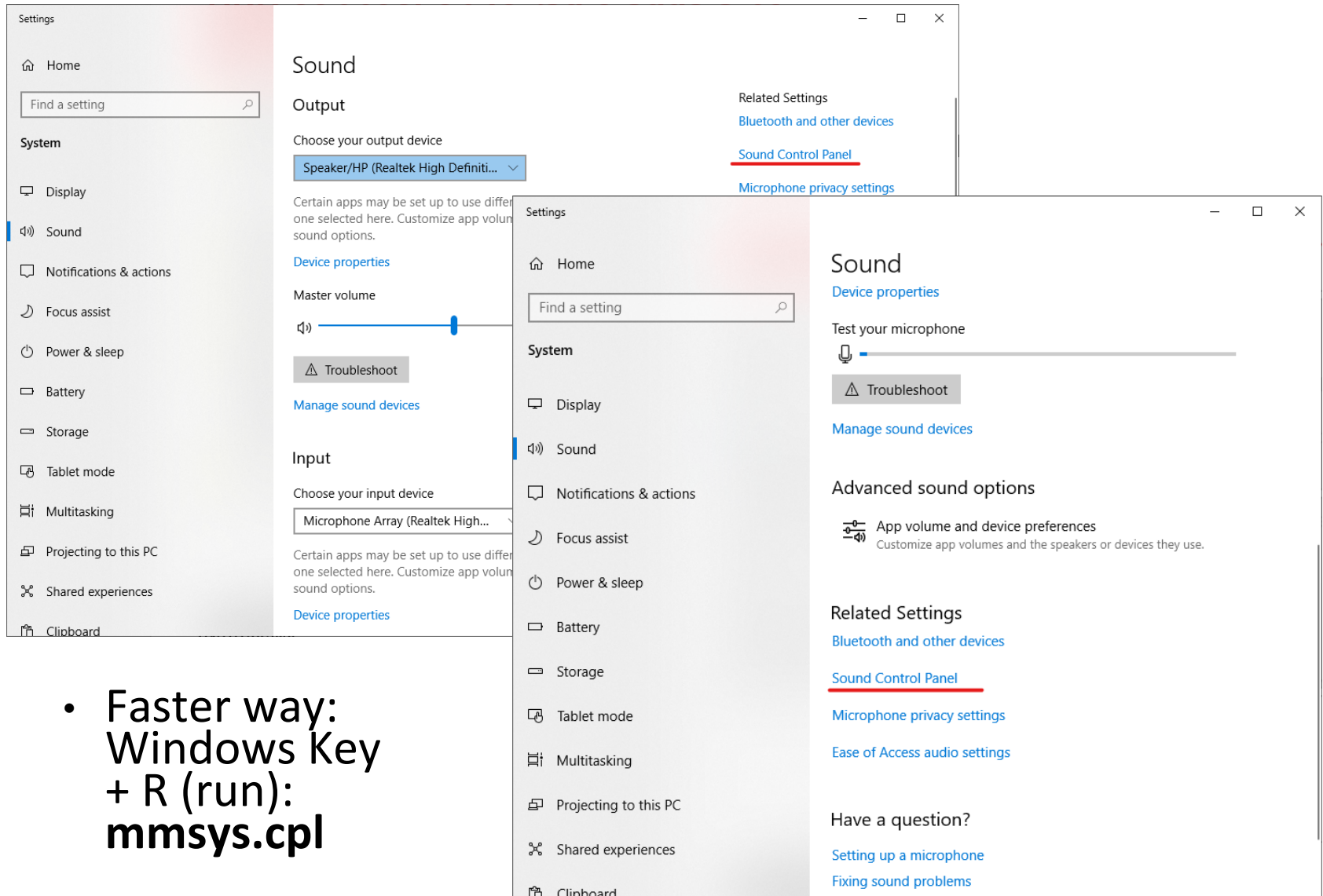
- Elecraft **K3**, Yaesu **FTdx3000**: USB and Serial Port do not operate independently (must pick one)
- USB and Serial Port *do* operate independently in:
 - Elecraft **K4**
 - Kenwood **TS-590S, TS-890S**
 - Yaesu **FTdx101D, FTdx101MP**
- ICOM USB and CI-V Ports (3.5mm, not DE-9) mostly operate independently (if you set **USB CI-V Port** to **Unlink from [REMOTE]**)
- Two devices can poll the radio at same time via independent serial ports, one USB and one DE-9 or CI-V.

USB connection to radio adds a new Windows Sound Card

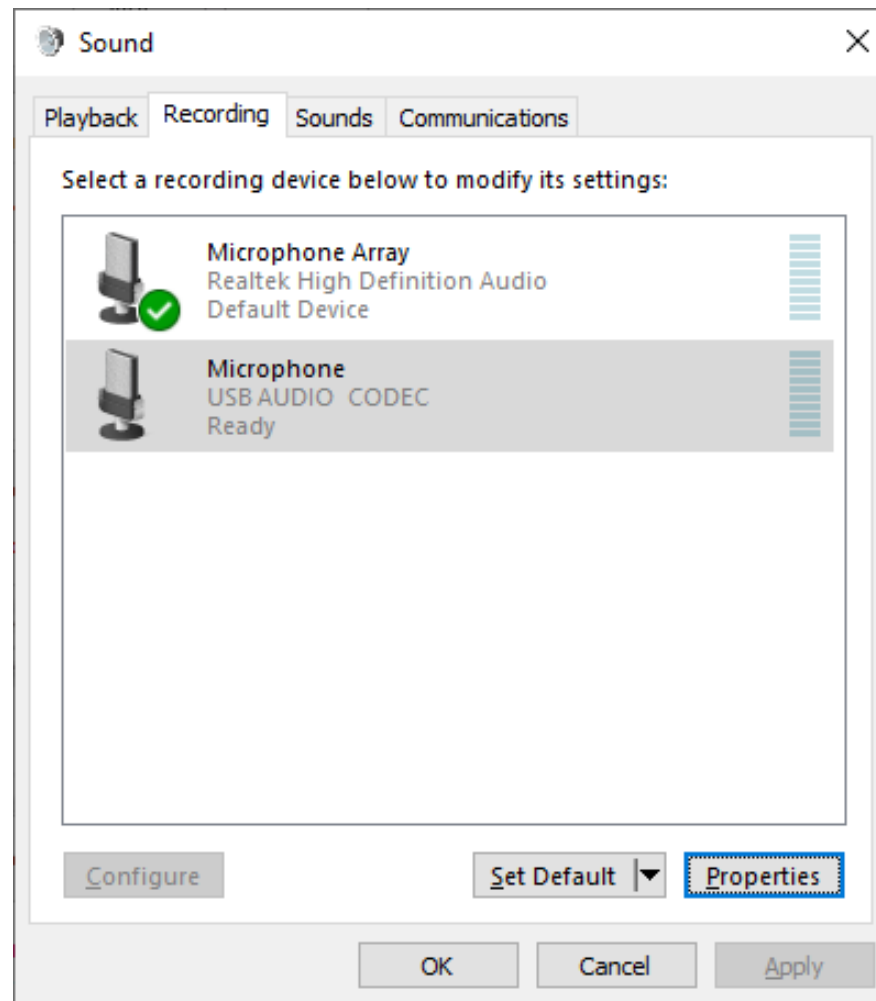
- **USB Audio CODEC**
- Can be use for contest recording, voice keying, RTTY / FT8 decoding
- Multiple “USB Audio CODEC” devices, which is my radio?
- Right click on Speaker icon, then **Open Sound settings**



Click Sound Control Panel



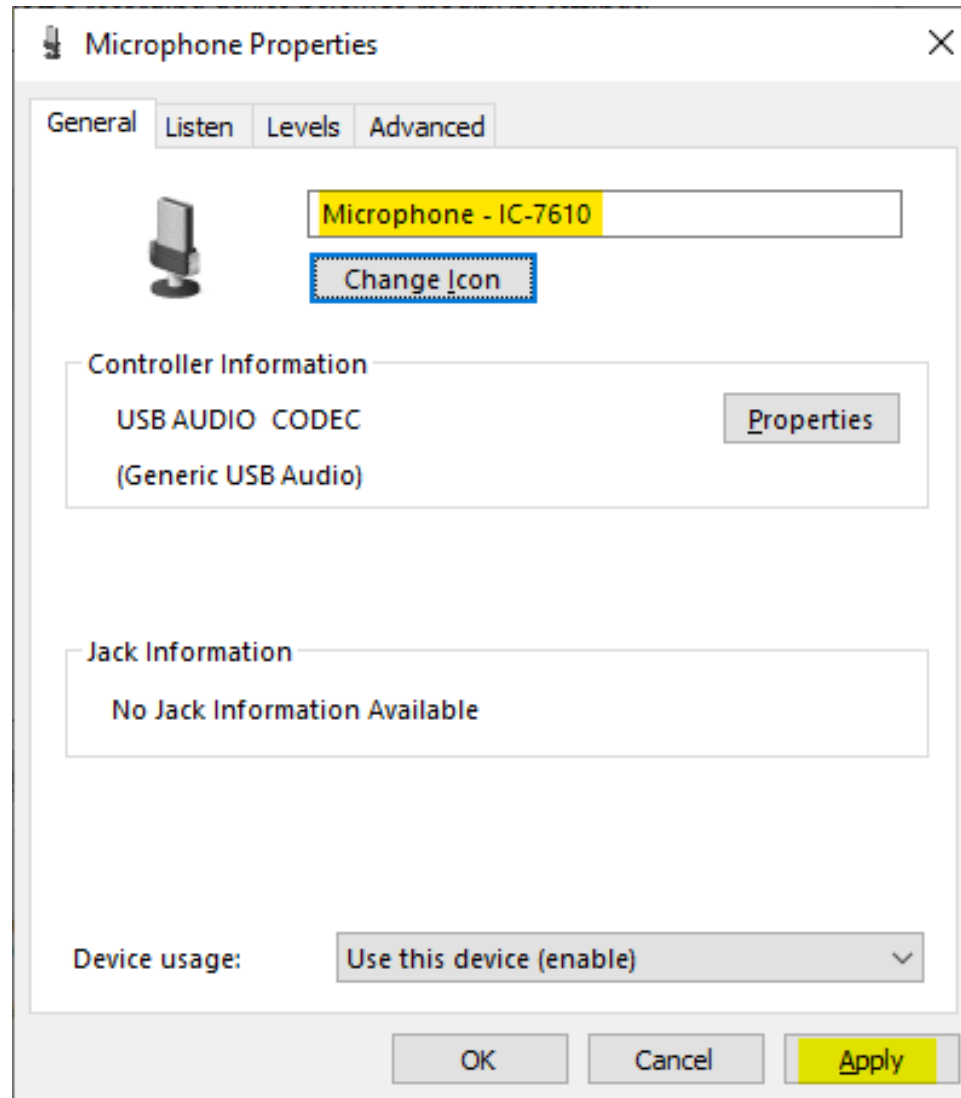
Windows Sound Control Panel, Recording Tab



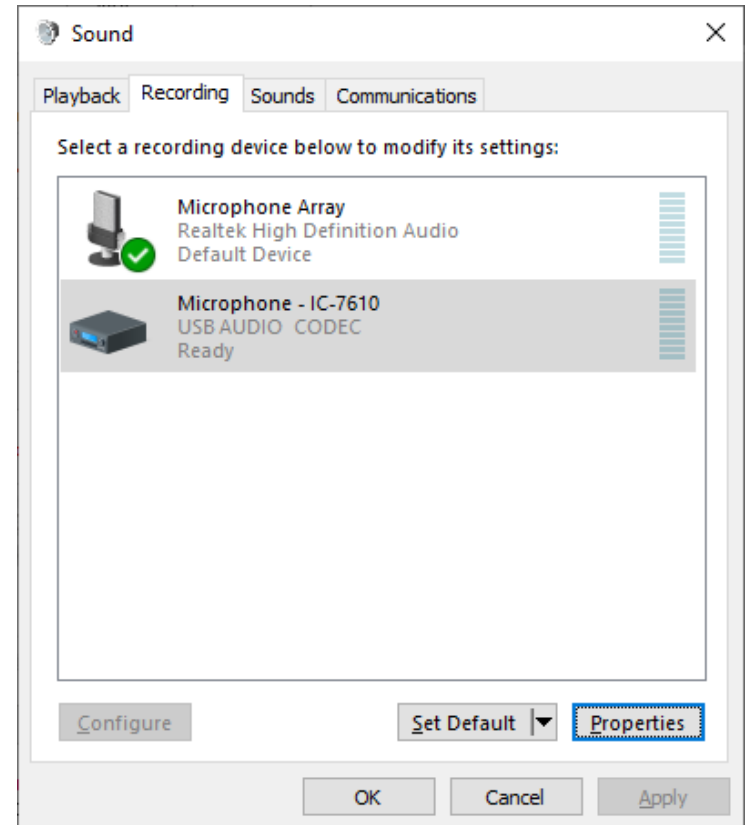
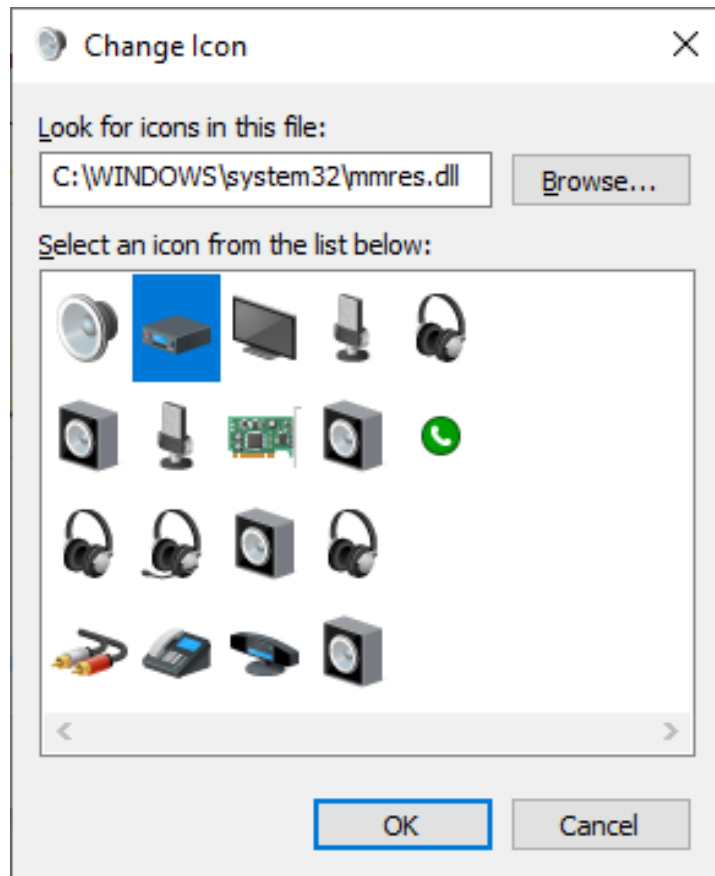
In Sound Control Panel, which sound card is my radio?

- Watch **USB AUDIO CODEC** devices
- A device will disappear and reappear when you disconnect and reconnect the USB cable from the back of the radio
- Select that device, then click **Properties** button
- Label both the **Recording** and **Playback** tabs with name of device, click **Apply**

Change Label and Icon of USB Audio CODEC



Change Icon of USB Audio CODEC Device



Key Points to Remember

- Use the Windows Device Manager to manage and renumber COM ports
- Always uninstall Prolific devices and drivers
- Always change the FTDI Default Options
- Consider labeling COM ports using Registry Editor
- Try CW, FSK and PTT keying via virtual serial port pins
- Use DTR for CW/FSK, RTS for PTT
- Understand serial port conflicts and sharing
- Label your USB Audio CODEC devices

References

- <http://www.qrz.com/db/n6tv> - Links to this and other presentations
- https://www.nirsoft.net/utils/usb_devices_view.html - USBDeview
- <https://docs.microsoft.com/en-us/sysinternals/downloads/process-explorer> - Windows Process Explorer
- <https://bit.ly/S-BOX> - The “Serial Box” by N6TV
- n6tv@arrrl.net



Q&A