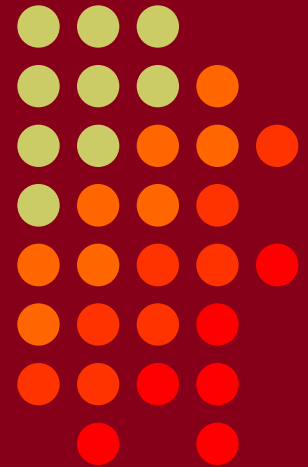


# Everything You Need to Know About USB and Serial Interfaces

N6TV@ARRL.NET



• CTU •  
CONTEST  
UNIVERSITY

ICOM®



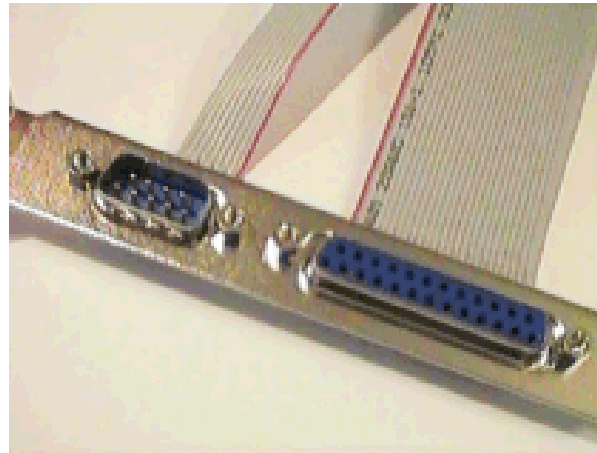
# Presentation Overview

- 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

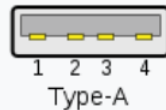


# USB 2.0 and 3.0 Ports

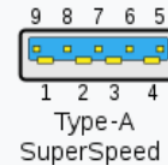
- Standard connector on most PCs and MACs

PC:

Type A



Type A

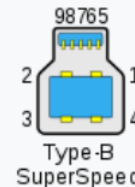


Radio:

Type B



Type B



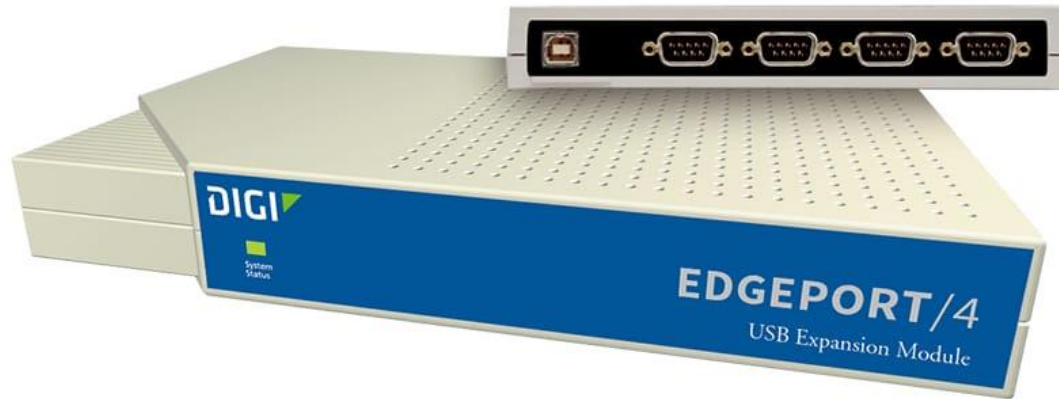


# USB-to-Serial Adapters

## 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. CH341 – Mortty, some WinKey USB, RigSelect
5. Silicon Labs (built in to Icom, Kenwood, Yaesu)
6. 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 CH1P1-X10 - \$18



GearMo 2-port - \$31



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

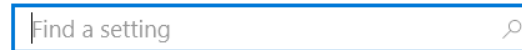
# Setting System Environment Variable



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

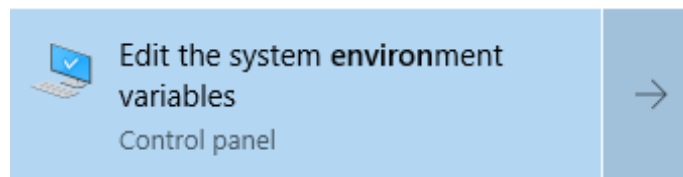


Windows Settings

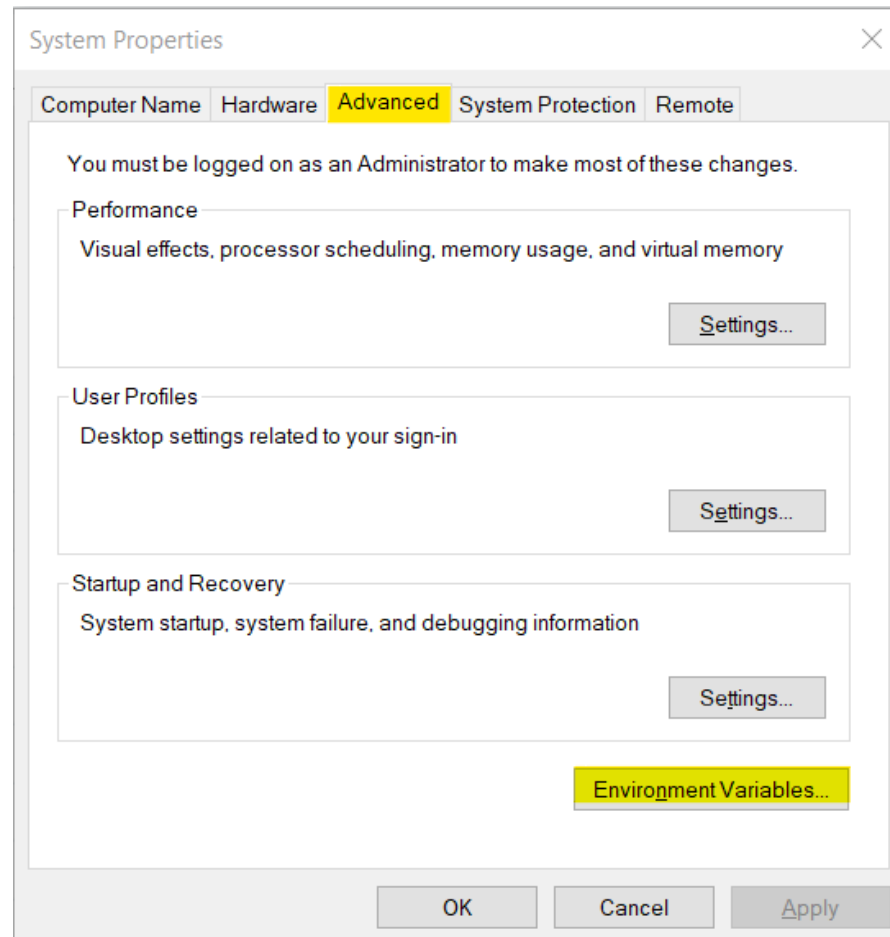


- Click “Edit the System Environment Variables”

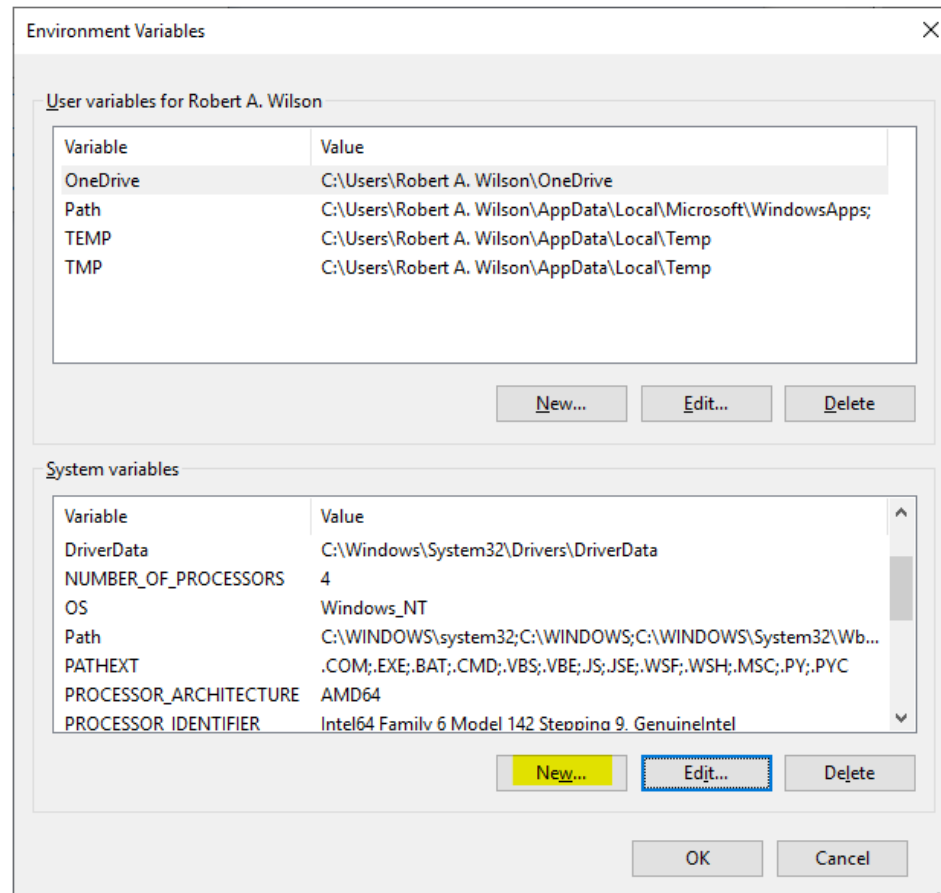
Best match



# 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**

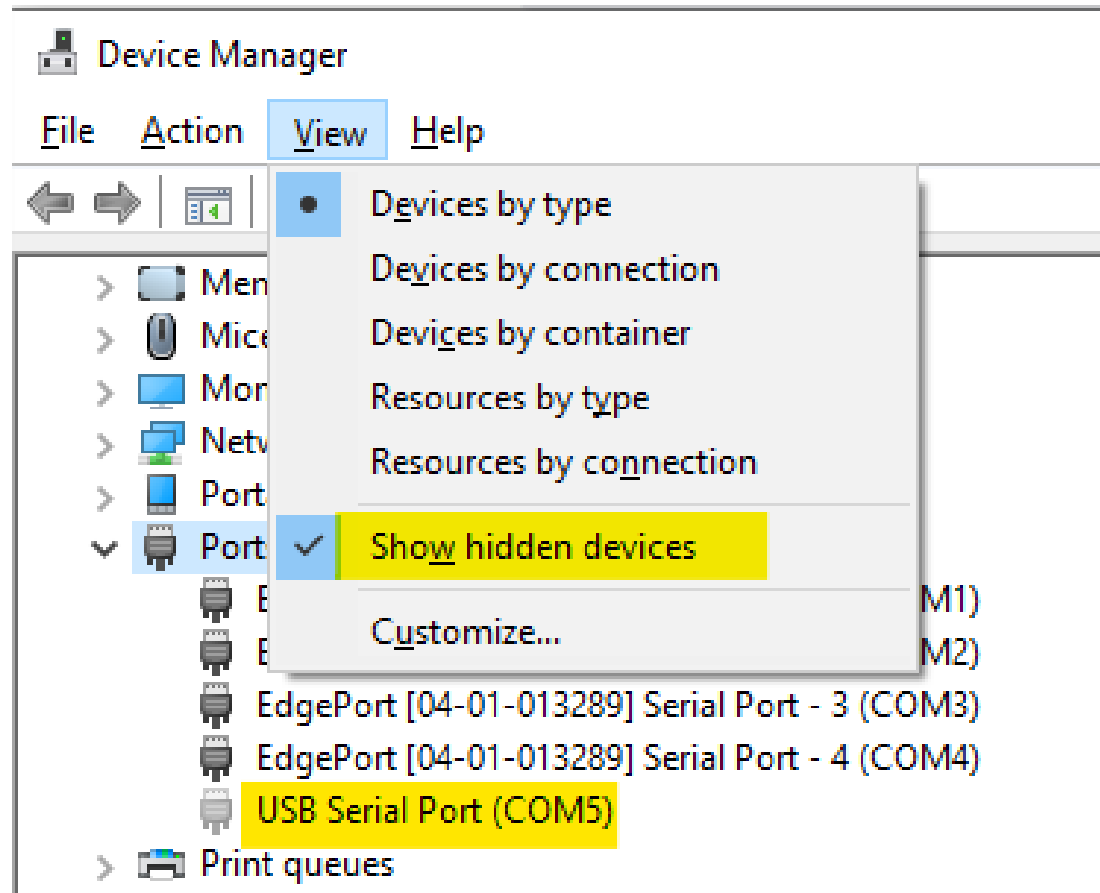
A screenshot of the 'Edit System Variable' dialog box. The title bar says 'Edit System Variable' with a close button (X) on the right. Inside the dialog, there are two text input fields. The first is labeled 'Variable name:' and contains the text 'devmgr\_show\_nonpresent\_devices'. The second is labeled 'Variable value:' and contains 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.

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



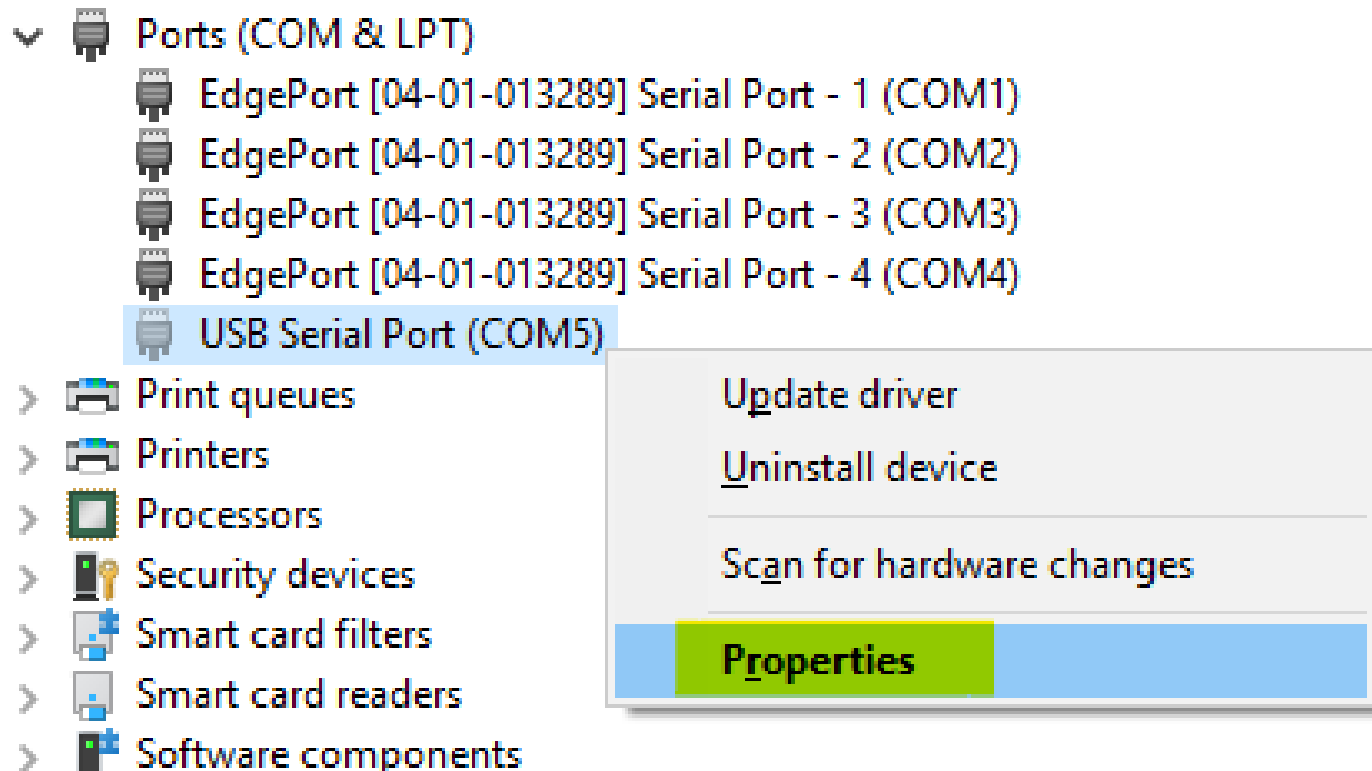
# Windows Device Manager

## Always select View → Show hidden devices



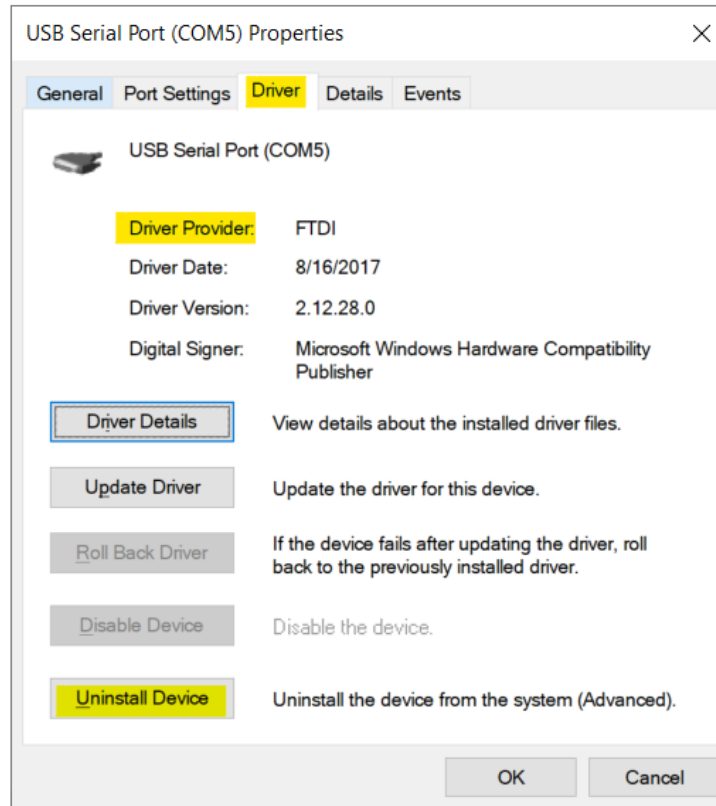
# Expand Ports section

Right click gray (offline) devices,  
Properties



# Click Driver Tab

## Check that Driver Provider is *not* Prolific



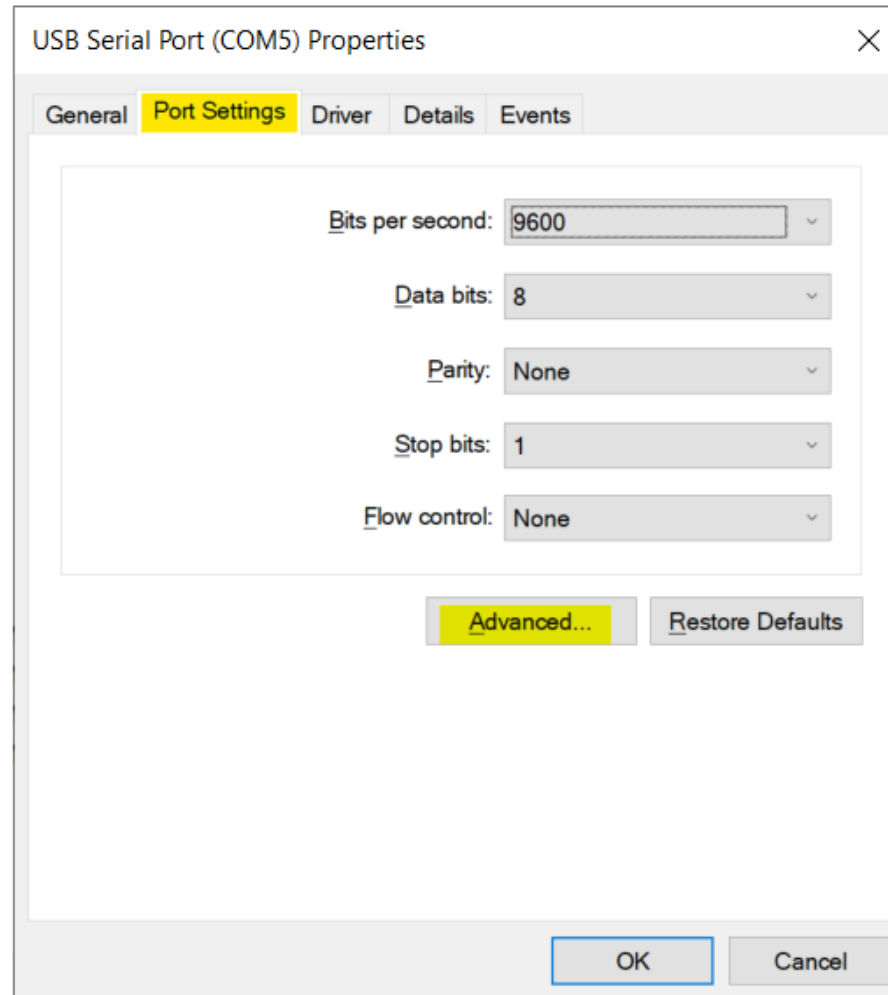
- If you see **Prolific**, click **Uninstall Device**



# 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

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

OK

Cancel

Defaults



# Change the FTDI Options To This:

Miscellaneous Options

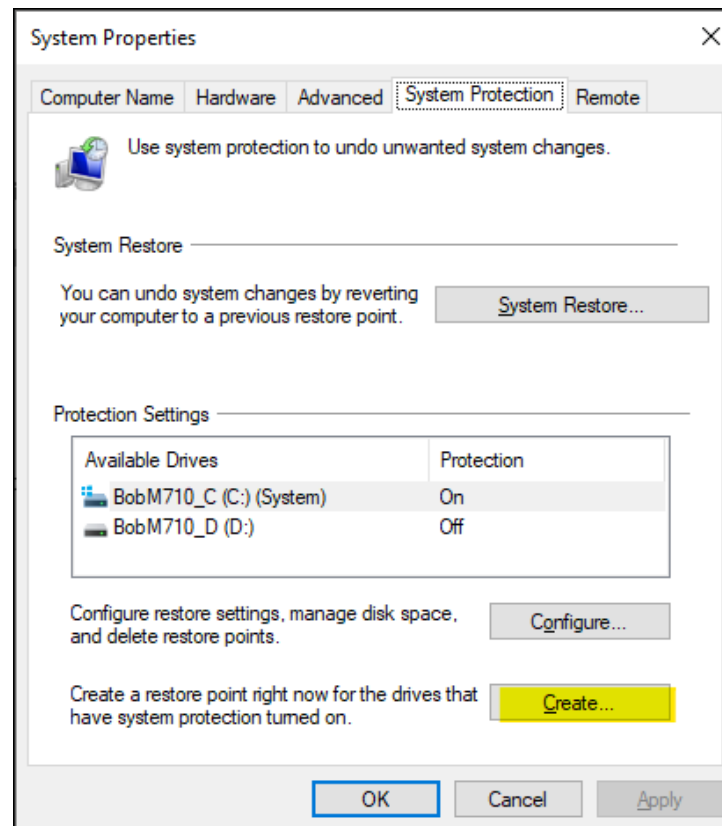
Serial Enumerator	<input type="checkbox"/>
Serial Printer	<input type="checkbox"/>
Cancel If Power Off	<input type="checkbox"/>
Event On Surprise Removal	<input type="checkbox"/>
Set RTS On Close	<input type="checkbox"/>
Disable Modem Ctrl At Startup	<input checked="" type="checkbox"/>
Enable Selective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

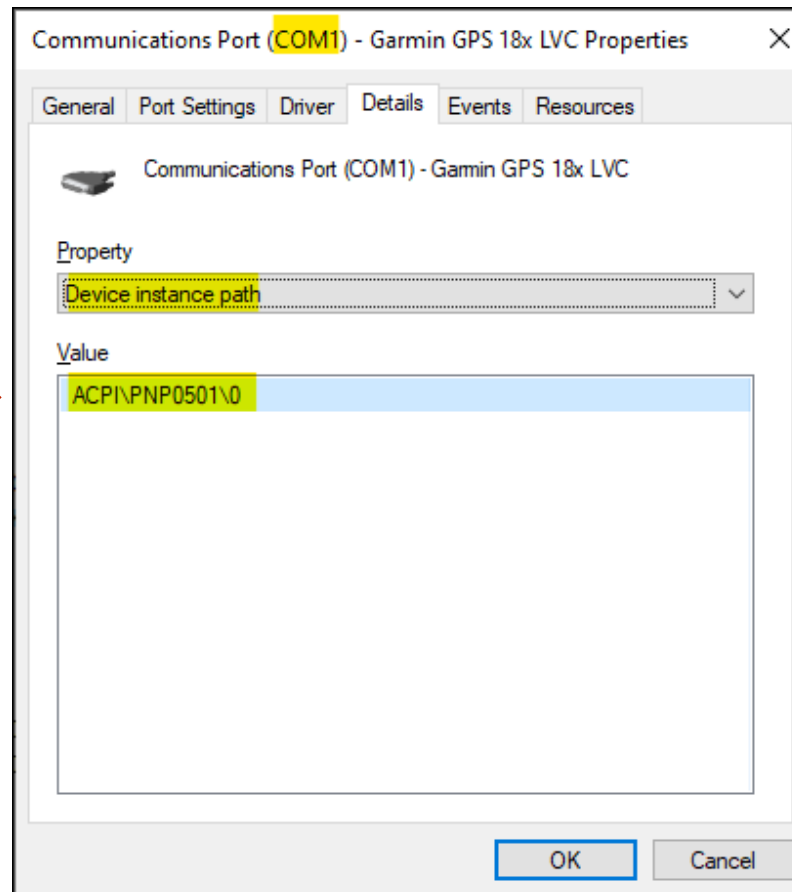
# Creating a Restore Point



# Locate Device Instance Path in Device Manager

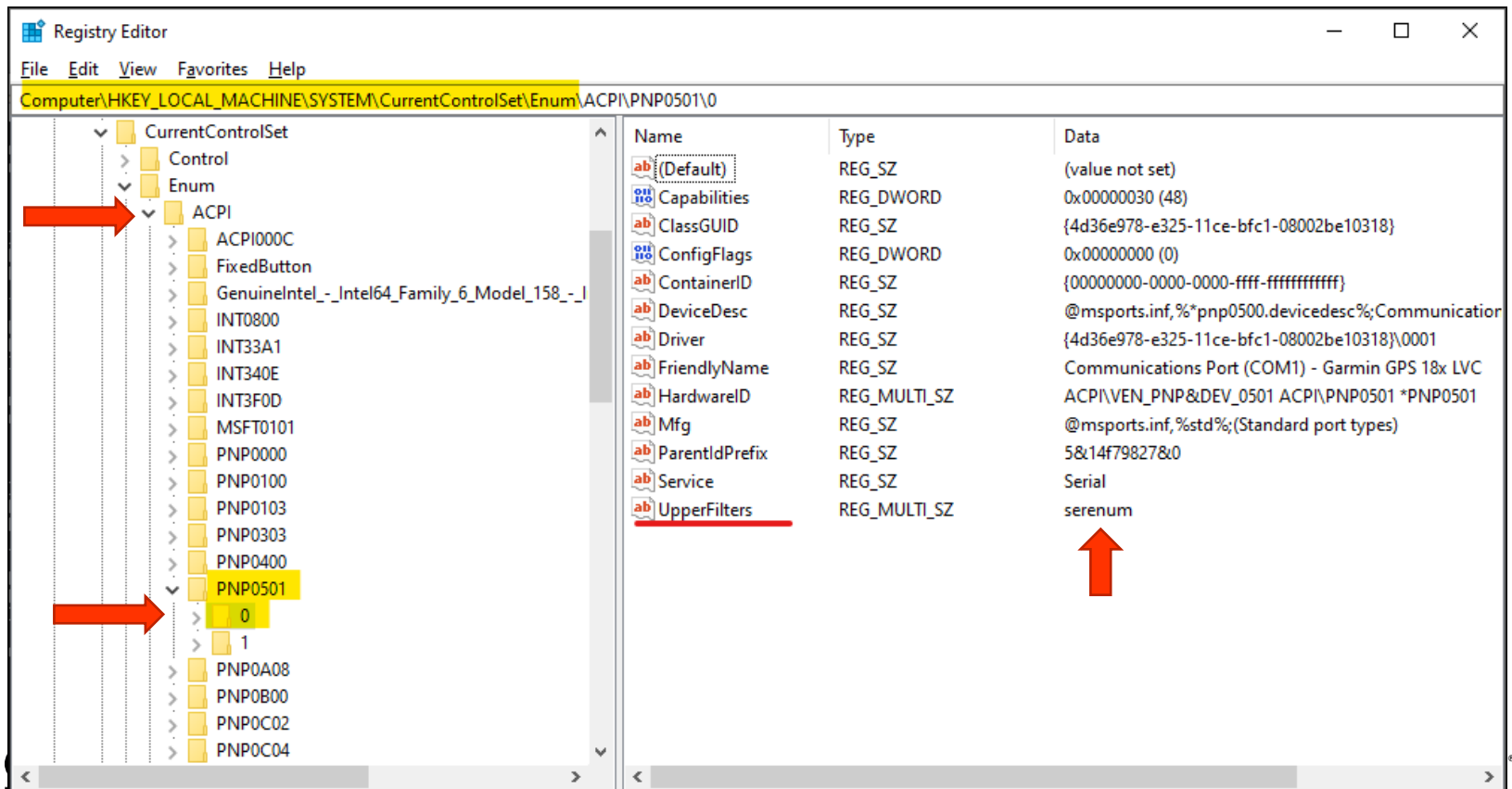


- Device Manager (devmgmt.msc), COM1:, Properties, Details



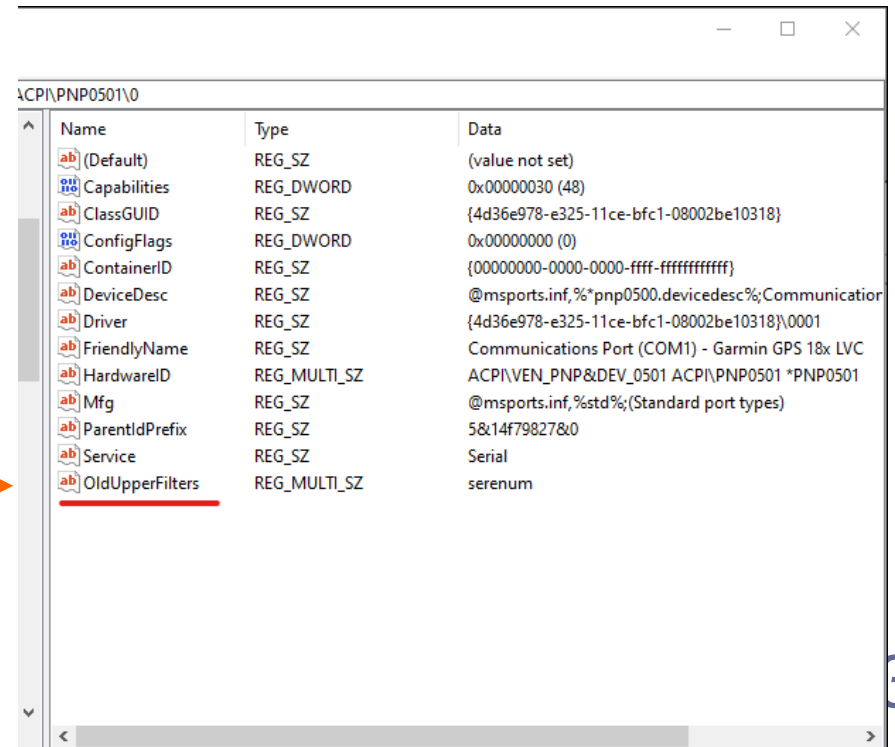
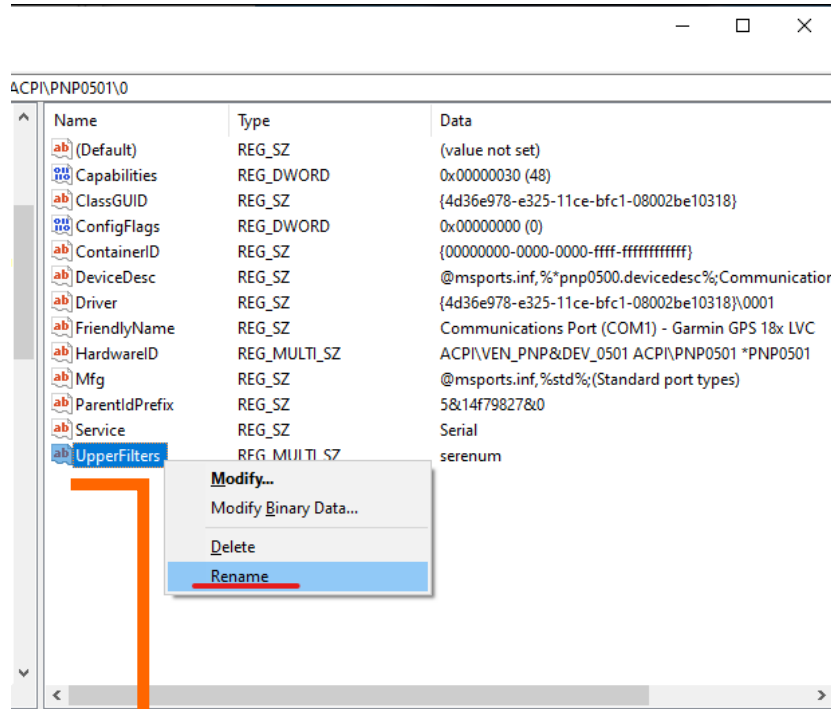
# Locate Device Instance Path in Registry

- Regedit, HKEY\_LOCAL\_MACHINE\SYSTEM\CurrentControlSet\Enum\

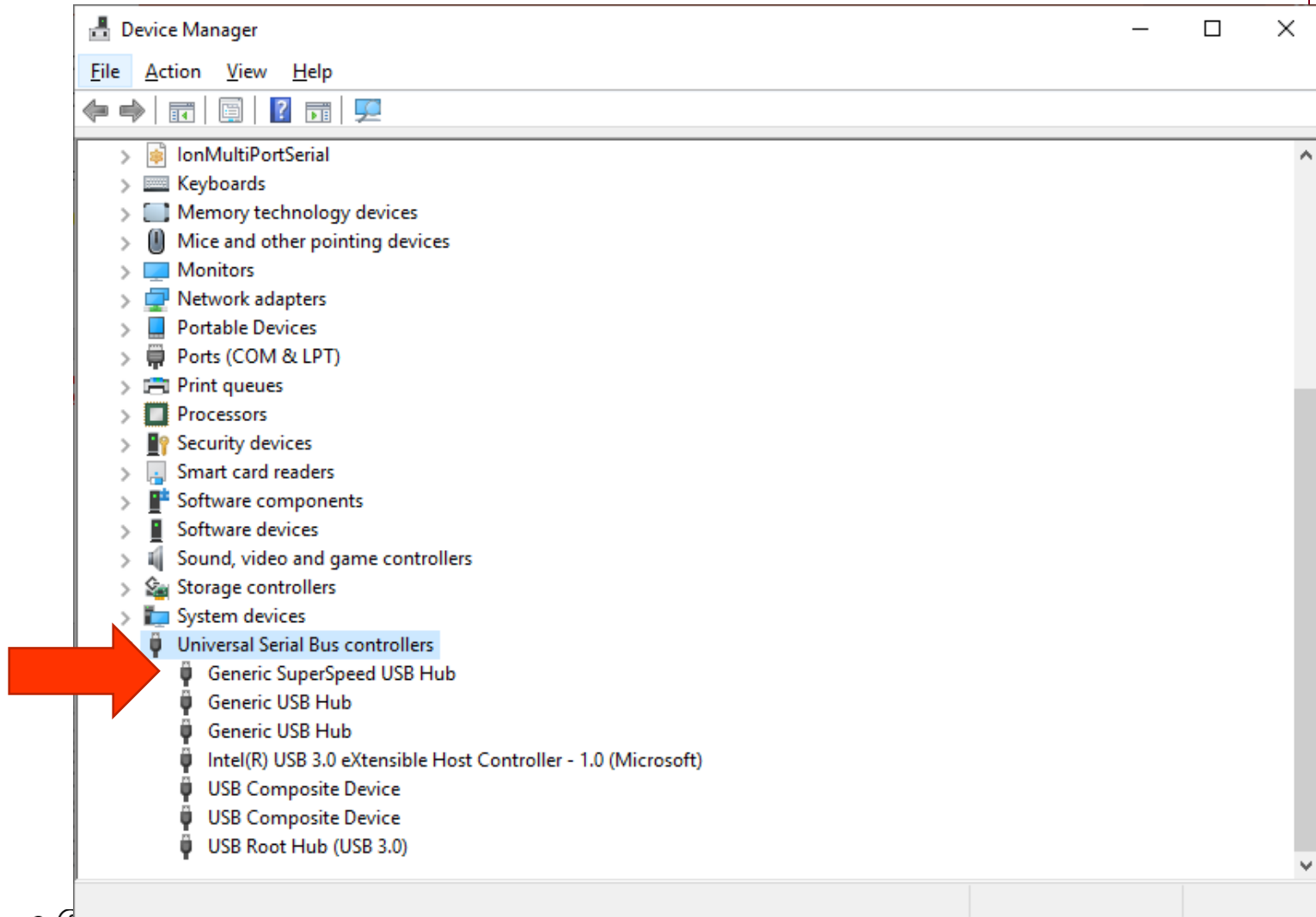




# Right Click, Rename Key to OldUpperFilters

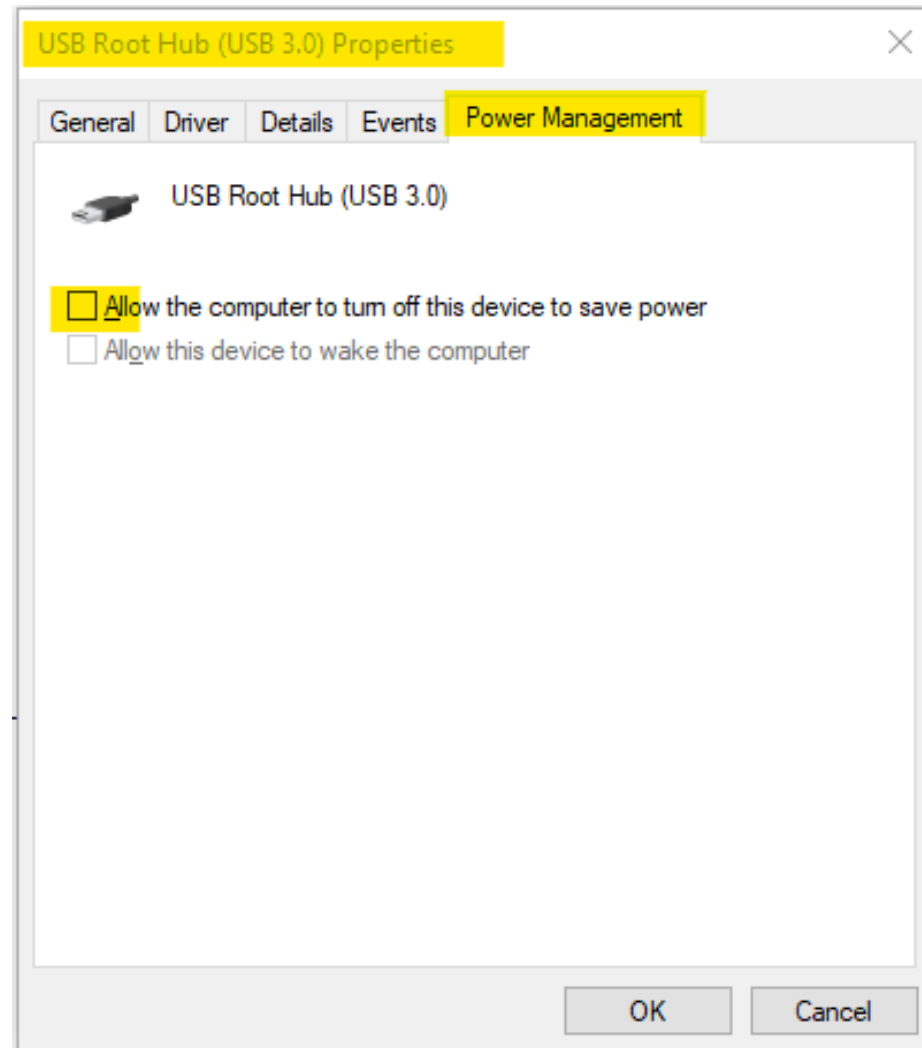


# Under USB Serial Bus Controllers: Right-Click each “Hub” device, Select Properties



# Look for Power Management Tab

## Do *not* allow computer to turn off this device

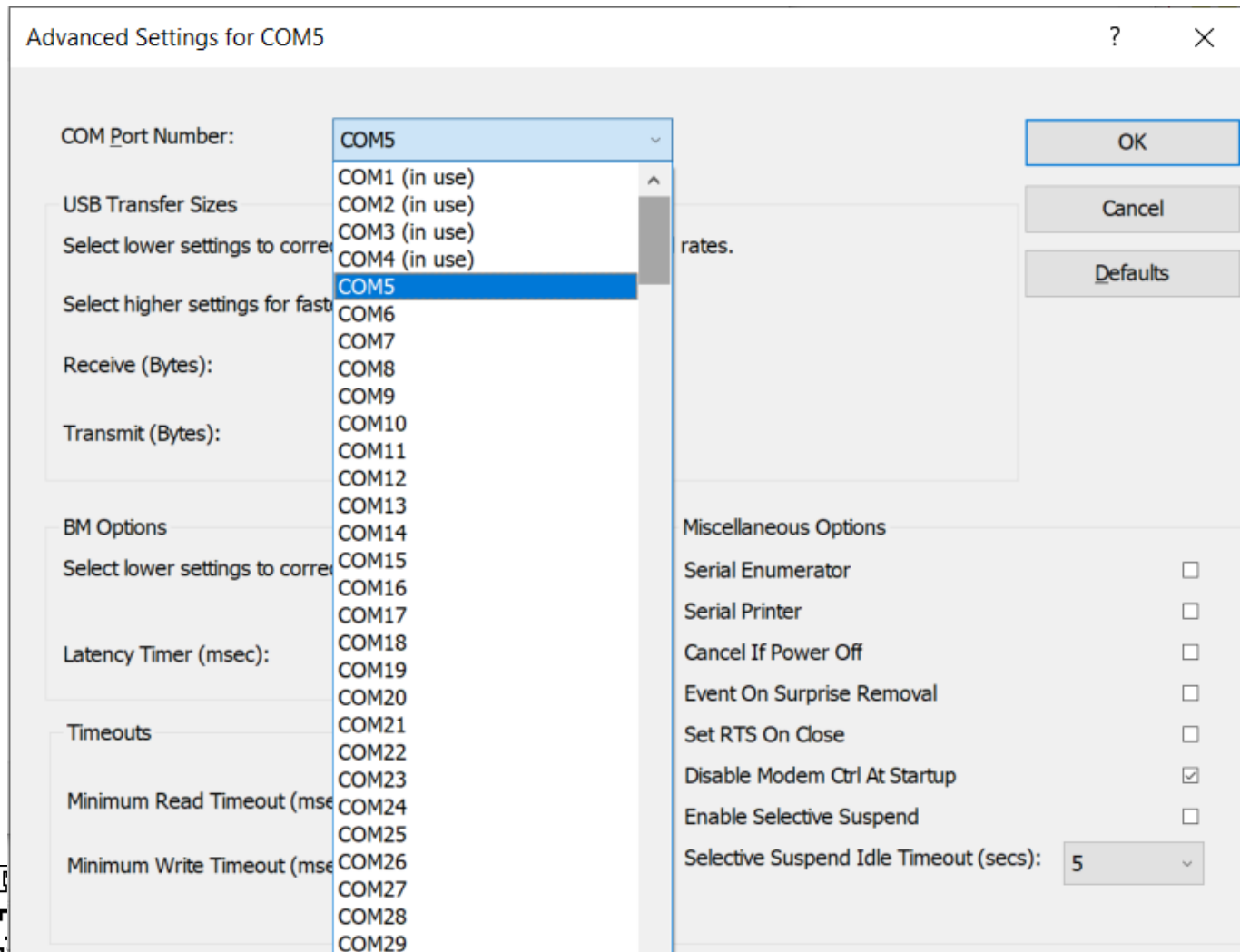




# Managing COM Port Numbers

- 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”

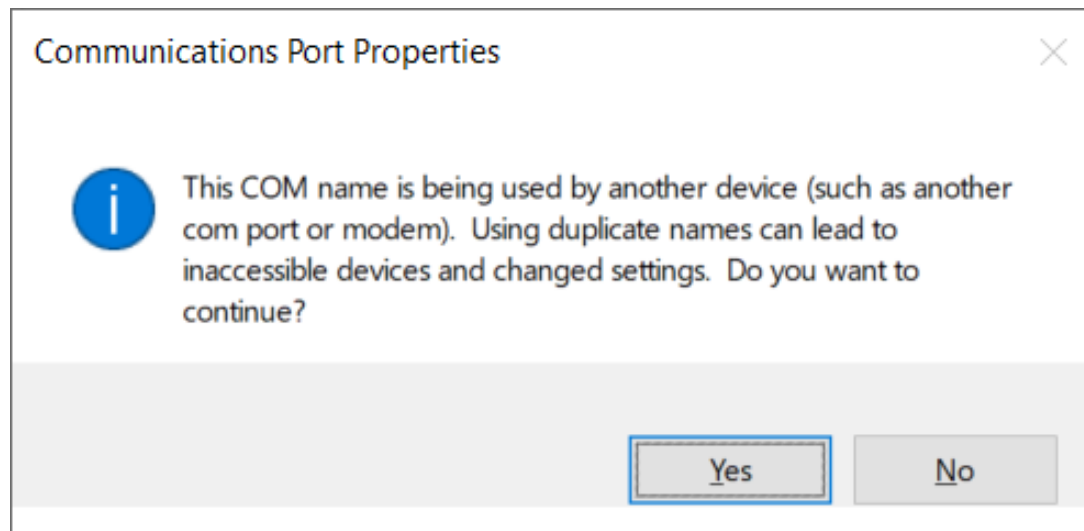
# Renumbering Serial Ports – Use Advanced Settings





# What does “In Use” Mean?

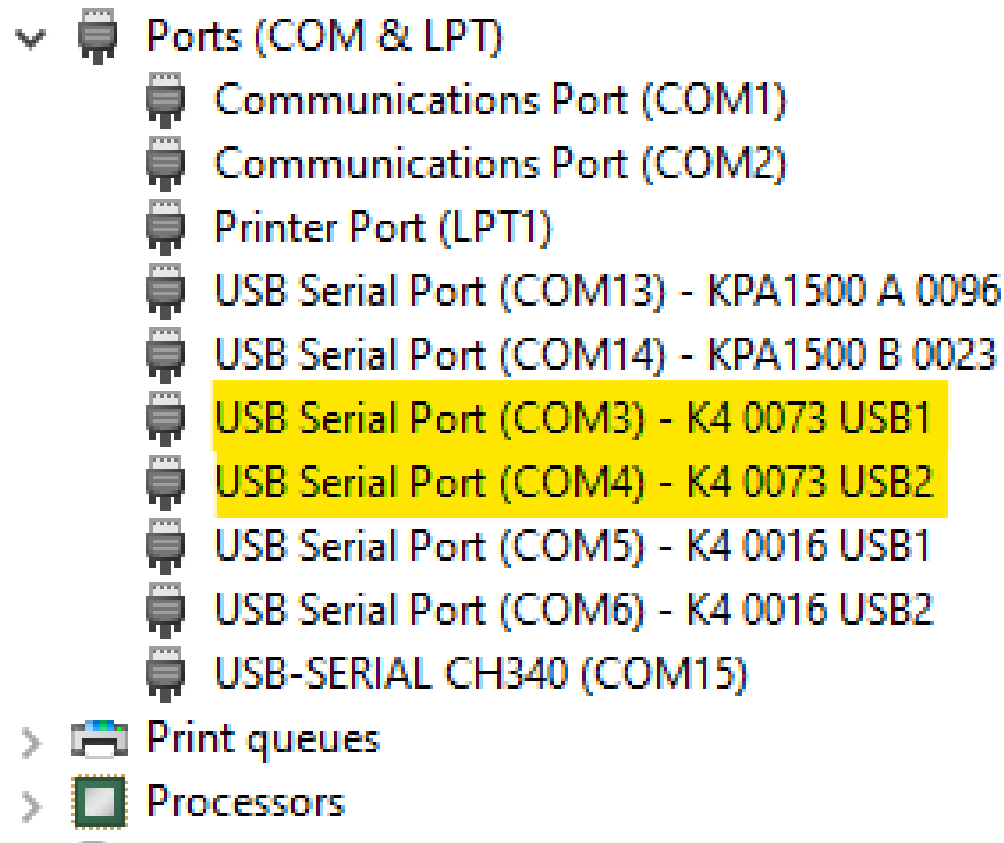
- It means this COM port number was assigned to some device, maybe years ago
- It usually does *not* mean that you can't use it during reassignment, especially if it is “grayed out” (hidden)
- Uninstalling disconnected devices first will help
- *Usually* safe to ignore this warning and click YES:





# Labeling Serial Ports

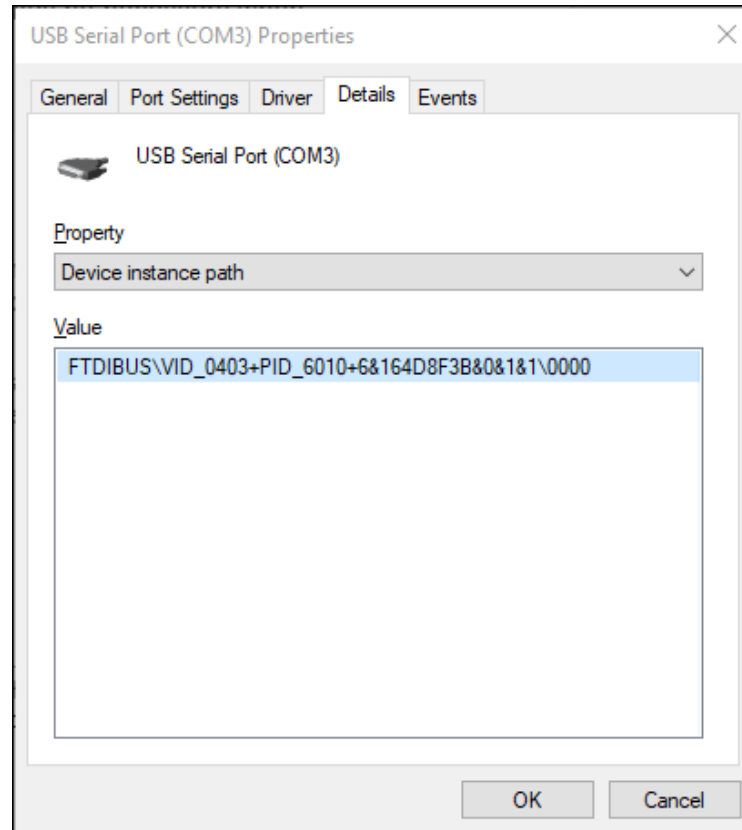
- Example:



# 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:

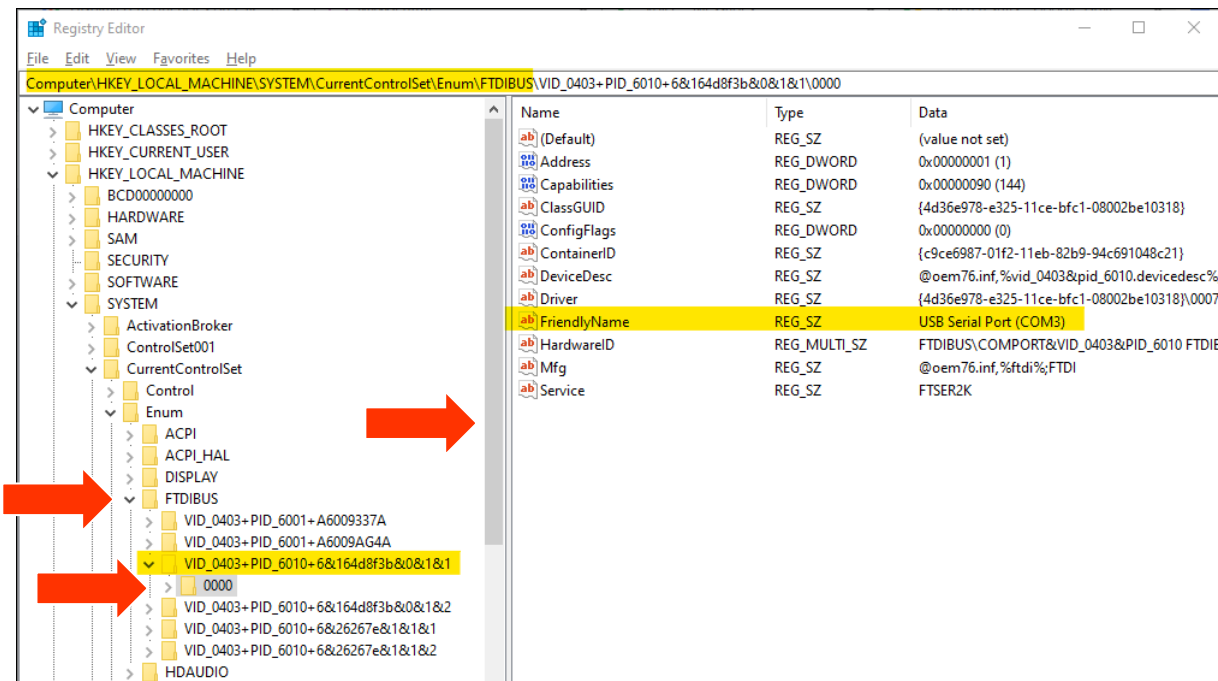




# Step 2 – Use Registry Editor (regedit)



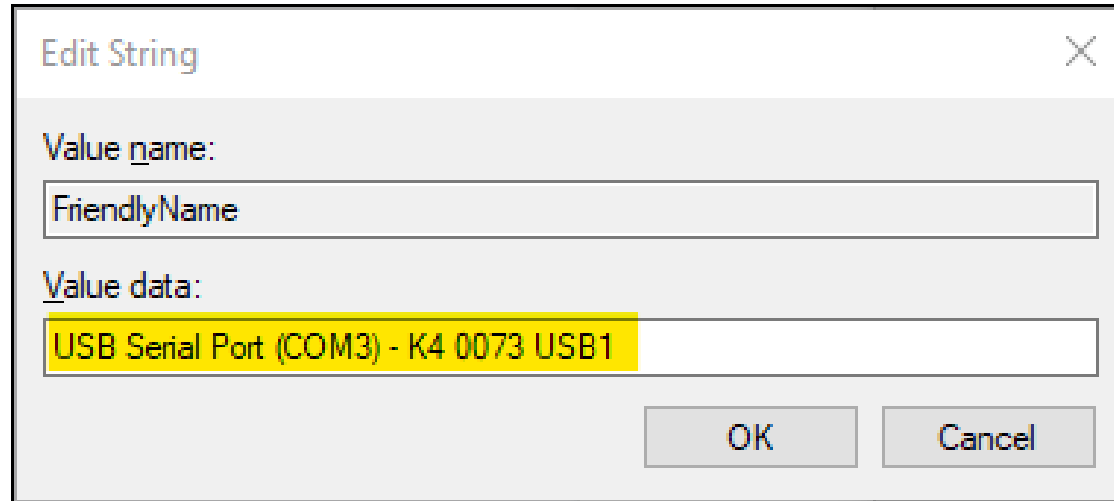
- Navigate to  
HKEY\_LOCAL\_MACHINE\SYSTEM\CurrentControlSet\Enum
- Device Instance Path, Subkey 0000 will have the  
**FriendlyName**





## Step 3 – Change the FriendlyName

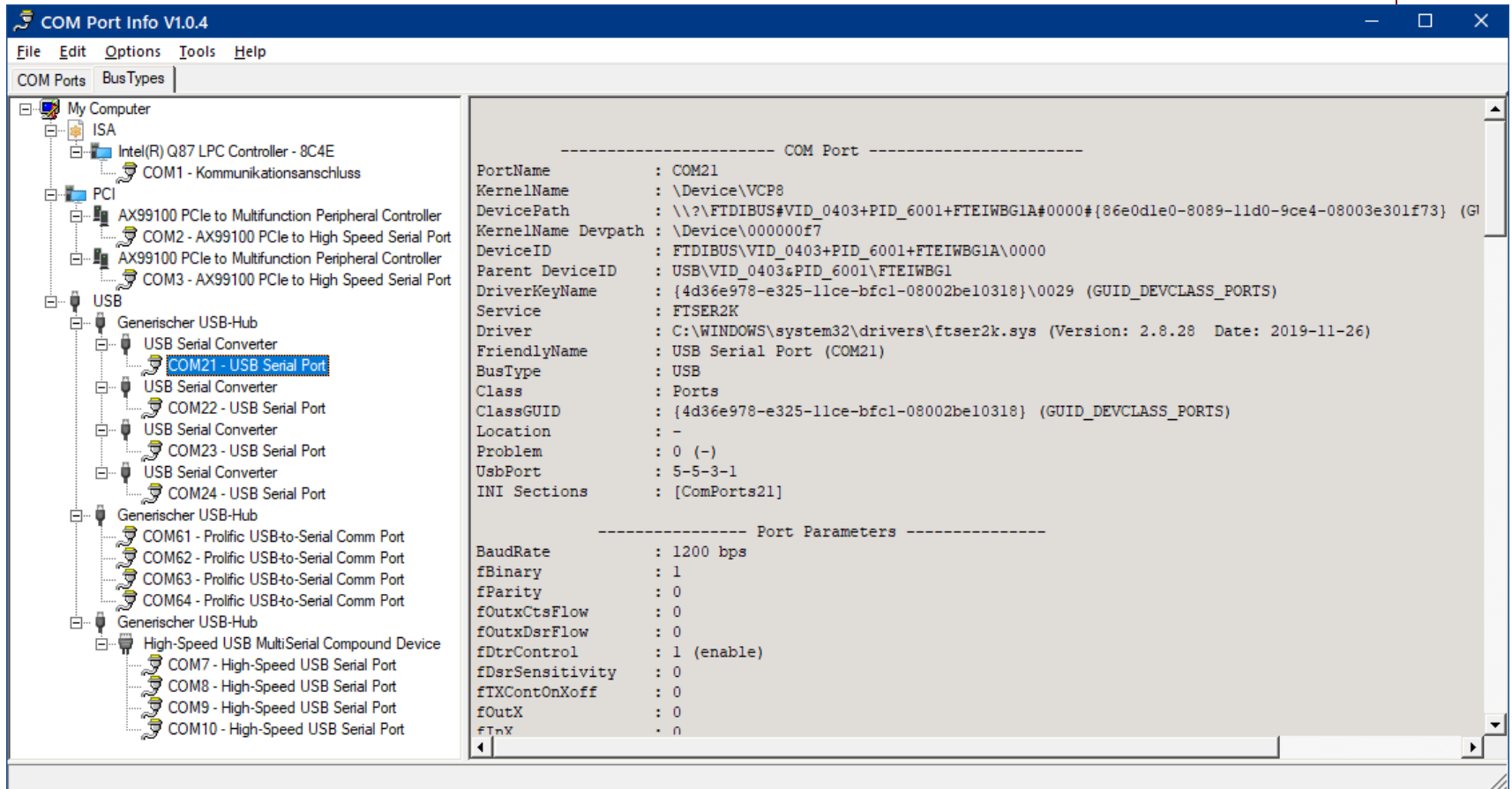
- Double-click on **FriendlyName** (or Right-click, **Modify...**)
- Edit the FriendlyName value and click **OK**



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

# ComPortMan / ComPortInfo

## by Uwe Seiber

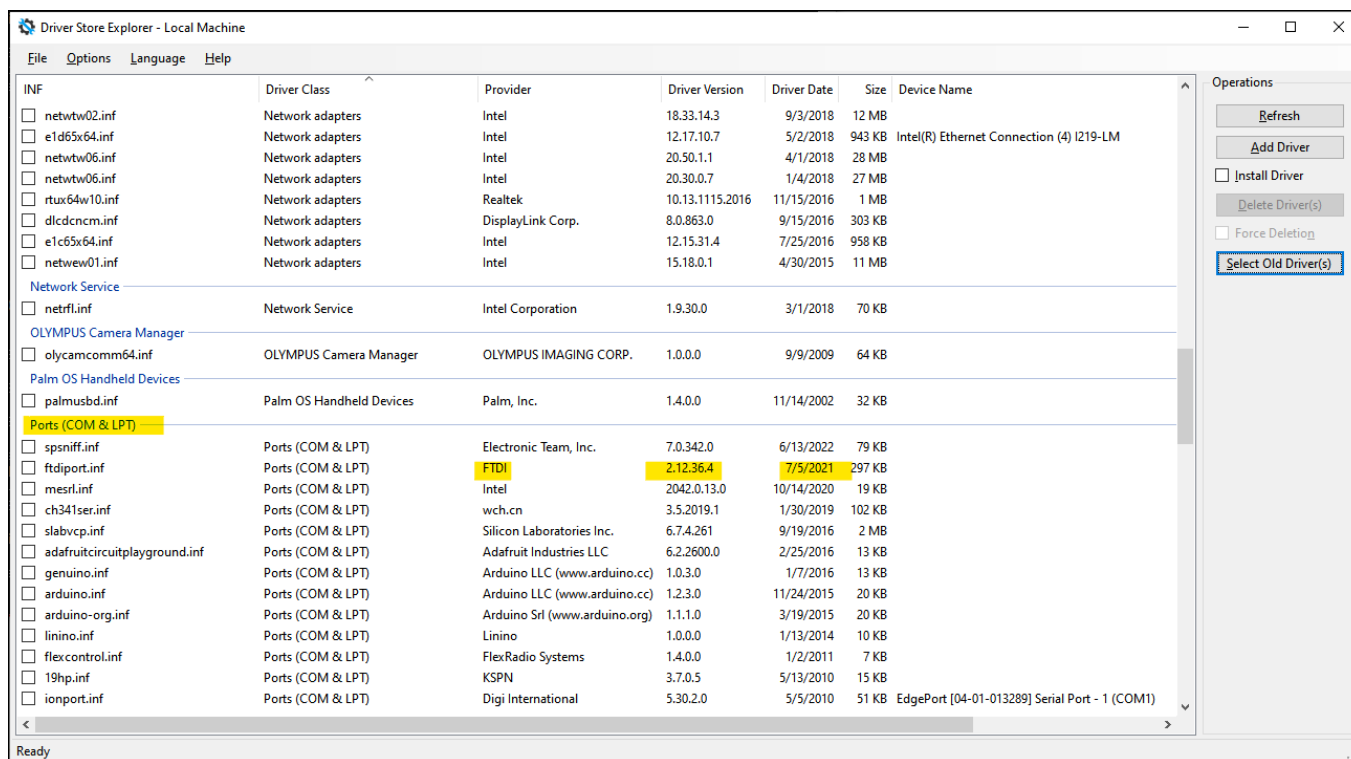


# Windows DriverStoreExplorer (Rapr.exe)



- Manage device driver *versions*

<https://github.com/lostindark/DriverStoreExplorer/releases/latest>



# Another USB Dev. Management Tool: NirSoft's USBDeview



- Stands for USB Device View
- [https://www.nirsoft.net/utils/usb\\_devices\\_view.html](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](mailto: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

# 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

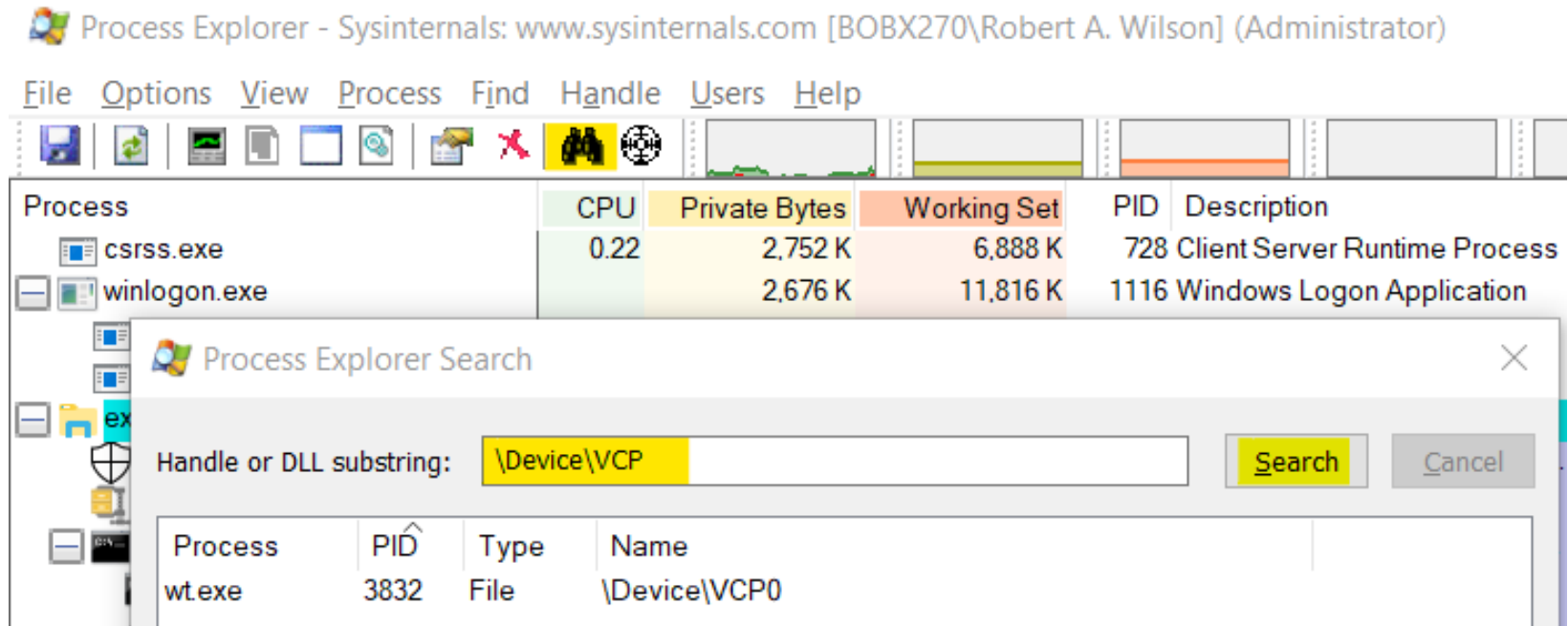
**\Device\Ser** – Hardware serial ports / CH341 (Mortty, Winkey)

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

**\Device\VSer** – Eltima / vspMgr virtual serial ports



# Process Explorer Search – Example 1

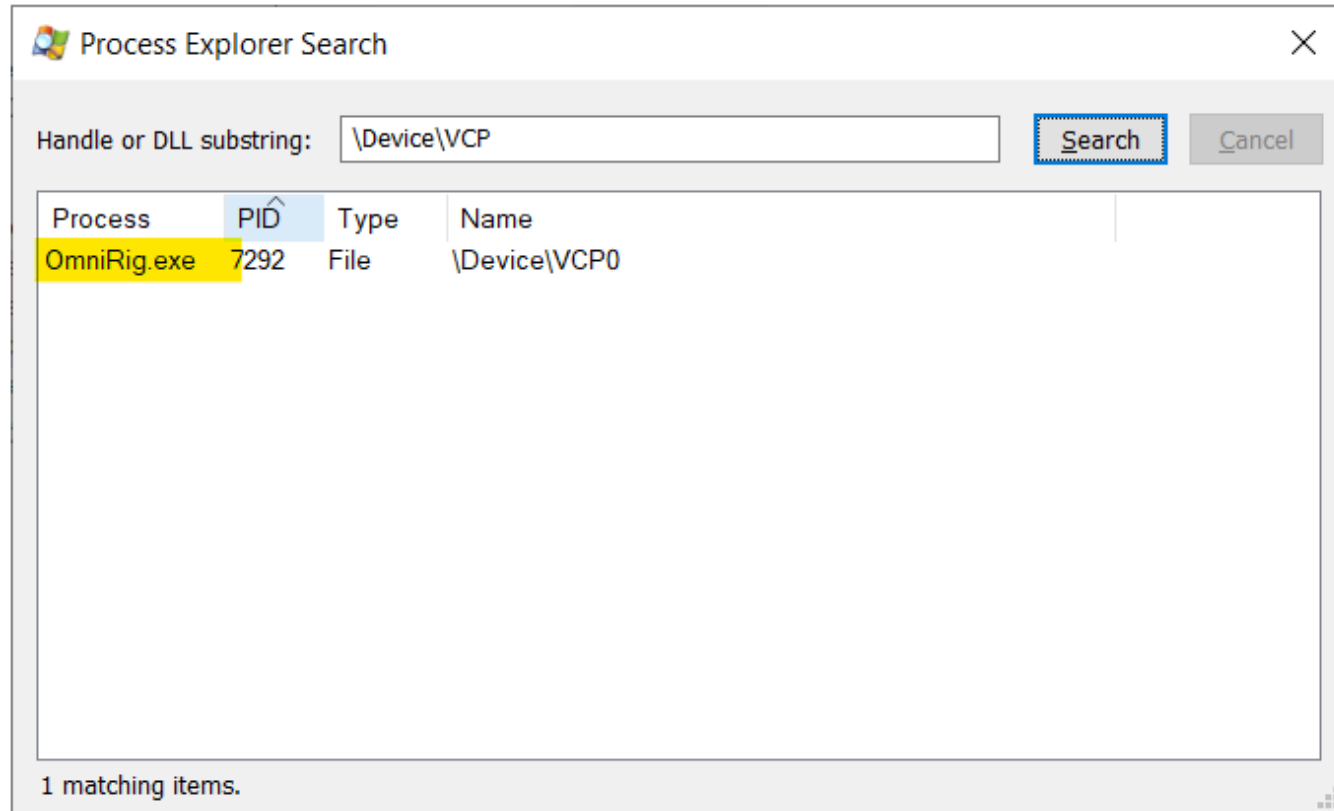


Win-Test (**wt.exe**) has opened the FTDI Virtual COM Port (VCP)





## Process Explorer Search – Example 2

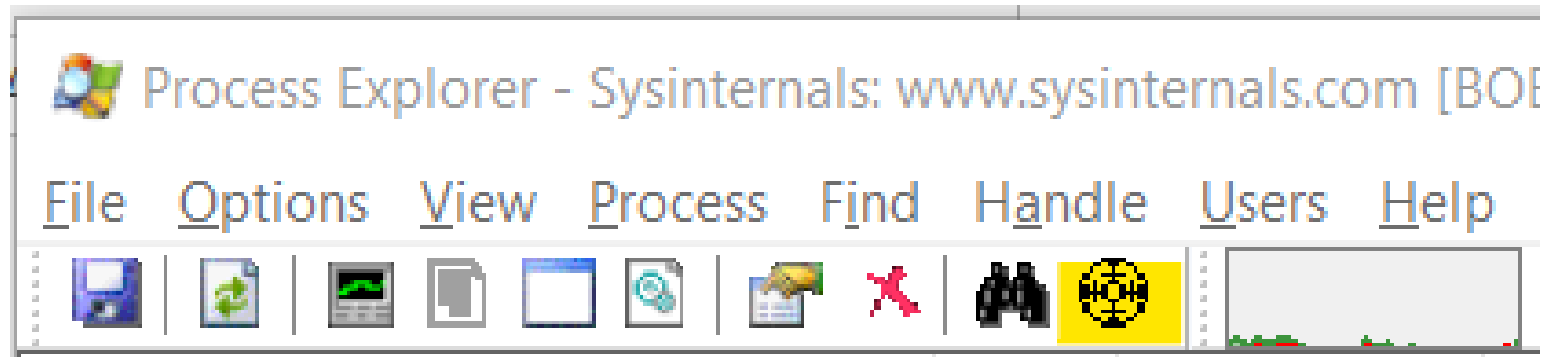


**OmniRig.exe** (e.g. WSJT-X, Log4OM) has opened the FTDI VCP



## 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



Process Explorer - Sysinternals: www.sysinternals.com [BOBX270\Robert A. Wilson] (Administrator)

File Options View Process Find Handle Users Help

Process

- winlogon.exe
- fontdrv...
- dwm.exe
- explorer.exe
- Security...
- WzPrelo...
- cmd.exe
- conferen...
- process...
- wt.exe
- Snipping...
- mspaint...
- chrome...

Type

- Desktop
- File
- File
- File
- File
- File
- File
- File
- File
- Event
- Directory
- Directory
- Directory
- Directory
- ALPC Port
- Directory

CPU Usage: 7.10% Commit Charge: 28.77% Processes: 210 Physical Usage: 31.98%

View Menu:

- System Information... Ctrl+I
- Show Process Tree Ctrl+T
- Show Column Heatmaps
- Scroll to New Processes
- Show Unnamed Handles and Mappings
- Show Processes From All Users
- Opacity
- Show Lower Pane Ctrl+L
- Lower Pane View
- Refresh Now F5
- Update Speed
- Organize Column Sets...
- Save Column Set...
- Load Column Set
- Select Columns...

Lower Pane View Sub-menu:

- DLLs Ctrl+D
- Handles Ctrl+H

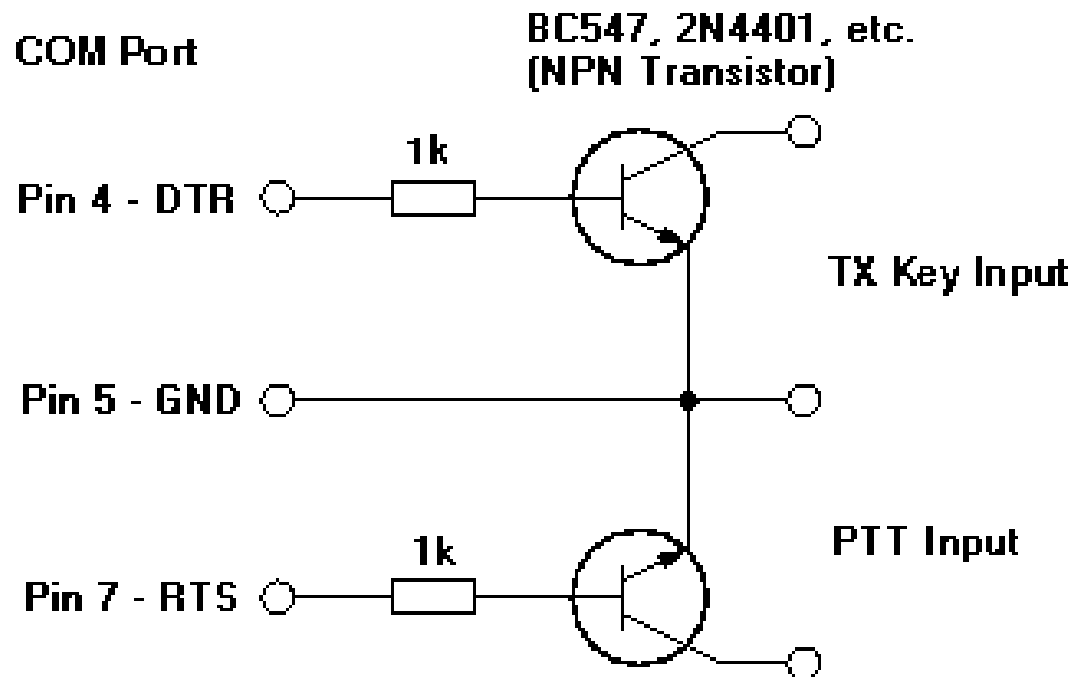
Process List:

PID	Description	Company Name
1116	Windows Logon Application	Microsoft Corporation
1172	Usermode Font Driver Host	Microsoft Corporation
1248	Desktop Window Manager	Microsoft Corporation
7544	Windows Explorer	Microsoft Corporation
10476	Windows Security notification ...	Microsoft Corporation
12876	WinZip Preloader	WinZip Computing, S.L.
10552	Windows Command Process...	Microsoft Corporation
10840	Console Window Host	Microsoft Corporation
	explorer	Sysinternals - www.sysinter...
	er	
		Microsoft Corporation
11236	Paint	Microsoft Corporation
12820	Google Chrome	Google Inc.
7272	Google Chrome	Google Inc.

# 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:



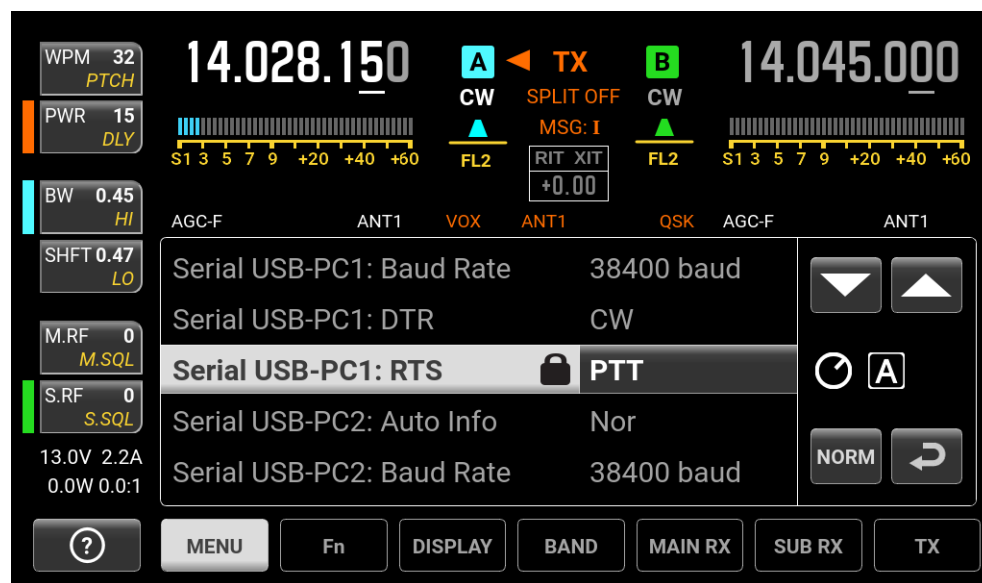


# Elecraft K3 / K3S keying via serial port

- 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:

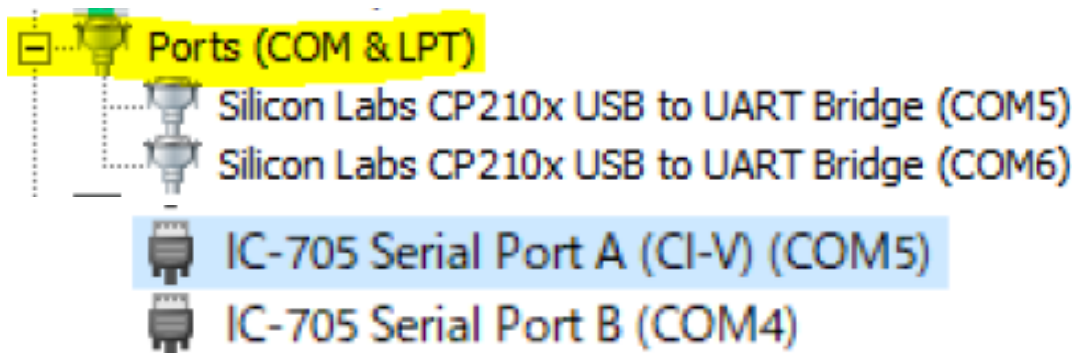


- Change FTDI Port Settings:
  - Uncheck “Serial Enumerator”
  - Check “Disable Modem Ctrl At Startup”

# 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-7760, IC-7850, IC-7851
- IC-7300 USB cable provides just *one* virtual serial port
- IC-705, IC-7610, IC-7760, IC-7850, IC-7851 provides *two* virtual serial ports:



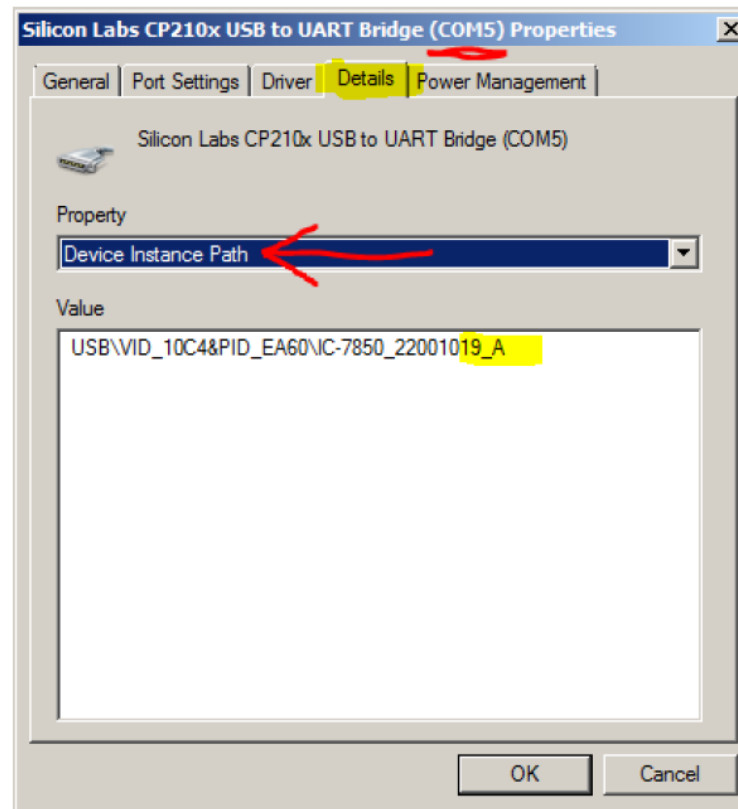
- To keep it simple use DTR pin for keying, RTS pin for PTT
- Use port “B” for MMTTY exclusively
- Mnemonic: CW : DTR : FSK • PTT : RTS : Send

◦ GTU ◦



## 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-705 **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-7760 Keying via USB Cable

- USB cable provides *two* virtual serial ports
- In IC-7760 **SET > Connectors > USB SEND/KEYING** menu:  
Set **USB Keying (CW)** to **USB (A) DTR**  
Set **USB Keying (RTTY)** to **USB (B) DTR**  
Set **USB Send** to **USB (A) RTS (CW)** or **USB (B) RTS (RTTY)**
- In Logging Software, rig control COM Port (USB (A))  
set DTR=CW, RTS=PTT
- In MMTTY, use **EXTFSK** or **EXTFSK64** to select second COM port (USB (B))  
FSK=DTR, PTT=RTS
- Cannot use *both* ports for hardware PTT, so use “Software PTT” on Rig Control Port (USB (A)) if necessary.

◦ CTU ◦



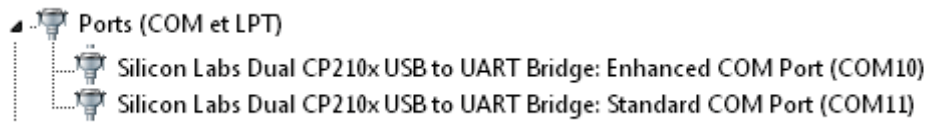
## ICOM IC-7850, IC-7851 Keying via USB Cable

- USB cable provides *two* virtual serial ports
- In IC-7851 **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.



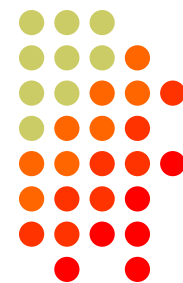
# Yaesu FT-991 Keying via USB Cable

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

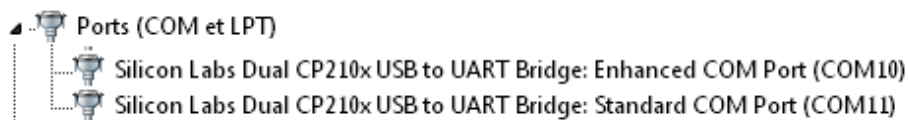


- In Yaesu Menu, set  
**030 232C TOT: 1000 msec** (default is only 10 msec)  
**033 CAT RTS: Disable** (Turns off RS232 handshaking)  
**060 PC Keying: DTR**  
**071 DATA PTT SELECT: RTS**  
**098 RTTY SHIFT PORT: DTR**  
**110 SSB PTT SELECT: RTS**
- In Logging Software, rig control is via the “Enhanced” 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:

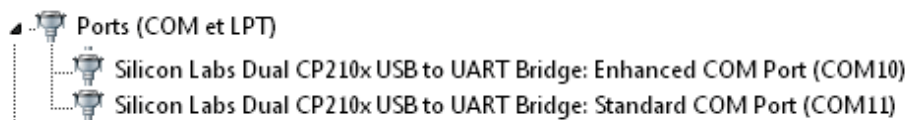


- In Yaesu Menu, set
  - OPERATION SETTING / GENERAL:  
**232C TIME OUT TIMER: 1000 msec** (default is only 10 msec)  
**CAT RTS: OFF** (Turns off RS232 handshaking)
  - RADIO SETTING / MODE SSB, RTTY, and PSK/DATA:  
**RPTT SELECT: RTS** (FSK will be by **DTR**)
  - RADIO SETTING / MODE CW:  
**PC KEYING: DTR** (PTT not available)
- 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 FTdx10 Keying via USB



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



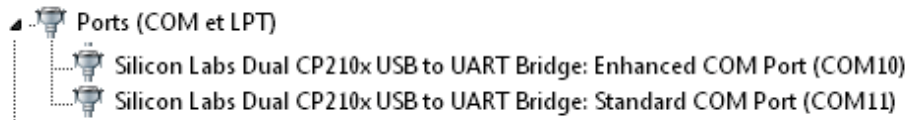
- In Yaesu Menu, set
  - OPERATION SETTING / GENERAL:  
**CAT TIME OUT TIMER: 1000 msec** (default is only 10 msec)  
**CAT RTS: OFF** (Turns off RS232 handshaking)
  - RADIO SETTING / MODE SSB, RTTY, and PSK/DATA:  
**RPTT SELECT: RTS** (FSK will be by DTR)
  - CW SETTING / MODE CW:  
**PC KEYING: DTR** (PTT not available)
- 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 FT-710 Keying via USB

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

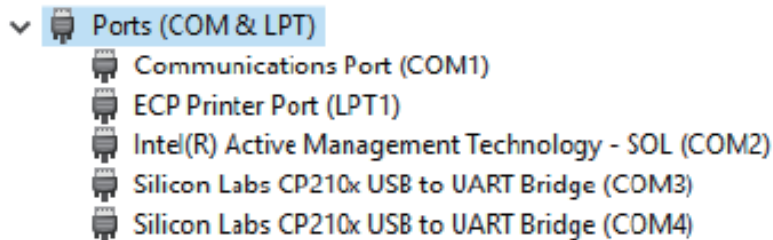


- In Yaesu Menu, set
  - OPERATION SETTING / GENERAL:  
**CAT1, CAT2, CAT3 TIME OUT TIMER: 1000 msec** (default is only 10 msec)  
**CAT RTS: OFF** (Turns off RS232 handshaking)
  - RADIO SETTING / MODE SSB, RTTY, and PSK/DATA:  
**RPTT SELECT: RTS** (FSK will be by DTR)
  - CW SETTING / MODE CW:  
**PC KEYING: DTR** (PTT not available)
- 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



Com12

Speed: 38400, Parity: N, DataBits: 8, Stop Bits: 1

DTR (pin 4): CW, RTS (pin 7): PTT, Radio Nr: 1

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

Two Radio Protocol: None, FootSwitch (pin 6): None

Radio Polling Rate: Normal

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

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	

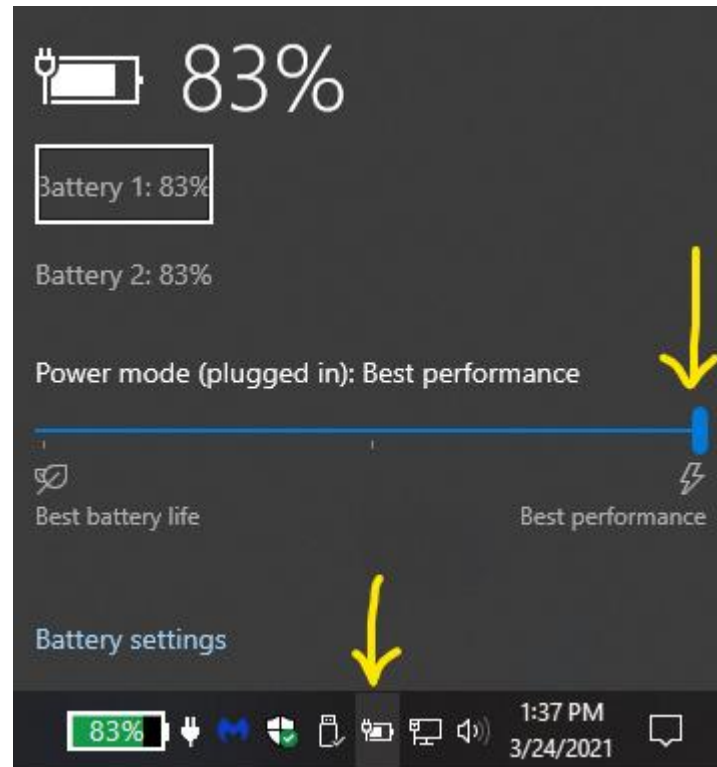
K3 Elecraft default settings

OK Cancel

# Notebook PC: Windows Power Mode Affects Timing



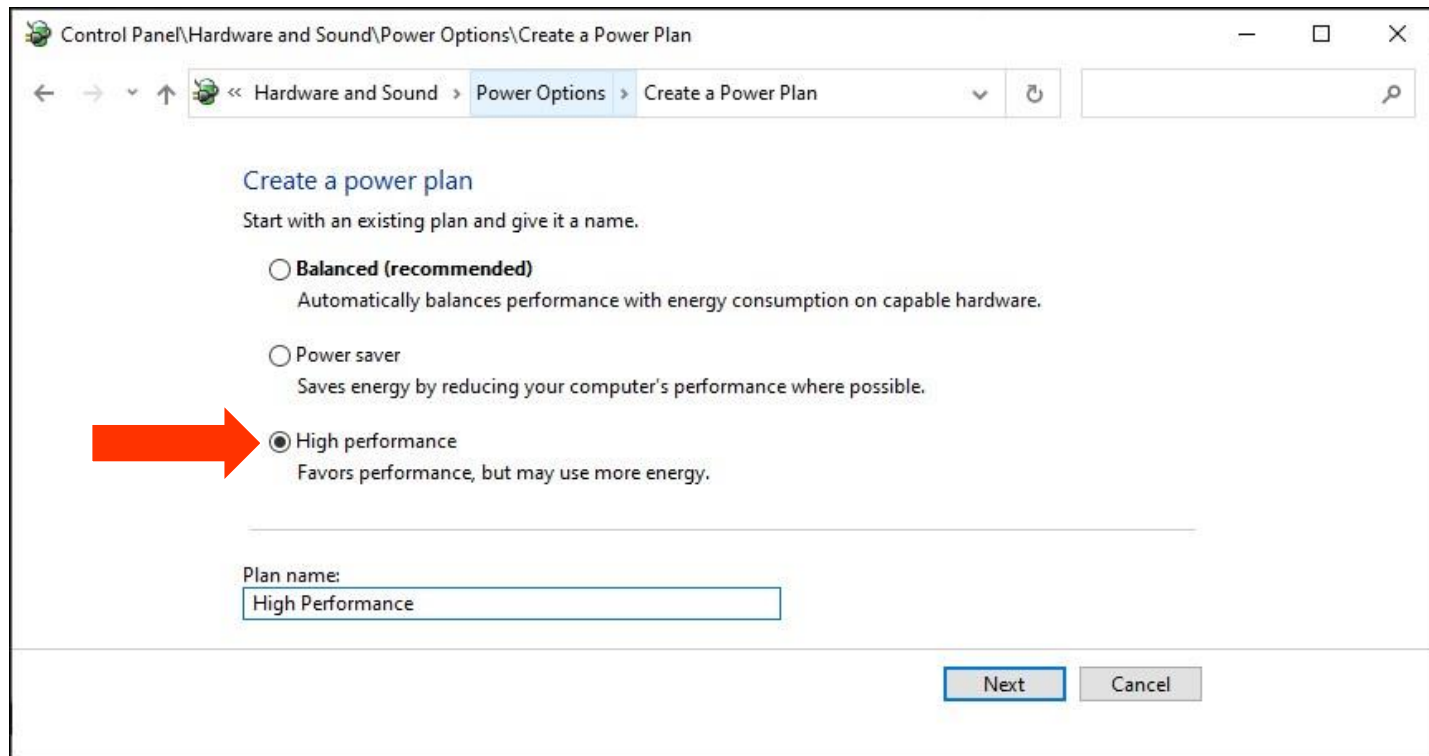
- CW Timing over USB is usually very good *if* you set Windows **Power Mode** to **Best Performance**:



# 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

Setup Ver1.68A

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

**DIDDLE**

☐ NONE  
☐ BLK  
☒ LTR

☐ Random  
☐ WaitTimer

**TX**

☒ UOS

☐ Double shift

☐ Disable Wait

☐ Disable Rev

☐ Always fix shift

Digital Output

Char. Wait

Diddle Wait

**PTT & FSK**

Port: **EXTFSK64**

☐ Invert Logic

**Radio command**

**TxBPF/TxLPF**

☒ Tx BPF Tap: 48 f

☐ Tx LPF Freq: 100 Hz

HAM Set Default(Demodulator) ? OK Cancel



# 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**

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**

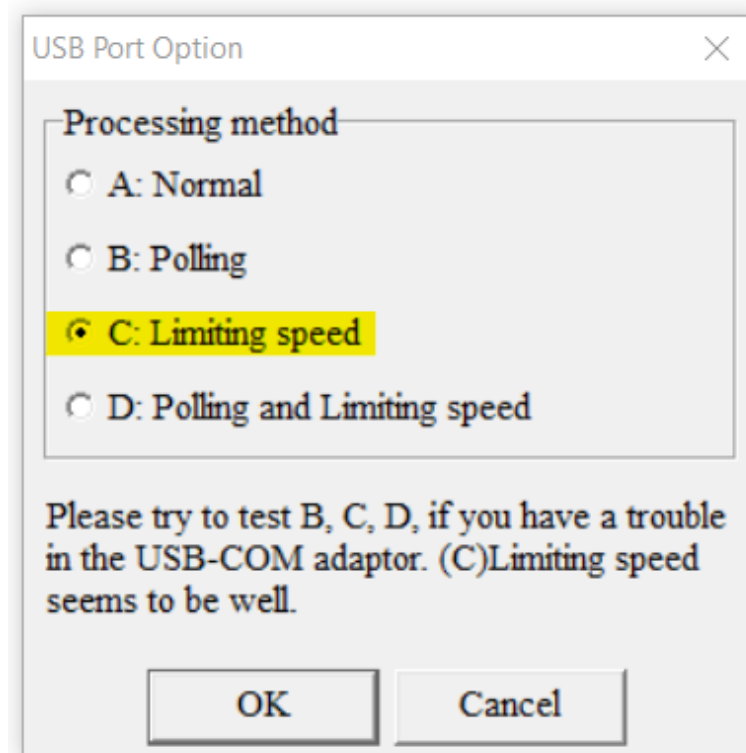
System Font  
Window Times New Roman Set 0  
Fixed pitch Courier New Set 0  
Japanese English

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

The screenshot shows the 'EXTFSK 2.0e' configuration window. At the top, the title bar reads 'EXTFSK 2.0e'. Below it, there is a 'Port' dropdown menu set to 'COM5' and a 'Status: OK' indicator. The window is divided into two main sections: 'FSK output' and 'PTT output'. In the 'FSK output' section, there are three radio buttons: 'TXD', 'RTS', and 'DTR'. The 'DTR' option is selected and highlighted with a yellow background. In the 'PTT output' section, there are also three radio buttons: 'TXD', 'RTS', and 'DTR'. The 'RTS' option is selected and highlighted with a yellow background. At the bottom of the window, there are two checkboxes: 'Inv. FSK' and 'Inv. PTT', both of which are unchecked. To the right of these checkboxes, the text '45 baud' is displayed in purple.



# 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, Tuner Genius) 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, JTDX, 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](#), VA2FSQ [Win4Yaesu](#) / [Win4K3Suite](#), AA6YQ [DXLab Suite](#)  
Allows sharing of Radio COM port with other applications
- Flex – SmartSDR CAT
- 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



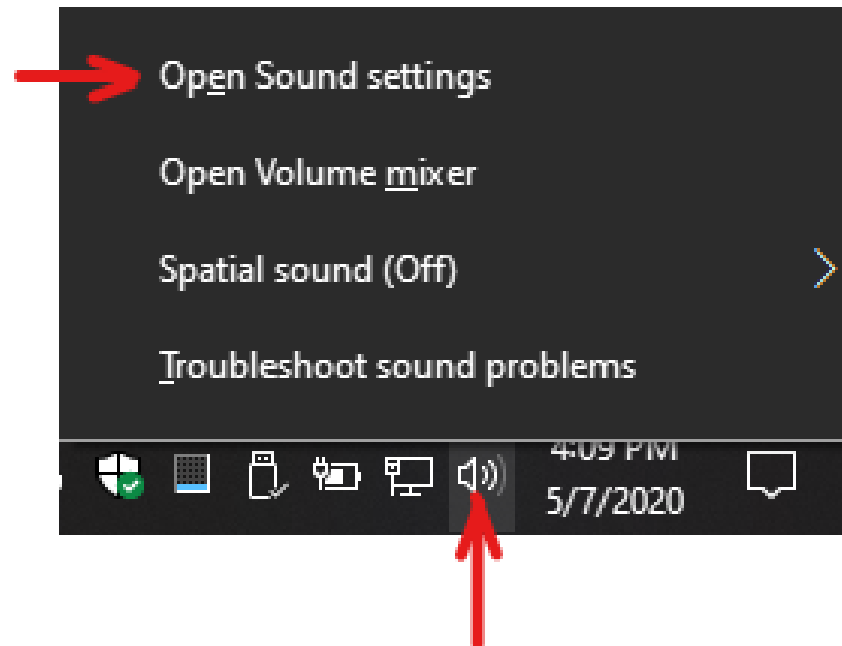
- Elecraft **K3**, Yaesu **FTdx3000**: USB and Serial Port do not operate independently (must pick one)
- USB and Serial Port *do* operate independently in:
  - Elecraft **K4**
  - Kenwood **TS-590S**, **TS-890S**, **TS-990S**
  - Yaesu **FTdx101D**, **FTdx101MP**, **FTdx10**
- ICOM USB and CI-V Ports (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
- Multiple “USB Audio CODEC” devices, which is my radio?
- Right click on Speaker icon, then **Open Sound settings**



# Access Sound Control Panel



Settings

Home

Find a setting

System

Display

Sound

Notifications & actions

Focus assist

Power & sleep

Battery

Storage

Tablet mode

Multitasking

Projecting to this PC

Shared experiences

Clipboard

Sound

Output

Choose your output device

Speaker/HP (Realtek High Definition Audio)

Related Settings

Bluetooth and other devices

Sound Control Panel

Microphone privacy settings

Device properties

Master volume

Troubleshoot

Manage sound devices

Input

Choose your input device

Microphone Array (Realtek High Definition Audio)

Device properties

Settings

Home

Find a setting

System

Display

Sound

Notifications & actions

Focus assist

Power & sleep

Battery

Storage

Tablet mode

Multitasking

Projecting to this PC

Shared experiences

Clipboard

Sound

Device properties

Test your microphone

Troubleshoot

Manage sound devices

Advanced sound options

App volume and device preferences

Customize app volumes and the speakers or devices they use.

Related Settings

Bluetooth and other devices

Sound Control Panel

Microphone privacy settings

Ease of Access audio settings

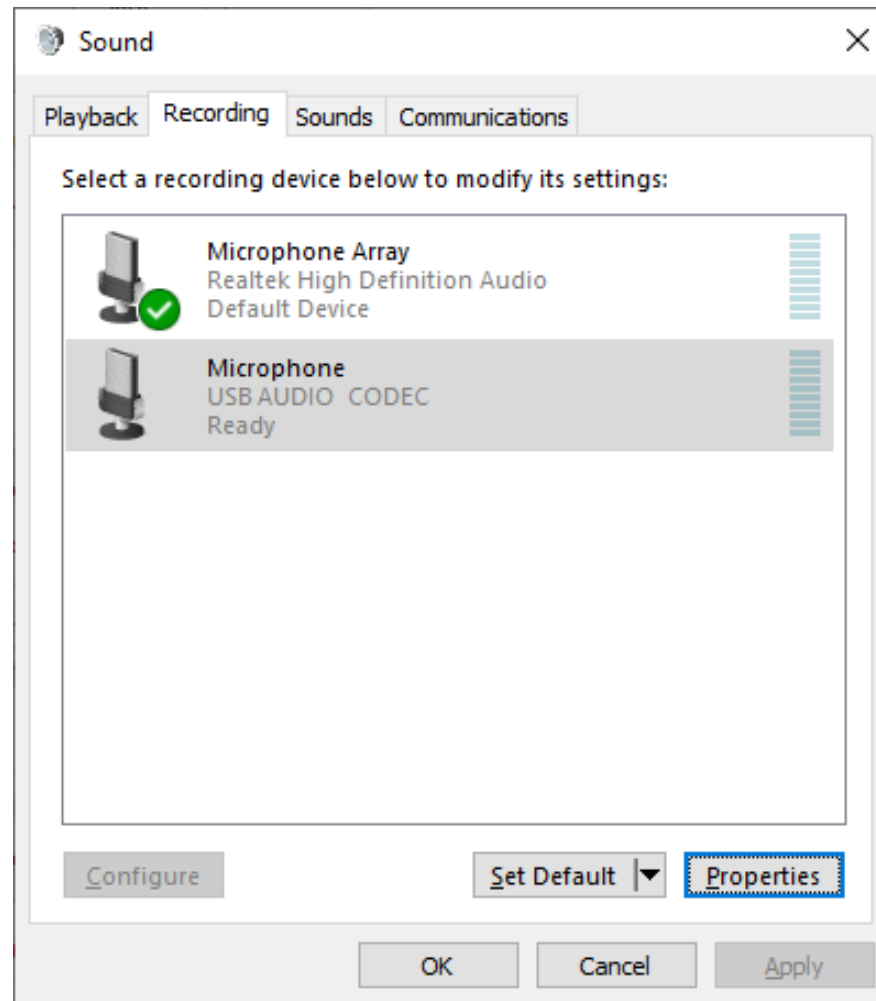
Have a question?

Setting up a microphone

Fixing sound problems

- Faster way:  
Windows Key  
+ R (run):  
**mmsys.cpl**

# Windows Sound Control Panel, Recording Tab

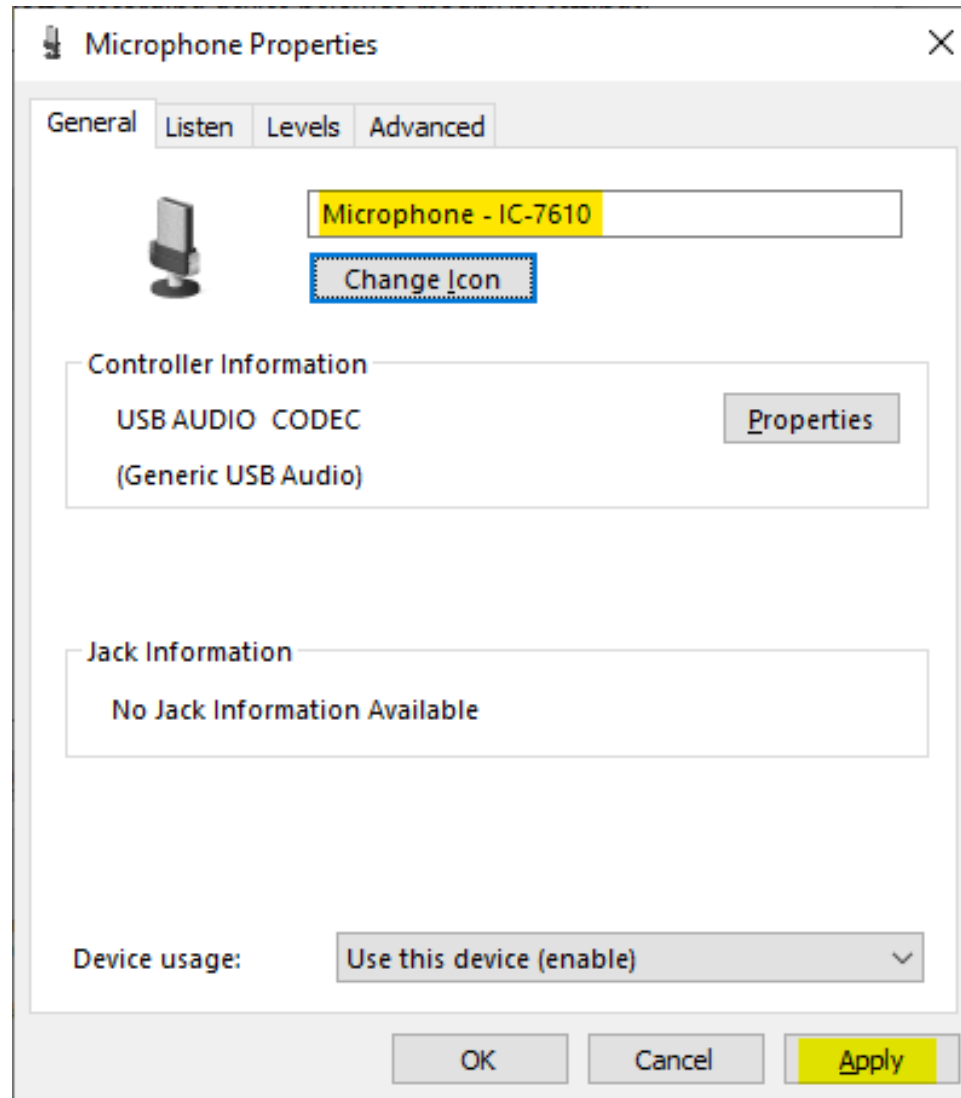


# In Sound Control Panel, which sound card is my radio?

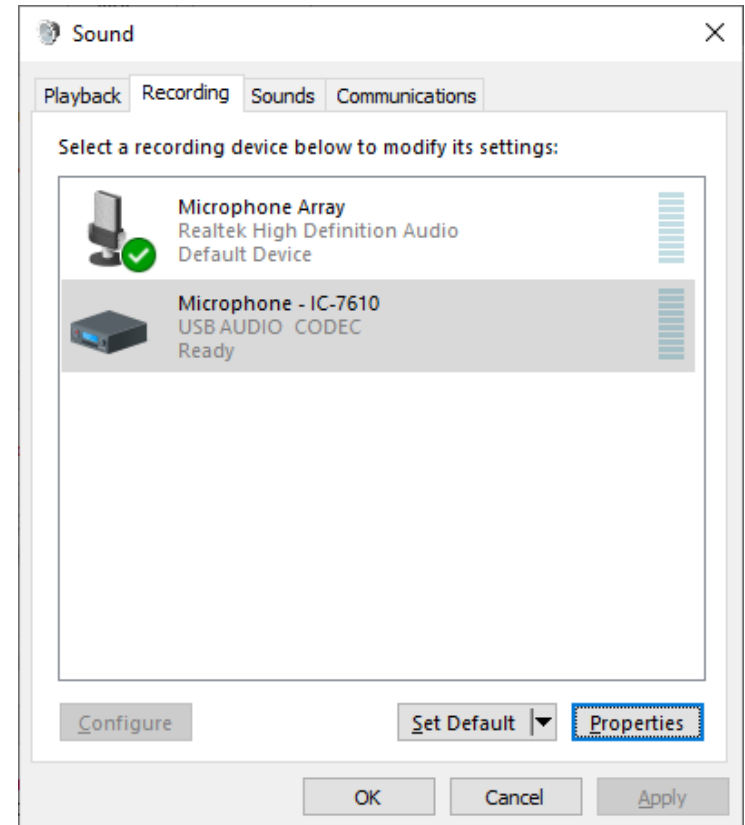
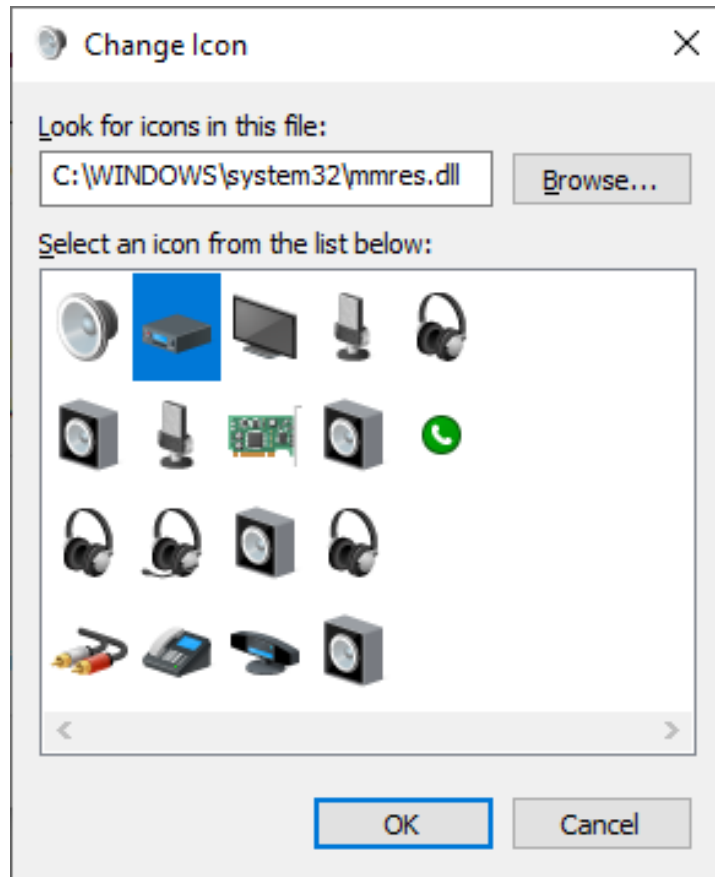


- Watch **USB AUDIO CODEC** devices
- A device will disappear and reappear when you disconnect and reconnect the USB cable from the back of the radio
- Select that device, then click **Properties** button
- Label both the **Recording** and **Playback** tabs with name of device, click **Apply**

# 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



- <https://www.qrz.com/db/n6tv> - Links to this and other presentations
- [https://www.uwe-sieber.de/ComPortMan\\_e.html](https://www.uwe-sieber.de/ComPortMan_e.html) - ComPortMan / ComPortInfo
- <https://github.com/lostindark/DriverStoreExplorer/releases/latest> - DriverStoreExplorer
- [https://www.nirsoft.net/utils/usb\\_devices\\_view.html](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@arrl.net](mailto:n6tv@arrl.net)



# Q&A

