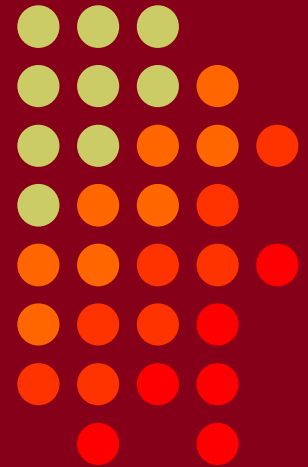


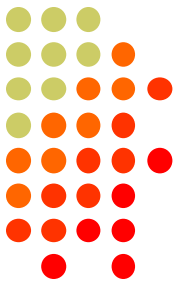
Everything You Need to Know About USB and Serial Interfaces

Presented by N6TV

n6tv@arrl.net



Presentation Overview

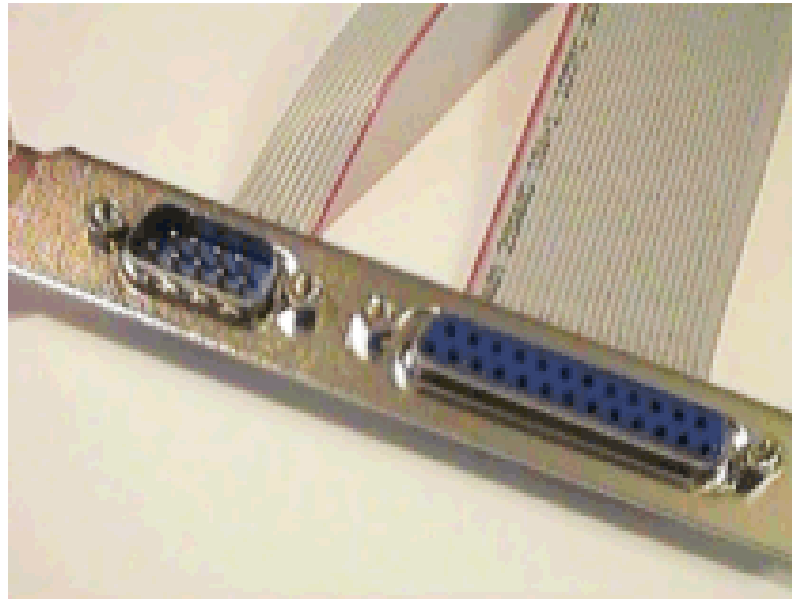


- Legacy PC Serial Ports
- USB Ports and Devices
- USB-to-Serial Adapters
- Using the Device Manager
- Managing Serial Port Numbers
- Using Serial Ports for CW / FSK / PTT Keying
- Sharing Serial Ports
- USB Sound Cards
- Q & A

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”



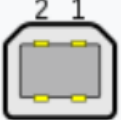
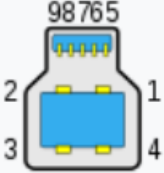


- “Real” serial and parallel ports disappear, replaced by USB ports
- Notebook computers: PCMCIA, PC Card, ExpressCard slots for serial adapters disappear
- Radios (until recently) still had 9-pin serial ports
- Peripherals are still using 9-pin serial ports
 - Rotator controllers, SteppIR antenna controllers, 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:	<p>Type A</p>  <p>1 2 3 4 Type-A</p>	<p>Type A</p>  <p>9 8 7 6 5 1 2 3 4 Type-A SuperSpeed</p>
Radio:	<p>Type B</p>  <p>2 1 3 4 Type-B</p>	<p>Type B</p>  <p>9 8 7 6 5 2 1 3 4 Type-B SuperSpeed</p>

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 EXTFSK for MMTTY. Used internally by Elecraft K3.
 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

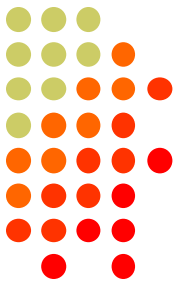


Digi International Edgeport/8



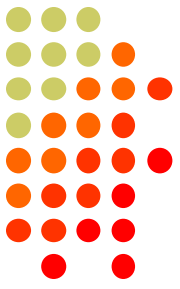
- One USB 2.0 Type B connector
- Eight independent DE-9M serial ports
- Windows automatically finds and installs drivers

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

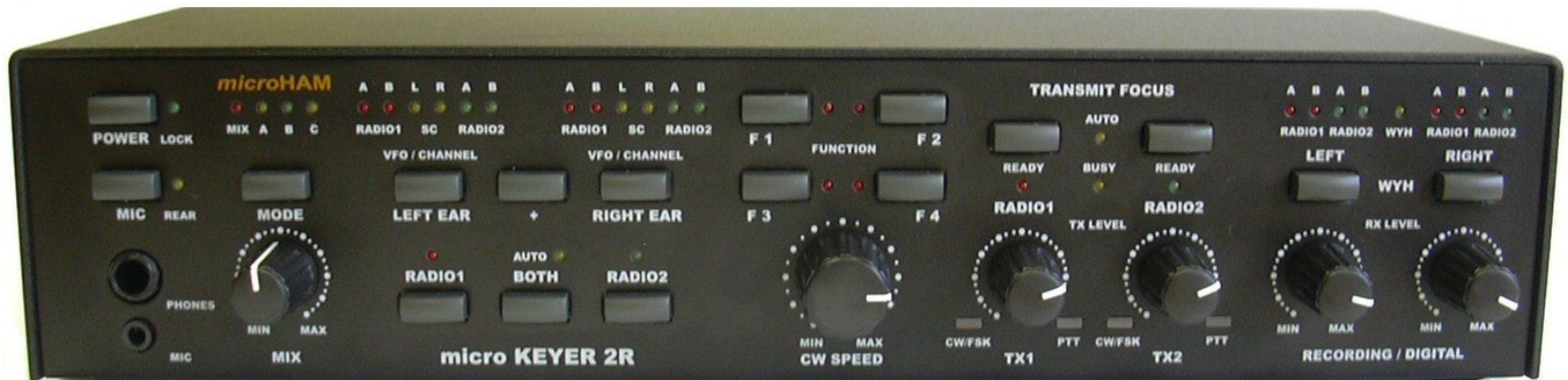


- One USB 2.0 Type B connector
- Eight independent FTDI DE-9M serial ports
- Separate 5V Power Supply

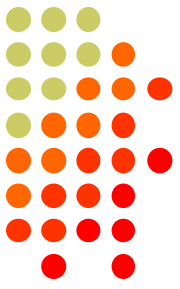
microHAM uses Eltima drivers



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-10 - \$15



GearMo 2-port - \$30



GearMo 4-port - \$40



Prolific USB-to-Serial Adapters



- Widely available, cheap (but many counterfeits)
- 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 ports assigned sequentially
- Use Windows Device Manager to view assigned COM Port number


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

Using the Windows Device Manager



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

Setting System Environment Variable



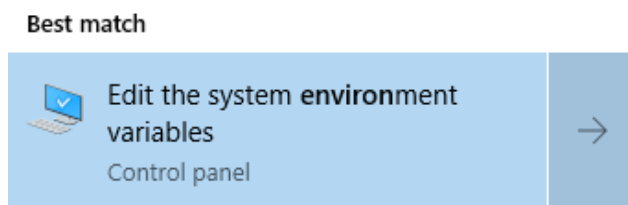
- Type “Environment” in Windows Search box or Windows Settings Search box



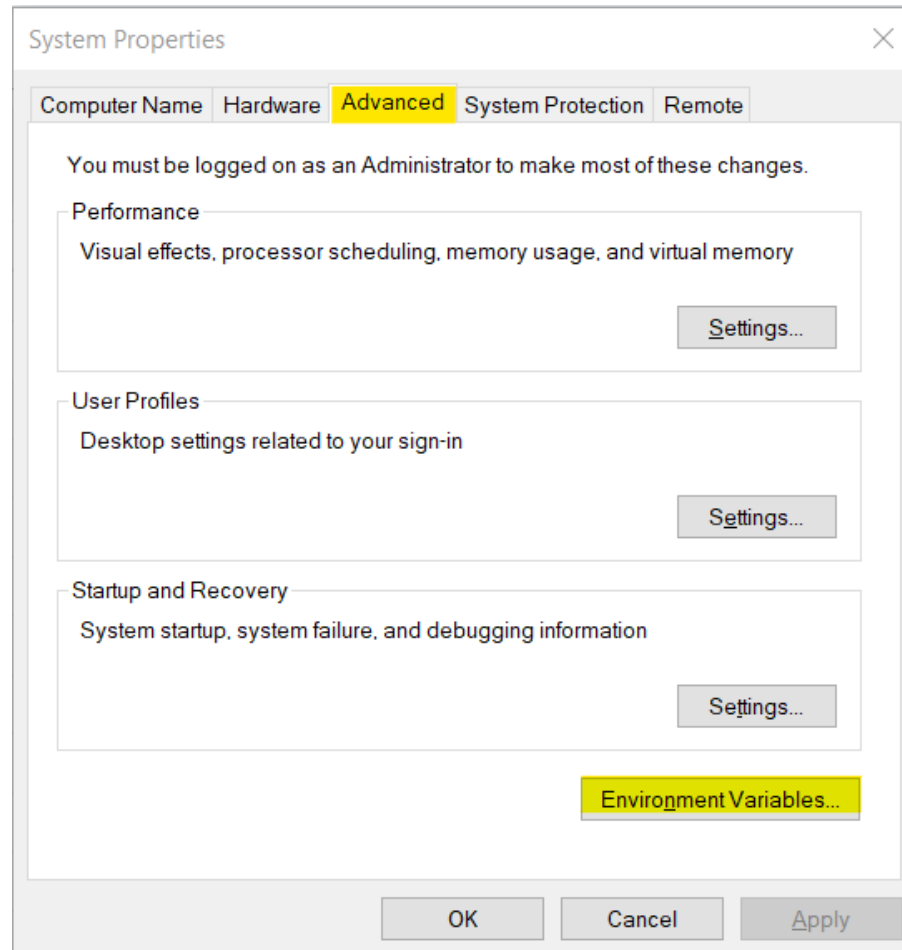
Windows Settings



- Click “Edit the System Environment Variables”

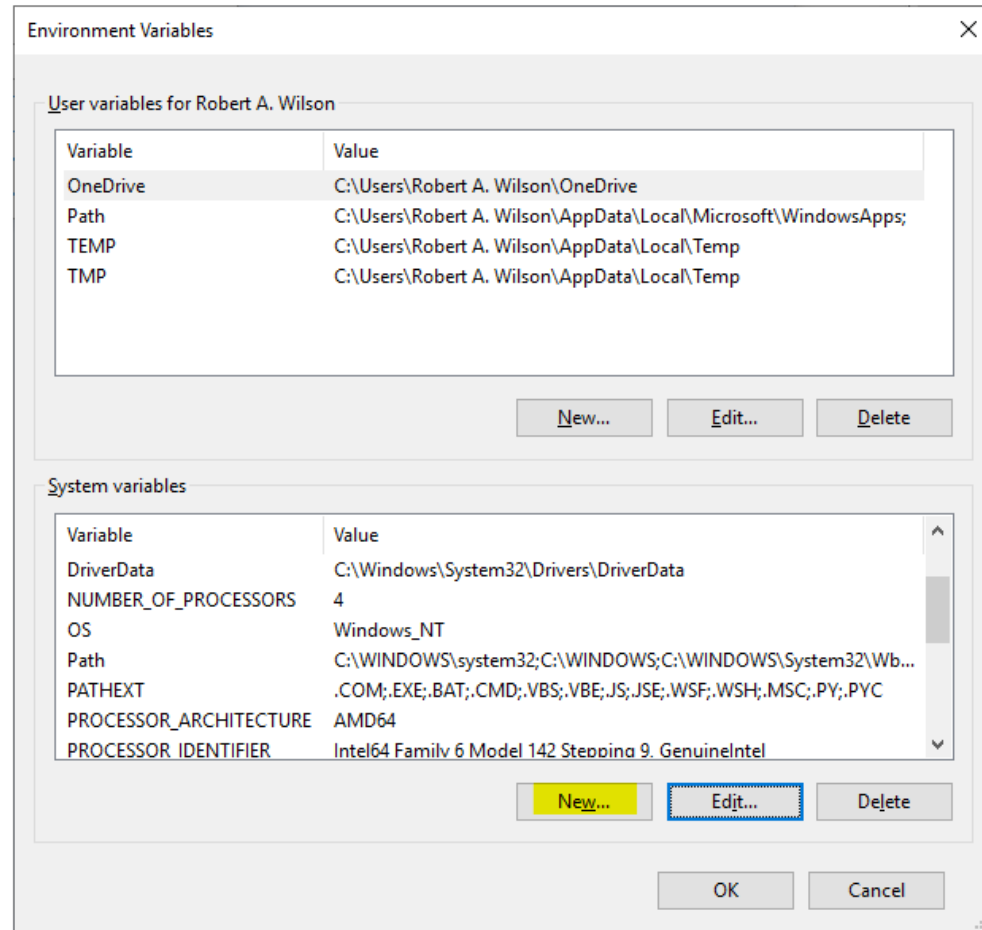


Step 1 – Under Advanced tab click Environment Variables...





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





Step 3 – Add the new environment variable

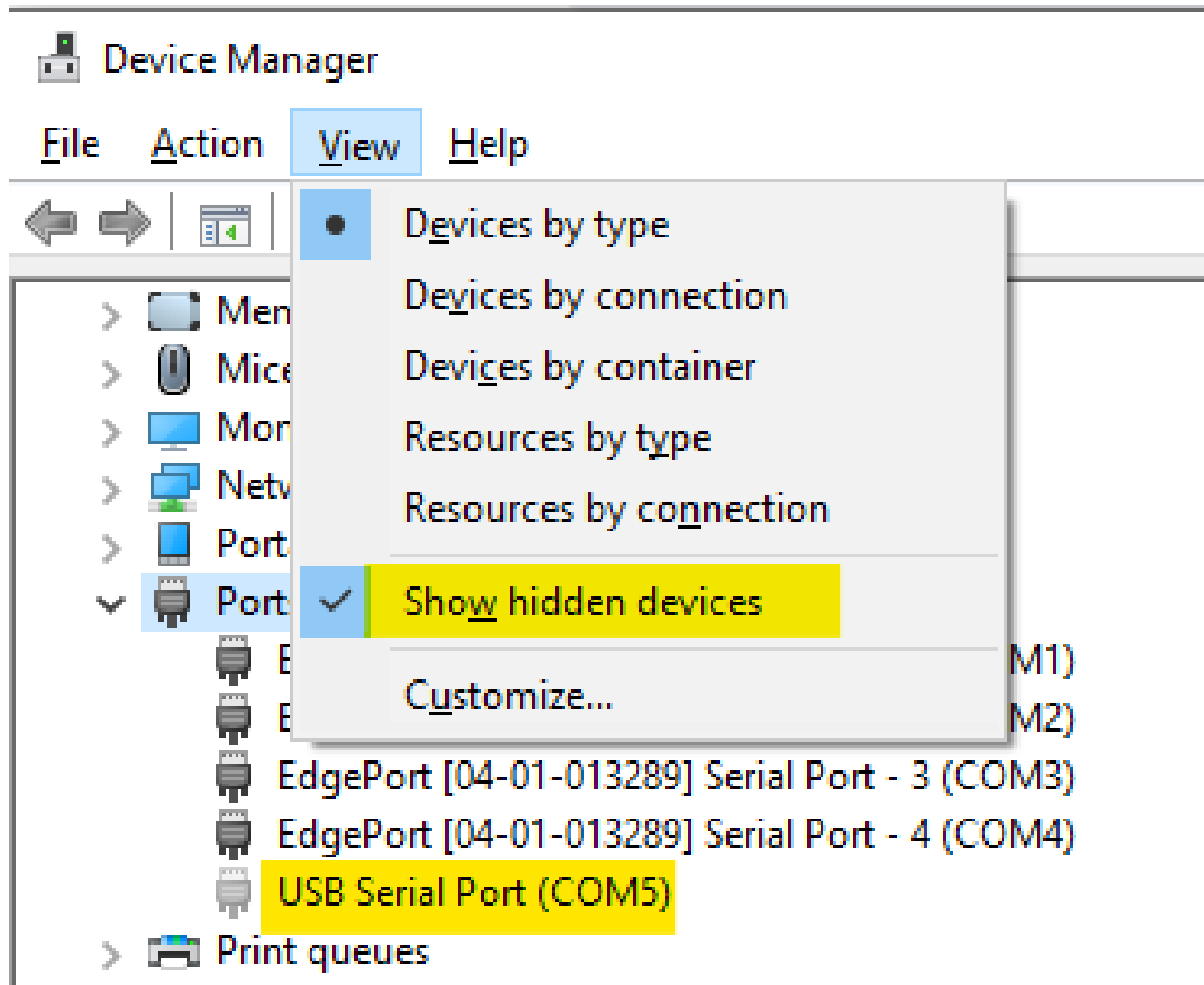
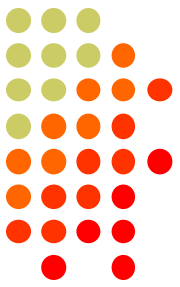
Name: `devmgr_show_nonpresent_devices`

Value: `1`

The screenshot shows a 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 value "devmgr_show_nonpresent_devices" and "Variable value:" with the value "1". Below the 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

Step 4 – in Device Manager: Select View → Show hidden devices



Expand Ports section

Right click offline devices, Properties



Ports (COM & LPT)

- EdgePort [04-01-013289] Serial Port - 1 (COM1)
- EdgePort [04-01-013289] Serial Port - 2 (COM2)
- EdgePort [04-01-013289] Serial Port - 3 (COM3)
- EdgePort [04-01-013289] Serial Port - 4 (COM4)
- USB Serial Port (COM5)**

> Print queues

> Printers

> Processors

> Security devices

> Smart card filters

> Smart card readers

> Software components

Update driver

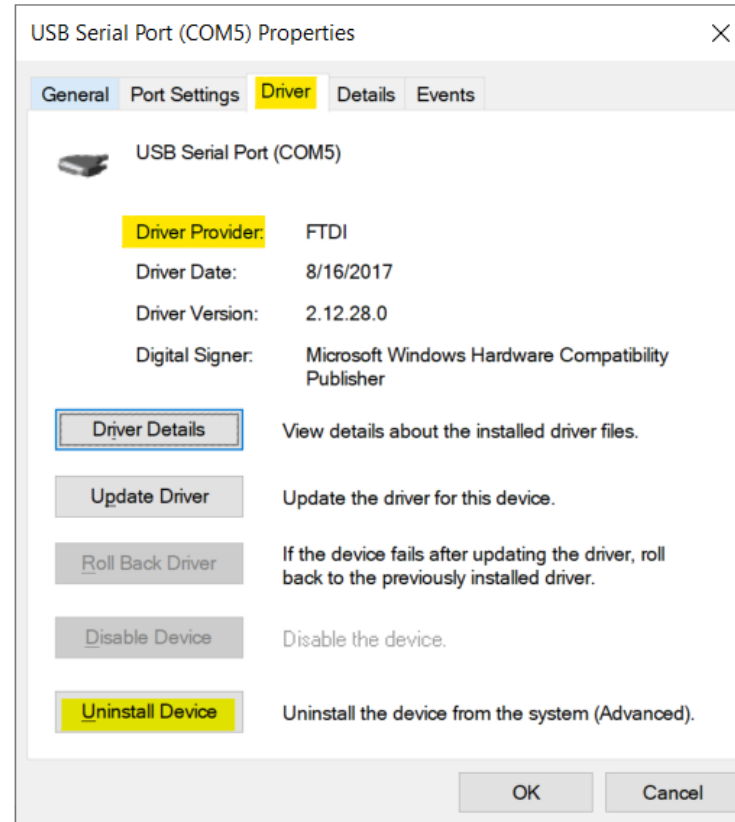
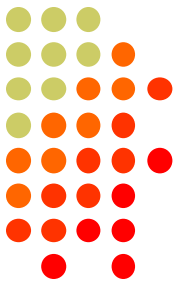
Uninstall device

Scan for hardware changes

Properties

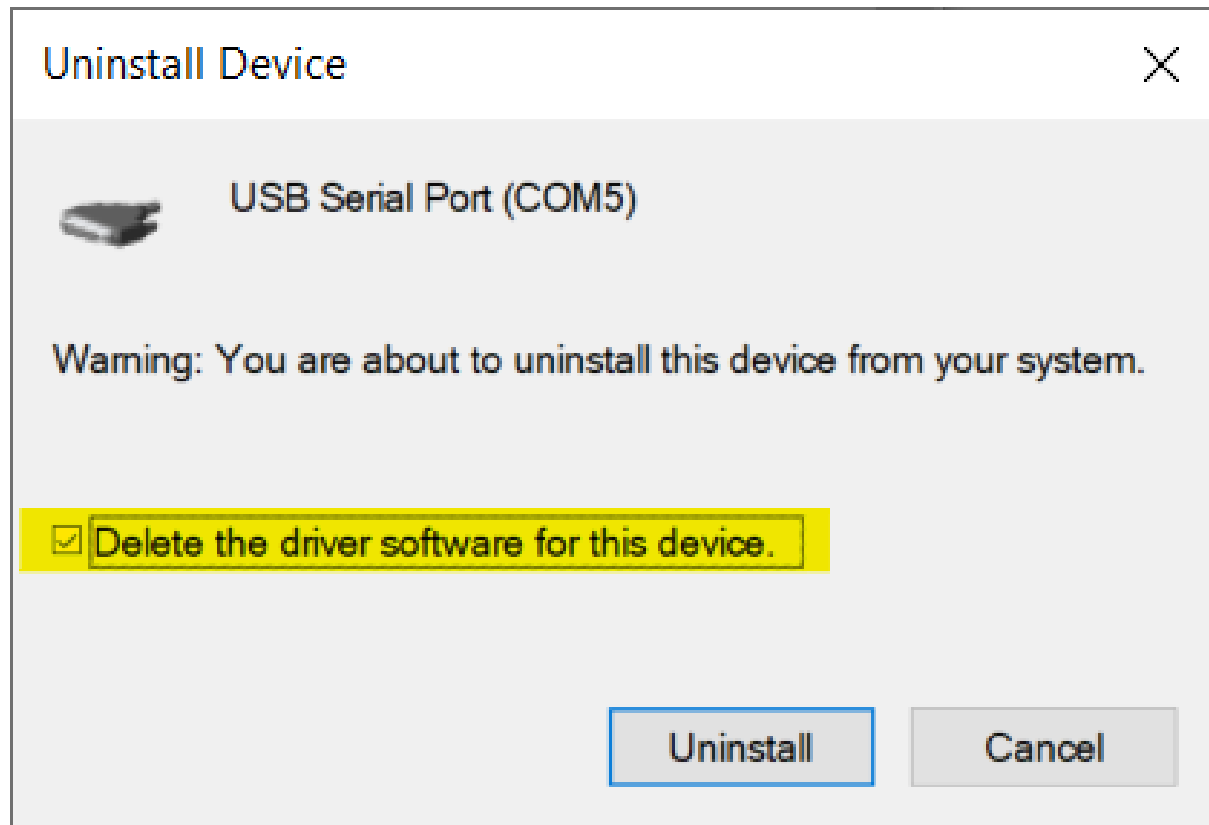
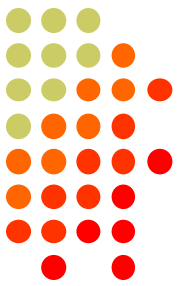
Click Driver Tab

Check that Driver Provider is not Prolific

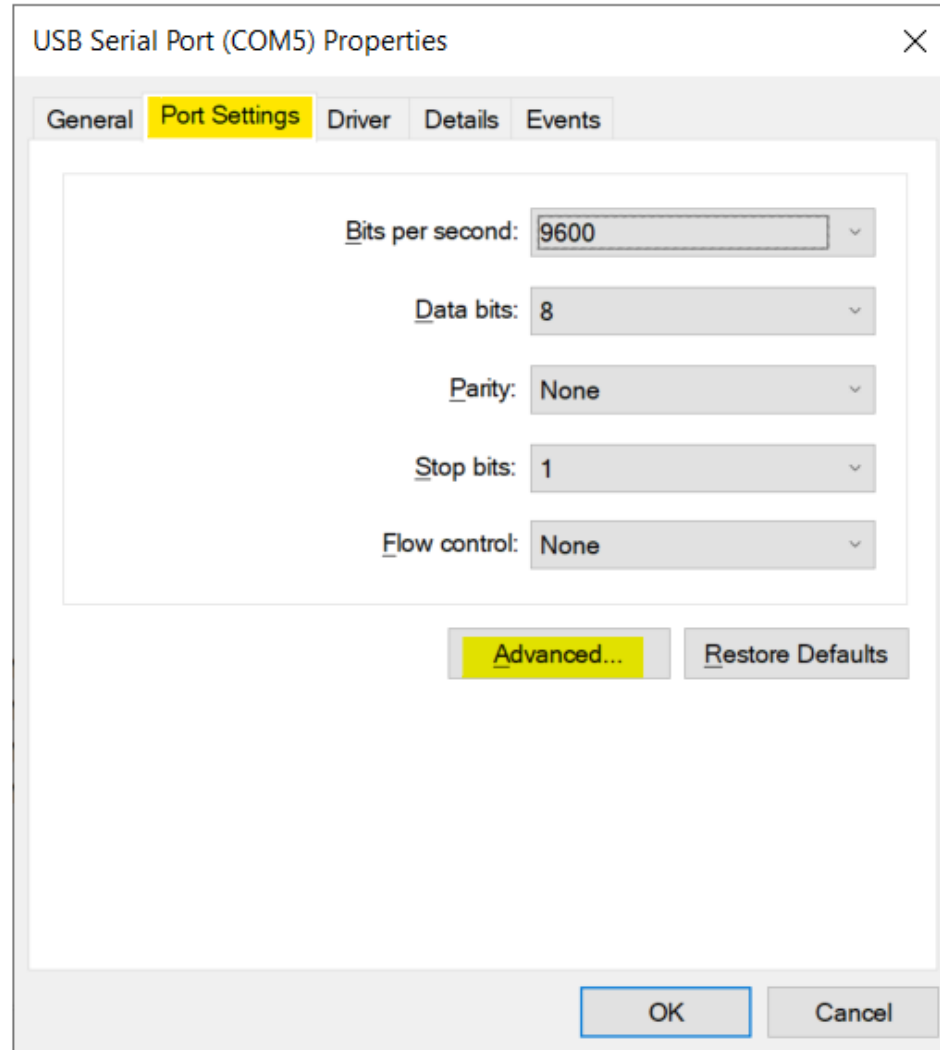
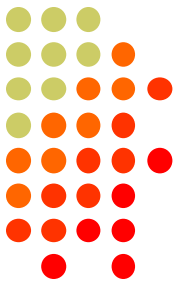


- If you see **Prolific**, click **Uninstall Device**

Uninstall the Prolific Device AND Delete the Driver Software



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



FTDI Default Options – not good



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

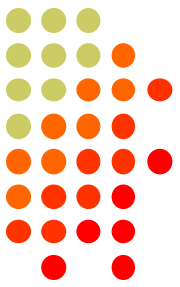
Minimum Write Timeout (msec): 0

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

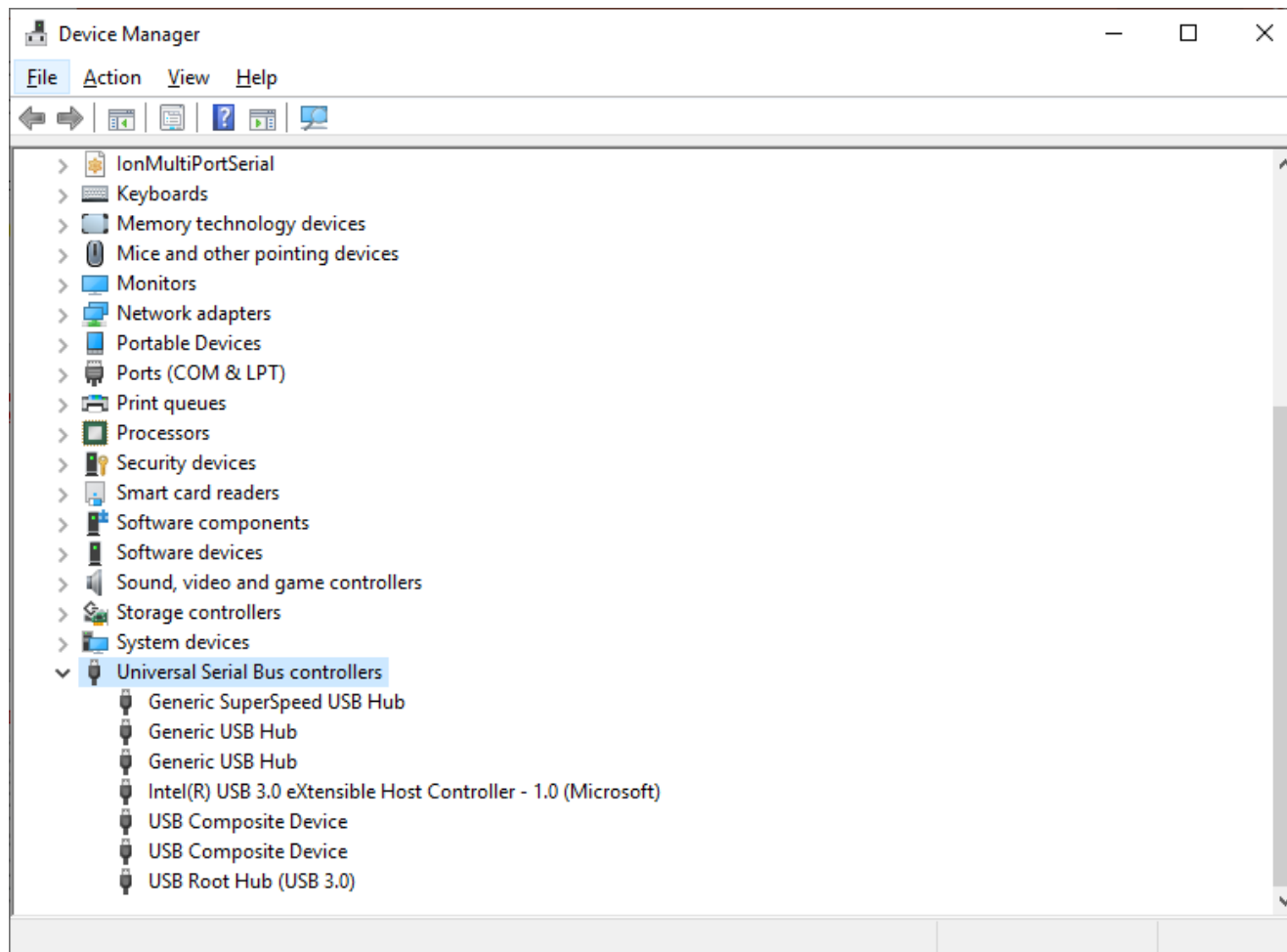
Change the FTDI Options To This



Miscellaneous Options

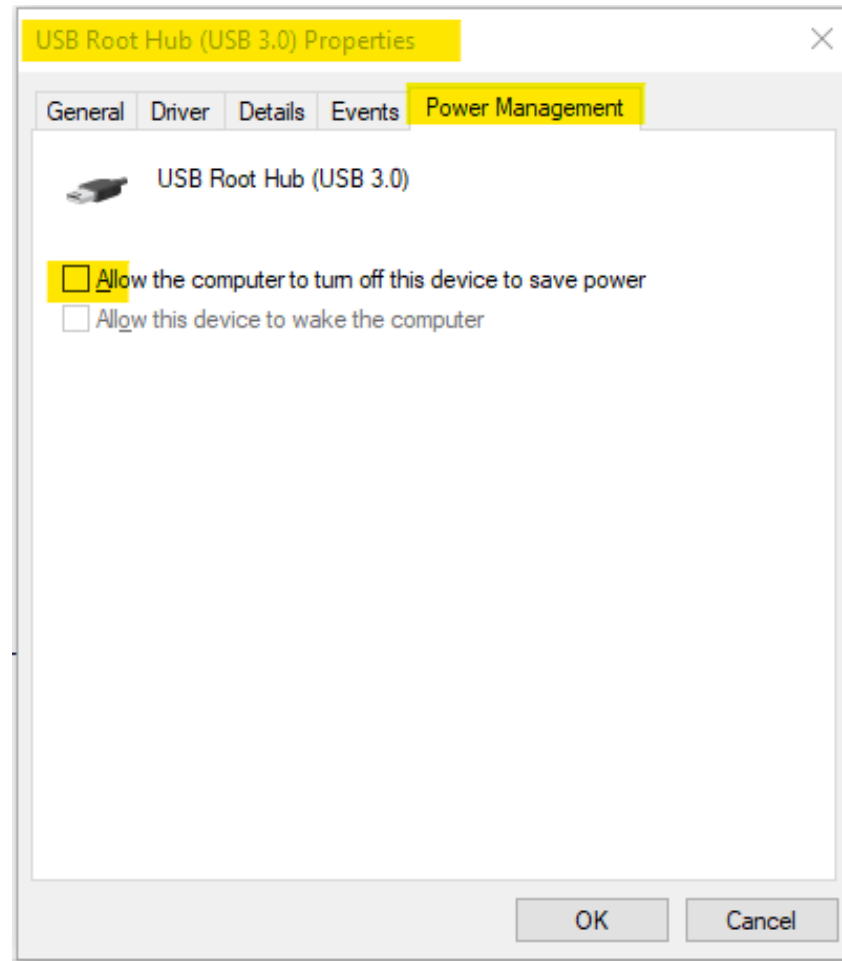
Serial Enumerator	<input type="checkbox"/>
Serial Printer	<input type="checkbox"/>
Cancel If Power Off	<input type="checkbox"/>
Event On Surprise Removal	<input type="checkbox"/>
Set RTS On Close	<input type="checkbox"/>
Disable Modem Ctrl At Startup	<input checked="" type="checkbox"/>
Enable Selective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

Under USB Serial Bus Controllers: Right-Click each, Select Properties



Look for Power Management Tab

Do not allow computer to turn off



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

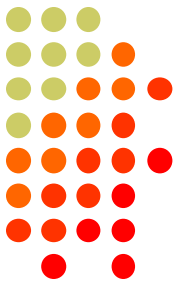
Description	Device Type	Service Name	Drive Letter	Serial Number	Connected	Created Date	Last Plug/Unplug Date
Edgeport/4	Vendor Specific	EdgeSer		04-01-013289	No	3/12/2019 7:00:09 PM	12/13/2018 2:37:38 AM
USB Serial Converter	Vendor Specific	FTDIBUS		FT0F59X0	No	12/18/2018 9:12:08 A...	12/18/2018 9:12:08 AM
USB Serial Converter	Vendor Specific	FTDIBUS		FT1P91QU	No	3/5/2019 5:35:00 PM	3/5/2019 5:35:00 PM
USB Serial Converter	Vendor Specific	FTDIBUS		FT1P91TN	No	1/23/2019 1:38:04 PM	1/18/2019 7:14:30 PM
USB Serial Converter	Vendor Specific	FTDIBUS		FT1P9J2B	No	2/21/2019 6:14:56 PM	2/21/2019 6:14:56 PM
USB Serial Converter	Vendor Specific	FTDIBUS		FT1P9QFU	No	2/22/2019 4:56:01 PM	2/14/2019 5:07:08 PM
USB Serial Converter	Vendor Specific	FTDIBUS		FT1P9UYS	No	3/14/2019 4:37:40 PM	3/14/2019 4:37:40 PM
USB Serial Converter	Vendor Specific	FTDIBUS		FT1PC6NN	No	1/21/2019 6:09:53 PM	1/21/2019 5:59:32 PM
USB Serial Converter	Vendor Specific	FTDIBUS		FT1PC8M1	No	3/11/2019 4:29:13 PM	2/20/2019 6:56:30 PM
USB Serial Converter	Vendor Specific	FTDIBUS		FT1PCCIE	No	2/11/2019 6:51:25 PM	1/19/2019 7:05:05 PM
USB Serial Converter	Vendor Specific	FTDIBUS		FT1TQHCM	No	3/5/2019 5:33:41 PM	3/5/2019 5:33:41 PM
USB Serial Converter	Vendor Specific	FTDIBUS		FT1TSBDH	No	2/14/2019 4:53:40 PM	2/14/2019 4:53:40 PM
USB Serial Converter	Vendor Specific	FTDIBUS		FTYWN20G	No	1/14/2019 10:59:41 P...	1/14/2019 10:59:41 PM
USB Serial Converter	Vendor Specific	FTDIBUS		FT06EEKQ	No	12/26/2018 12:32:04 ...	12/13/2018 2:37:35 AM
USB Serial Converter	Vendor Specific	FTDIBUS	COM5	FT06EEK7	No	3/26/2019 3:42:28 PM	3/19/2019 10:06:35 AM
Logitech USB Wheel Mouse	HID (Human Interface D...	HidUsb			No	3/16/2019 9:39:15 PM	3/16/2019 9:39:15 PM
Logitech USB Wheel Mouse	HID (Human Interface D...	HidUsb			No	3/12/2019 7:00:08 PM	12/13/2018 2:36:51 AM

45 item(s), 1 Selected NirSoft Freeware. <http://www.nirsoft.net> usb.ids is not loaded

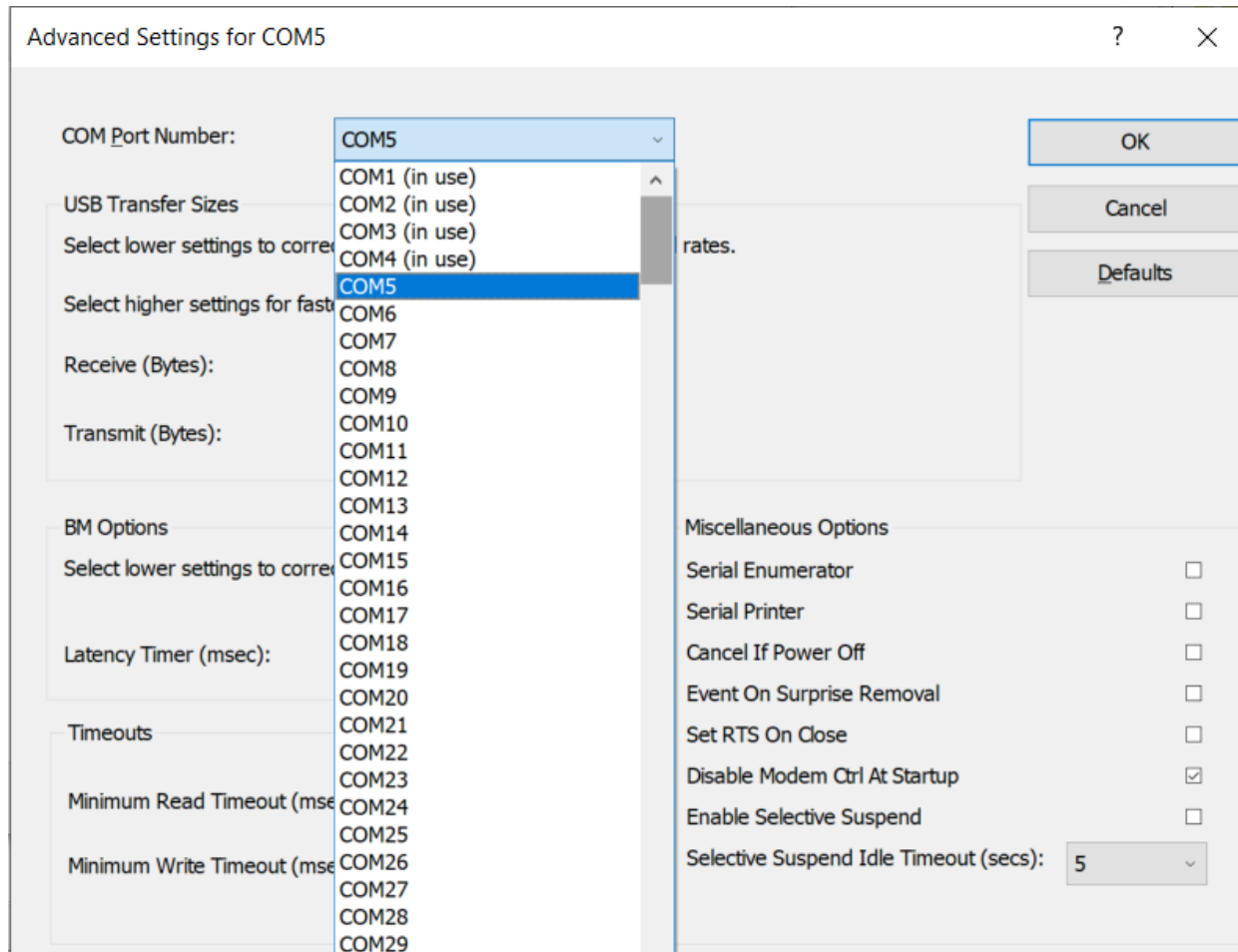
Managing COM Port Numbers



- 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"



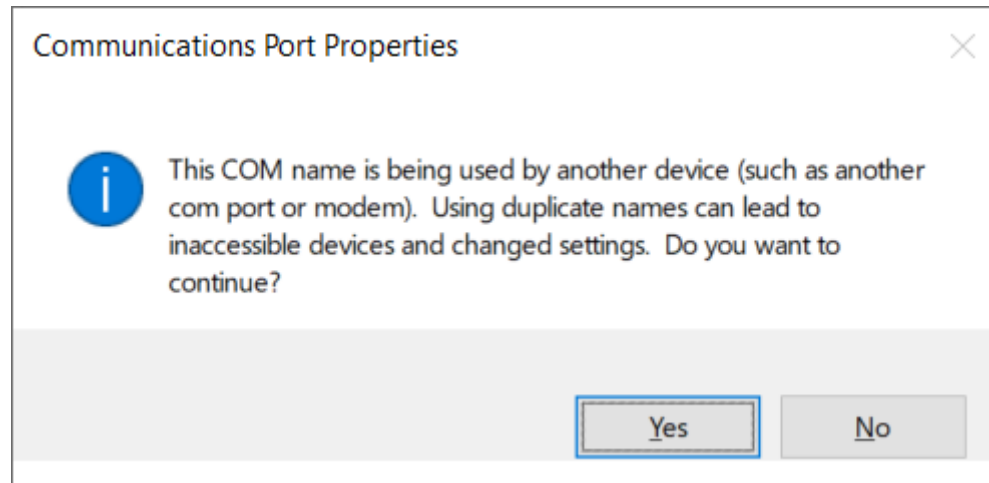
Renumbering Serial Ports





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:

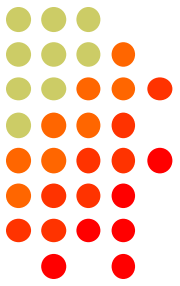


What program is currently using my serial port?



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

Search Example 1



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

File Options View Process Find Handle Users Help

Process	CPU	Private Bytes	Working Set	PID	Description
csrss.exe	0.22	2,752 K	6,888 K	728	Client Server Runtime Process
winlogon.exe		2,676 K	11,816 K	1116	Windows Logon Application

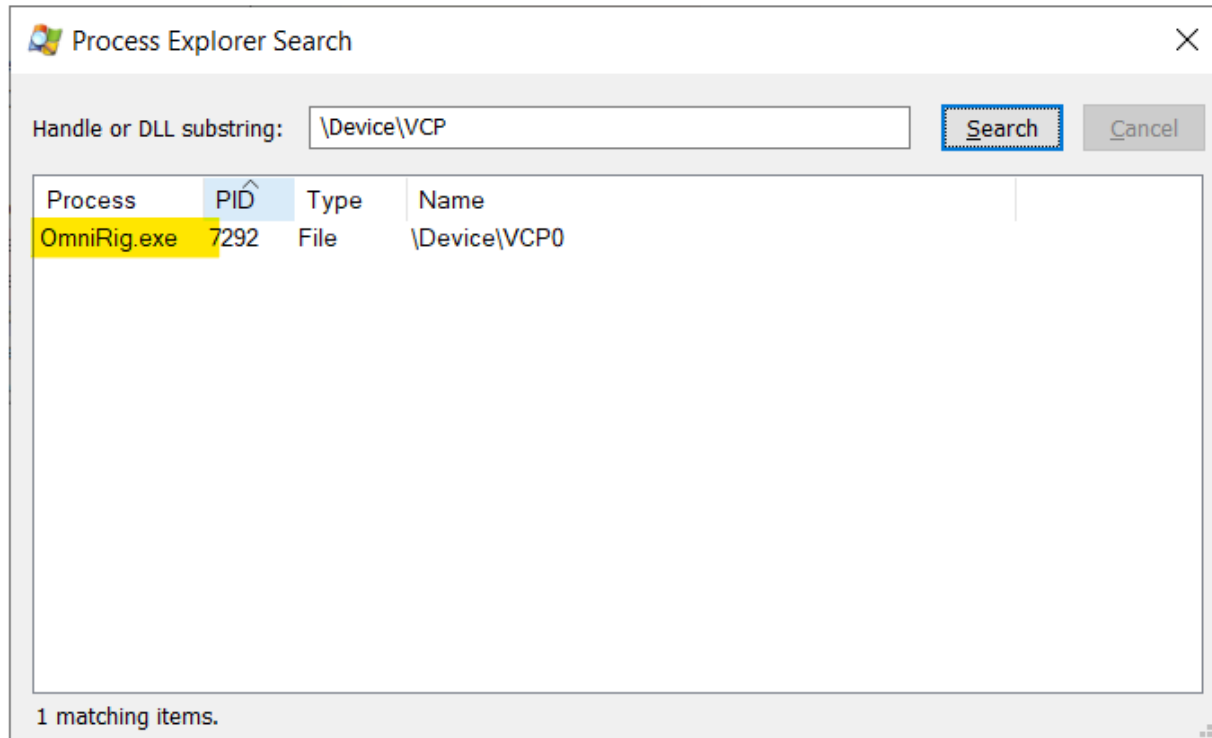
Process Explorer Search

Handle or DLL substring:

Process	PID	Type	Name
wt.exe	3832	File	\Device\VCP0

Win-Test (wt.exe) has opened the FTDI Serial Port

Search Example 2

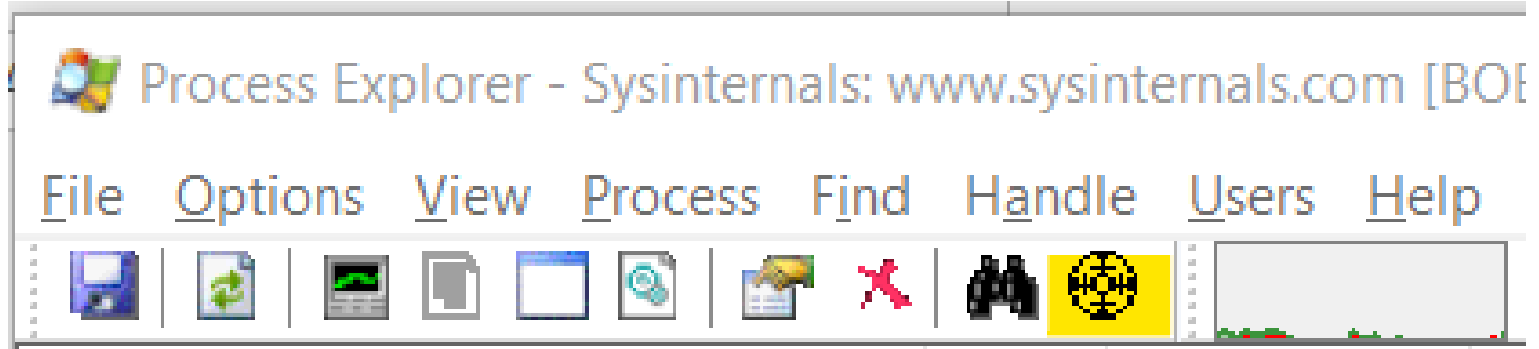


OmniRig (e.g. WSJT-X, Log4OM) has opened the FTDI Serial Port



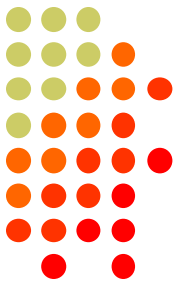
Not sure what to search for?

- 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



The screenshot shows the Process Explorer application window. The 'View' menu is open, and the following options are visible:

- 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 >
 - DLLs (Ctrl+D)
 - Handles (Ctrl+H)
- Refresh Now (F5)
- Update Speed >
- Organize Column Sets...
- Save Column Set...
- Load Column Set
- Select Columns...

The main process list is visible in the background, showing columns for PID, Description, and Company Name. The 'Handles' option is selected, and the process list is sorted by Name.

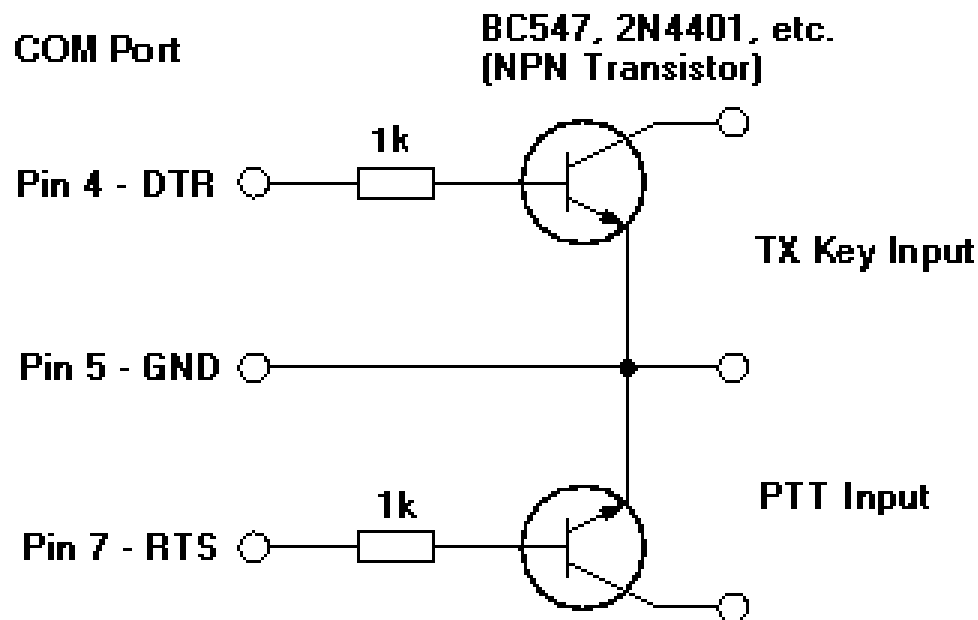
PID	Description	Company Name
1116	Windows Logon Application	Microsoft Corporation
1172	Usermode Font Driver Host	Microsoft Corporation
1248	Desktop Window Manager	Microsoft Corporation
7544	Windows Explorer	Microsoft Corporation
10476	Windows Security notification ...	Microsoft Corporation
12876	WinZip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

At the bottom of the window, the status bar shows: CPU Usage: 7.10% | Commit Charge: 28.77% | Processes: 210 | Physical Usage: 31.98%

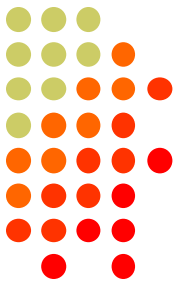
Computer CW, PTT, and FSK RTTY Keying Using Serial Port pins (DTR=CW, RTS=PTT)



- A simple hardware keying circuit, used for decades:



Elecraft K3 / K3S keying via serial port

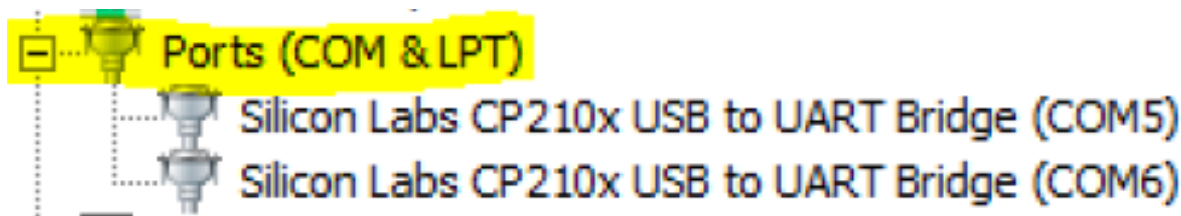


- First transceiver to include computer keying circuit *inside the radio*
- Does not use RTS and DTR pins for RS232 “Handshaking”, freeing them for other purposes
- In K3, set **CONFIG:PTT-KEY** to **RTS-DTR** (vs. **OFF-OFF**)
- Works the same over a standard serial cable (CONFIG:RS232 = 38400) or the K3S USB connection (CONFIG:RS332 = USB)
- To prevent unwanted transmissions when PC reboots, change FTDI Port Settings:
 - Uncheck “Serial Enumerator”
 - Check “Disable Modem Ctrl At Startup”



ICOM Copies Elecraft, Adds FSK Keying

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

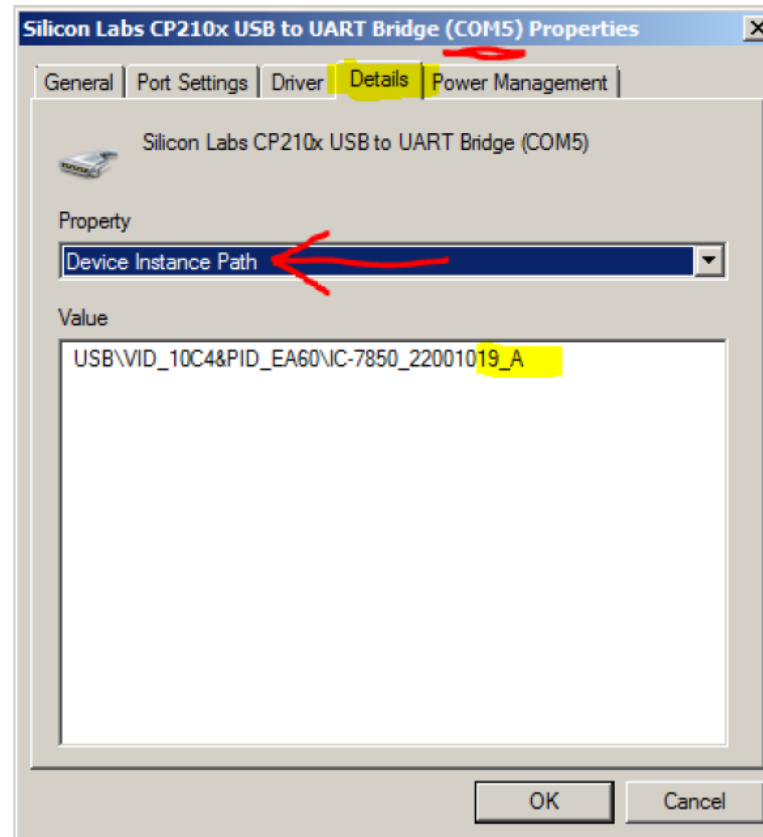


- To keep it simple use DTR pin for keying, RTS pin for PTT
- Use port “B” for MMTTY exclusively
- Mnemonic: CW : DTR : FSK • PTT : RTS : Send



ICOM: Determining COM Port A and B

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





ICOM IC-7300

- 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.**



ICOM IC-7610

- 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 **ESTFSK64** to select second COM Port (B):
FSK=DTR, PTT=RTS



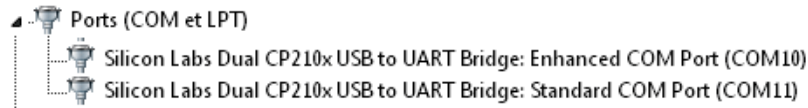
ICOM IC-7850, IC-7851

- 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 **ESTFSK64** to select second COM port (USB2)
FSK=DTR, PTT=RTS



Yaesu FT-991

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

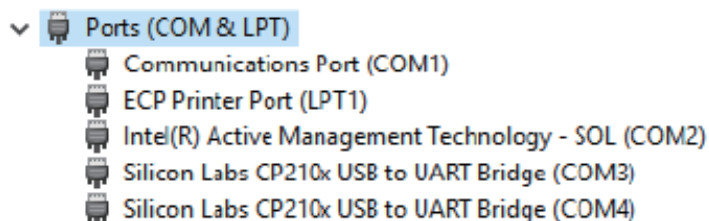


- In Yaesu Menu, set
033 CAT RTS: Disable (Turns off RS232 handshaking)
060 PC Keying: DTR
047 AM PTT SELECT: RTS
071 DATA PTT SELECT: RTS
076 FM PKT PTT SELECT: RTS
110 SSB PTT SELECT: RTS
- In Logging Software, rig control is via the “Enhanced” COM Port, CW / PTT via “Standard” COM Port: DTR=CW, RTS=PTT
- In MMTTY, use **EXTFSK** or **ESTFSK64** with the “Standard” COM port: FSK=DTR, PTT=RTS

Kenwood TS-890



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

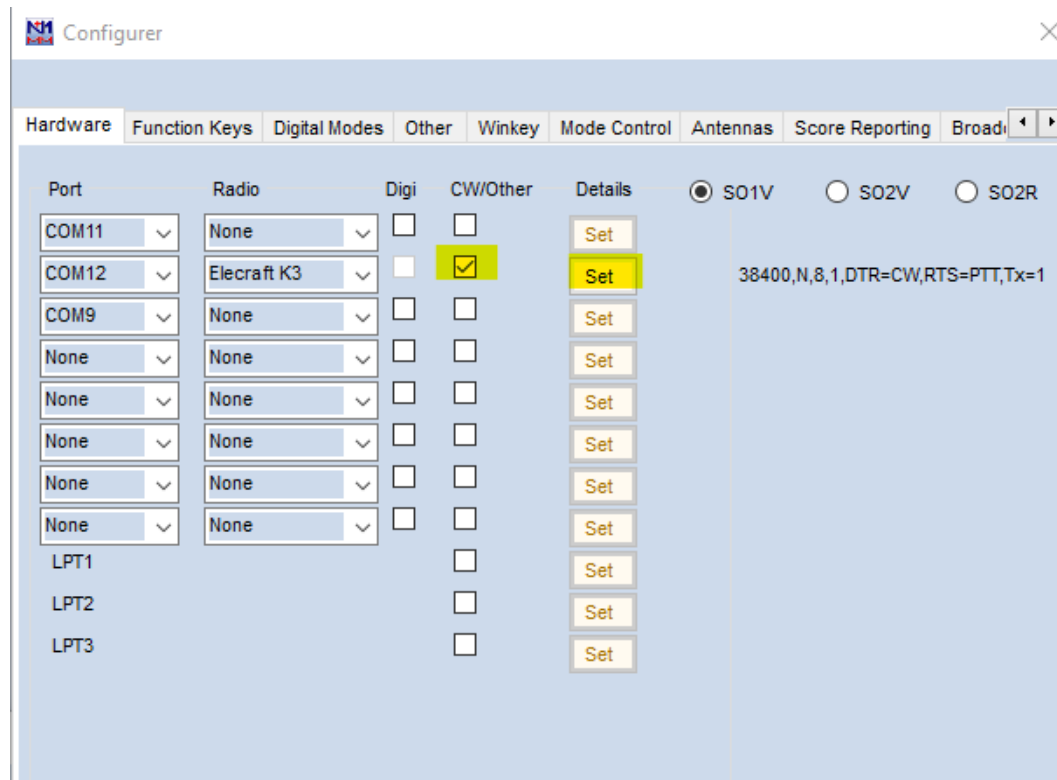


- Right click, Properties, Details tab, Location Path:
USB1 is “Standard” Serial Port, USB2 is “Enhanced”
- In Logging Software, rig control is via the “Standard” COM Port
CW / PTT / FSK keying may be assigned to DTR or RTS of either port
- **Menu 17 Virtual Standard COM Port RTS: PTT**
Menu 18 Virtual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

- Open Configurer, view Hardware Tab
- Check CW/Other box next to Rig's Serial Port
- Click Set button





N1MM+ Contest Software

- CW Timing over USB is usually OK!
- 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
 Allow ext interrupts
 PTT via Radio Command Digital Mode

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

Radio Polling Rate: Normal

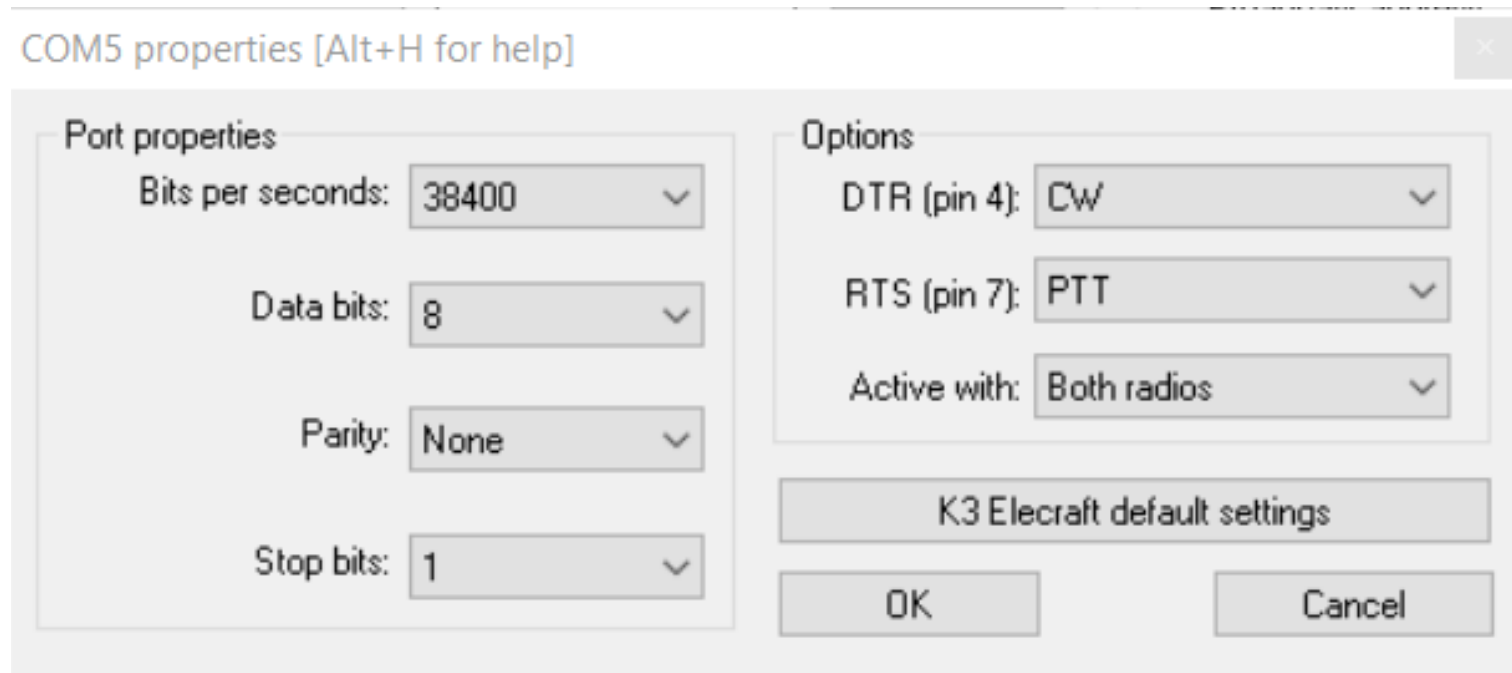
Suggested Elecraft K3 Settings:
19200 - 38400, N, 8, 1, Always Off, Always Off

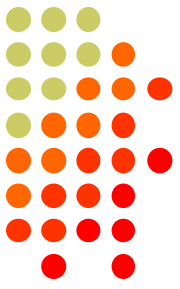
Buttons: Help, OK, Cancel



Win-Test Contest Software

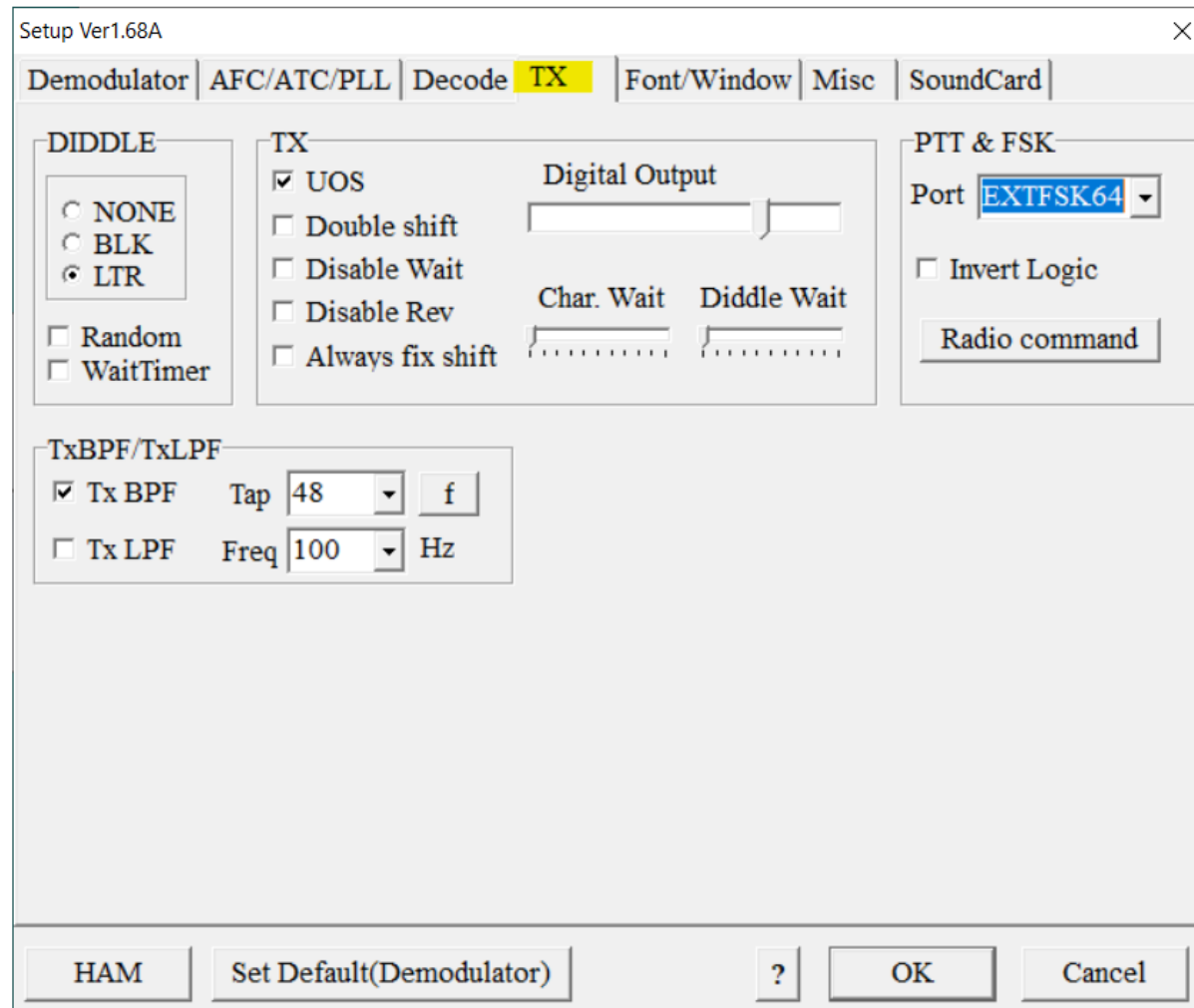
- Set DTR (pin 4) = CW, RTS (pin 7) = PTT





MMTTY Setup Menu, TX Tab

- Set Port to **EXTFSK64**





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**

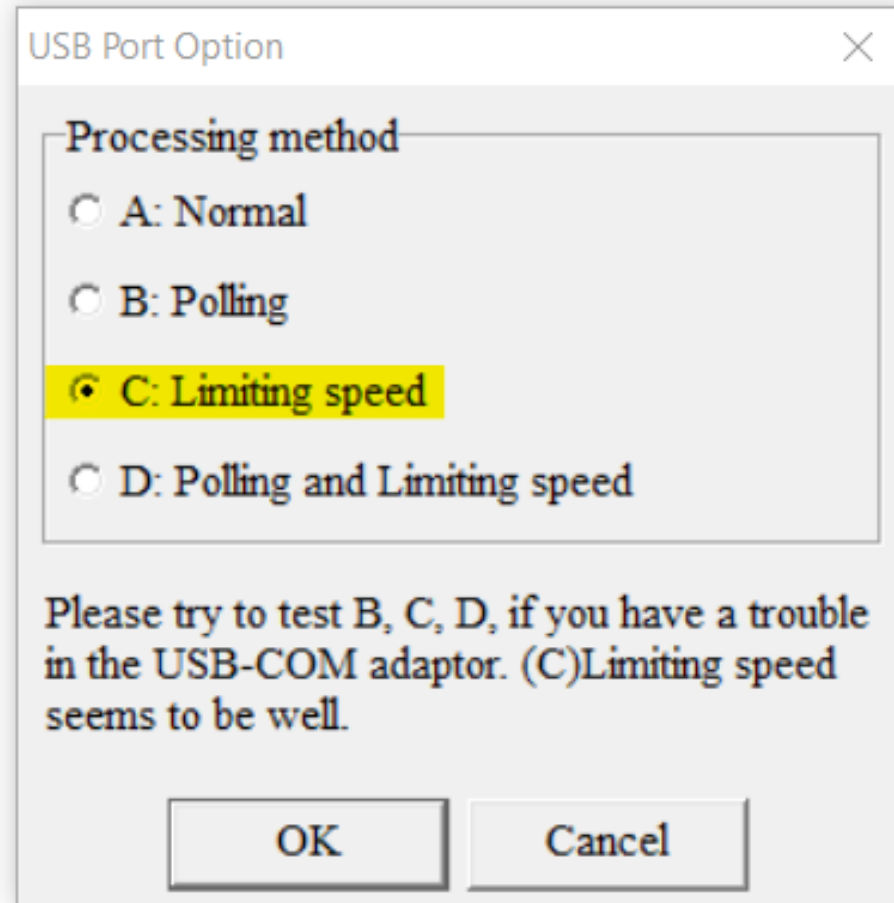
System Font
Window Times New Roman Set 0
Fixed pitch Courier New Set 0
Japanese English

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

EXTFSK 2.0e

Port Status:OK

FSK output

TXD

RTS

DTR

PTT output

TXD

RTS

DTR

Inv. FSK Inv. PTT 45 baud

Serial Port Hardware Sharing



- 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 on Pin 3 (TXD), Radio sends response on Pin 2 (RXD).
- AUTO INFO mode provides same output without PC polling
- Multiple devices (SteppIR controllers, Band Decoders, Elecraft / ACOM / SPE amplifiers) may *monitor* the RXD line in parallel by only connecting to Pin 2.

Shameless Plug



- The N6TV “Serial Box” (S-BOX and S-BOX-USB w/FTDI) by N6TV implements parallel connections to RXD pin via standard D-SUB cables:

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



- S-BOXs provide four NPN keying circuits for rigs that do not have any RTS/DTR CW/FSK/PTT keying support (Yaesu FTdx5000, FT-1000MP, Kenwood TS-990s, TS-590s, ICOM IC-7700, IC-7800, etc.)

Serial Port Software Sharing



- 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, WJST-X, Log4OM, etc. for rig control
- NOT supported by N1MM+, N3FJP, others
- OmniRig owns the serial port, acts as traffic cop, no collisions or conflicts between applications
- Can I use VSPE instead? Maybe, but collisions / conflicts may occur
- CW / PTT / FSK Keying via OmniRig port not supported

Radios with USB *and* DE-9 connectors



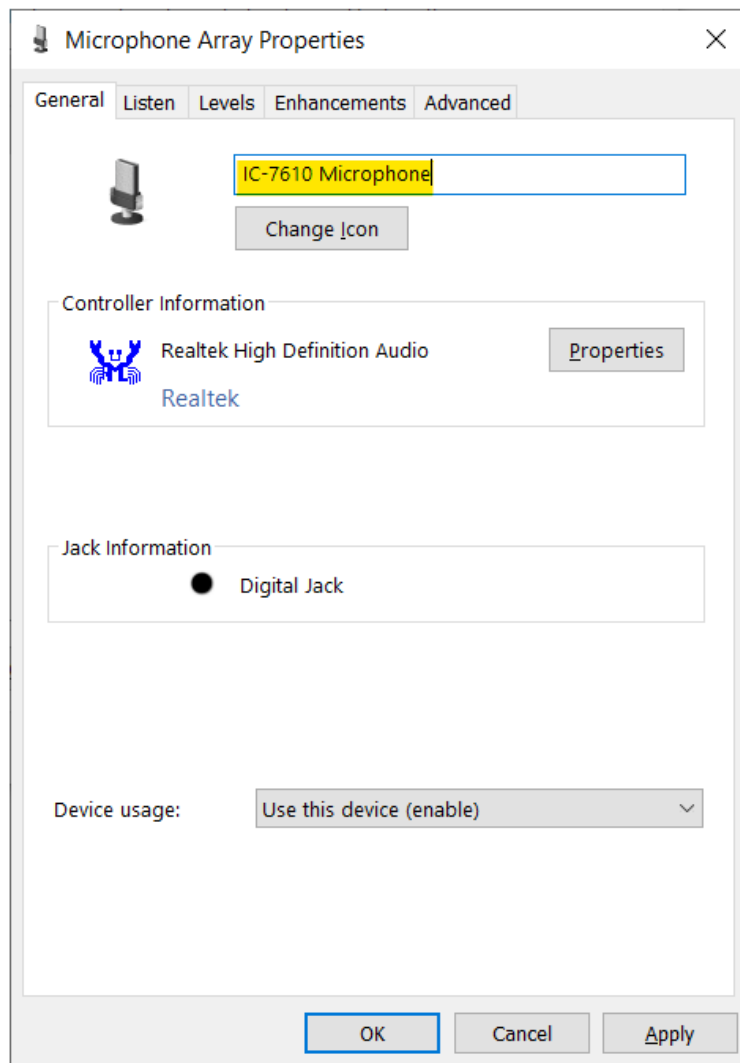
- Elecraft K3: USB and Serial Port (“P3/RS232”) do not operate independently (parallel TXD wiring)
- Kenwood TS-590S and others: USB and Serial Port operate independently
- ICOM USB and CI-V Ports (3.5mm, not DE-9) may operate independently (set **USB CI-V Port** to **Unlink from [REMOTE]**)
- Provides possibility for two programs to poll radio at same time via independent serial ports, one USB, 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, MMTTY / FT8 decoding
- Multiple “USB Audio CODEC” devices, which is which?
- Right click on Speaker icon, Open Sound Settings
- Scroll down and select **Sound Control Panel**
- Select **USB Audio CODEC** device that appears when you connect USB Cable
- Click **Properties**
- Label both the “Recording” and “Playback” devices

Labeling a USB Audio CODEC Device



Key Points to Remember



- Set **devmgr_show_nonpresent_devices** to **1**
- Use the Windows Device Manager to manage and renumber COM ports
- Always uninstall Prolific devices and drivers
- Always change the FTDI Default Options
- Try CW, FSK and PTT via serial port pins
- Use DTR for CW/FSK, RTS for PTT
- Understand serial port conflicts and sharing
- Label your USB Audio CODEC devices

Questions?



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