

Everything USB

UFI USB 101

Installing and Troubleshooting USB Connections
to UFI devices

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Overview

UFI supplies an increasing number of instruments and systems that connect to a PC computer, and make use of software running on that PC in order to supply additional system capabilities. The computer and software either extend or complete the capabilities of the UFI system or instrument. This approach requires some form of data link between the UFI device and the software running on the PC.

Originally, a standard Serial Port supplied this data link between UFI equipment and the computer. This link proved both versatile and relatively painless in application. The shift to USB has brought substantially improved capabilities, but at the cost of much more complex system support and configuration. Making matters worse, the overall PC operating system itself has evolved rapidly, and increased in complexity, with dizzying new cosmetic variants supplied recently at a far too rapid pace.

UFI embraced USB early on, and chose the FT232RL and associated drivers as a means of supporting the serial interface common to our applications, but over a USB link. And rather than wander around from solution to solution, we continue to use this same interface, which should simplify our customer's lives! We refer to this interface approach as Serial embedded in USB. The supplier of this device (FTDI) has a web site and additional support. However, we at UFI should be your first 'go-to' for support, and this document is intended to answer all your questions, and get you back in action.

Early on, we used this USB interface solution, but left the Serial Port handling in place in our software. (This capability is one of the main reasons we selected this particular solution.) These devices still connect to the PC over standard USB. But for software written like this, there are constraints on which Com Port can be assigned to the UFI device by the PC computer, and the device instructions point this out. The Com Port range is usually Com1 through Com8. And, if the computer assigns a higher Com Port number, this has to be adjusted, and you can find information below describing how to accomplish this. Many of our more recent programs access the USB interface directly, and so the actual Com Port assigned to the UFI device by the PC does not matter. Again, note that the instructions for the specific UFI device or system will clearly indicate if the actual Com Port assignment matters or not. As an example, Baercom-PC software versions 2.1 and 2.2 do NOT care about the Com Port assignment, but ALL EARLIER versions (2.0, 1.9, 1.7, etc.) REQUIRE BELOW Com9.

The above discussion only deals with the interface between the PC and the UFI device. This interface is a sub-system all by itself, and the Device Manager list can be used to explore, adjust, and troubleshoot this sub-system. The UFI device usually involves another, complete micro-controller based system that the PC software needs to actually communicate with. Some sort of 'find' or 'locate' process is generally provided in the UFI PC software in order to test the function of this link, and to allow the PC software to communicate with the UFI device. The actual USB link functions behind the scenes in this process, but the USB interface needs to be operational before the 'find' process and subsequent communication can take place! More details about this 'find' process are included in the final section (5).

As a side note, the 'legacy' Serial Port architecture required a one to one correspondance between the serial connector and the specific Com Port number. The serial interface circuitry was generally adjacent to the connector, and the configuration of that circuitry is what dictated the Com Port number. USB interfaces are vastly different in this regard. First, a USB device can be assigned a wide range of Com Port numbers. Also, you can plug your UFI USB device into any free USB port on your PC, and the actual identification of the device (Com Port, etc.) is performed independent of the USB connector used. If you plug the UFI USB device into a different USB port the next day, everything should still work fine. USB establishes a link to a device, regardless which USB connector on your computer you use.

The above discussion surfaces a few more worthwhile observations. Given the complexity of the data link that the PC needs to set up, experience has shown that USB is not a 100% proposition. You WILL run into situations where something blocked successfully completing the USB link. Rather than getting irritated or frustrated, you should just unplug the USB device, wait 30 seconds, then try plugging it in again. We also recommend that, after making ANY changes to the drivers on your PC, you should wait 30 seconds after any changes or additions are done, then turn your computer off, wait 30 more seconds, then start your computer up again, and continue from there. Sometimes this re-boot cycle can be an important part of the install process.

We recommend that you scan through this document before actually working with your computer. You can then try a few things on your own. Snooping around on your computer won't hurt anything unless you randomly start changing stuff! Still, quite a bit of the material below is relevant to specific operating systems (few use 98* anymore!). For these sections, you only need to pay attention to content that applies to the operating system on your computer!

The main goal of this document is to help you fix what is broken, to setup and troubleshoot the link between UFI software and UFI Devices. The USB interface isn't rocket science, but subtle details are important, so we carefully show you what to do, and across almost twenty years of operating systems, at that. We hope it helps!

Organization

The rest of this document discusses five main topics having to do with the USB interface used in UFI products.

1. USB Driver Installation

While most of the information in this section may duplicate what is included in the UFI device instructions, more detail is supplied here, and a wider range of possibilities are also included. Our goal is to increasingly point our customers here for the latest details on USB Driver installation for all our products. This will allow us to keep all the most recent information in one easy to find place.

2. Accessing the Device Manager List

Both sections 3 and 4 require access to the Device Manager list. This section (2) walks you through the steps necessary to bring up the Device Manager List on your computer, working with the last six versions of the PC operating system. You will notice a lot of variation in getting to this list, even though the Device Manager list itself has not changed!

3. Device Manager List View and Troubleshooting

A UFI device properly connected to your computer will always show up as distinct objects in two locations on the Device Manager list. And any error indications will show up there as well. Troubleshooting USB link and communication problems that may arise is done by inspecting this list.

4. Com Port Assignment -- Checking and Changing

Some of our software requires that the Com Port number assigned to the UFI device by the PC must generally be between Com1 and Com8. This section explains how to check and adjust this. Note that this is only necessary if the instructions for your UFI system or device clearly, specifically indicate this restriction on the Com Port number.

5. The Find or Locate process

As mentioned above, most UFI PC software includes a 'Find' or 'Locate' process to both check and initialize the data link between the UFI instrument and the PC Software. The USB link is a crucial background component for this process! Some aspects of this process are discussed in further detail in this section.

1. USB Driver Installation

As mentioned above, there are two components involved in the USB solution used in UFI products. The actual USB hardware interface module is built in to each UFI device that supports USB. The solution is completed by specific 'driver' software that must be correctly integrated into the PC operating system. These drivers accomplish the low level interfacing between the USB module in the UFI device and the rest of the PC operating system. These specific USB drivers must be installed on each computer the UFI device will be used with, in order to complete the UFI USB interface 'solution', and allow the UFI PC software program to communicate with the UFI device via USB.

These USB drivers MUST BE INSTALLED or the UFI PC software will NOT be able to communicate with the UFI USB device !!!

This section covers two basic topics that deal with the installation of the USB Drivers. The first topic is the actual installation process, and is covered in section 1.1. The other topic involves messages and alerts that your computer can generate, both during the installation of the drivers as well as the normal use of the UFI device. This is discussed in section 1.2.

Please read this entire section through completely before starting the USB Driver installation process !!!

1.1 Driver Installation Details

A folder named "Drivers", "USB Drivers" or something similar will be included on the Setup CD shipped with UFI products that include PC software and communicate over USB. This folder contains the information needed to install the correct USB Interface driver files on your computer.

Important Note!
HOW you proceed with the 'USB Driver Installation' process depends on WHICH OPERATING SYSTEM your PC computer is currently using!

(If you are not sure which operating system your PC computer has, see section 2.1 below.)

1.1.1 Xp* and previous versions

Under these operating systems, the installation of the USB drivers for the UFI device needs to be done BEFORE you connect the UFI device to your computer! In other words, the USB Driver installation must be done first!

A USB Driver "setup" program is included in the Drivers folder of the Setup CD shipped with the UFI device. This USB setup program is named "CDM20814_Setup.exe" or something similar, and 'running' or executing this program performs the installation of the required USB drivers on the computer.

The easiest way to accomplish this is to use the File Explorer -- My Computer or Computer, to locate this USB Setup file (usually on the CD drive), and then "double-click" over this file to direct the operating system to "execute" or run it. You must do this to perform the USB Driver installation. The actual time required to run this program is very short. After the drivers have been installed, the USB Setup program may open a window indicating successful completion. On some computers, it may just close.

After closing any message windows that may show, we recommend that you wait another minute, then shut your computer down the way you normally would. (We do not recommend Sleep or Suspend for this step.) After your computer is off, wait another minute, then start your computer up the way you normally do.

After your computer is up and running again (usually 2-4 minutes after power on), you should be able to plug the UFI device into one of the USB ports on your computer. The UFI device probably should be turned OFF for this step! The operating system will post a series of small 'balloon notices' in the lower right corner as it works through the actual operating system connection to the USB module in your UFI instrument. This might take a few minutes, be patient! When these notices indicate it is done, you can turn the UFI instrument on, start the UFI software, and everything should work correctly.

1.1.2 Vista* and newer versions

Under newer operating systems, you generally shouldn't (or can't) force the installation of the USB Drivers. **Instead, you must wait until the first time you connect the UFI Device** to one of the USB ports of your Computer. **AT THIS POINT**, the operating system will attempt to install the drivers for the UFI Device USB interface. The UFI Device does NOT need to be turned ON for this process to work. In fact, it should probably be turned **off!** (Power is supplied by the USB connection.)

First, make sure your computer has completed it's usual start up process if you just turned it on (wait 2-5 minutes). Next, to begin the USB Driver installation under these newer operating systems, make sure the UFI Device is turned OFF, then use a standard USB cable to connect the UFI Device to your PC computer. **This action** should initiate the USB Driver installation process.

Note Carefully !!!
How the USB driver installation procedes
can vary substantially from computer to computer!

Note that there are a number of variables for this process. Please read the options below carefully!

a. For some computers, the operating system will NOT know where the USB Driver information is located, and it will open a window asking you to 'browse' to the LOCATION of the driver information for the UFI Device USB Interface. You will need to direct the operating system to look in the USB DRIVERS folder on the UFI Device software CD (usually in a folder with the phrase "WHQL Certified" in the name, or something similar) for the information it needs to correctly install the drivers for the UFI Device USB interface. Once the operating system has this information, it should pull the drivers from the CD, install the necessary information, and complete the driver installation process. You may need to click 'OK' on a few Permissions windows as the installation progresses.

b. For other computers, especially if your computer is connected to the Internet, your computer may simply go online, locate, download then install the necessary drivers, requiring no other action on your part. This 'silent' installation may take a few minutes, as the computer performs the USB Driver installation in the 'background'. And the operating system may only require that you click 'OK' on a couple of small Permissions windows during this process. If your computer takes this approach, you will not need to worry about browsing to the CD. The computer will find the drivers online, and install them.

b1. However, for some Internet connected computers, this process may lock up for some unknown reason, and show no progress over 5 or more minutes, and the drivers will NOT automatically install. The only solution for this is to disconnect the UFI device from the computer, wait a minute maybe, then turn the computer off, temporarily disconnect the Internet cable from the computer (or turn off WiFi if that is in use), wait 30 seconds, then start your computer, and wait for it to complete its startup, then plug the UFI Device back into your computer. With no internet connection, the operating system should quickly open a window that allows you to browse to the appropriate USB drivers on the software CD as described above. The USB driver installation should progress normally from there, and you can re-connect the Internet to your computer after the USB installation is complete.

1.2 Balloon messages and USB Alerts

During the USB driver installation process, small “balloon” messages may show up in the lower right corner of your computer as the installation progresses, regardless of the approach taken by the operating system to locate the drivers (online or CD). Watch these, and allow the installation process to complete.

After you have completed the installation process, and the first time the UFI device is connected to a particular computer, a series of Balloon messages may also show as the operating system integrates the USB Device into the correct drivers. These messages likewise should indicate progress through this process, and finally notify you when the connection is '**ready to use**'. When you see this notice, the drivers are correctly installed, and you should be able to turn the UFI Device on, and the PC software should be able to access the UFI Device.

If you have some sort of speaker system connected to your computer, you may also note that the computer supplies characteristic sounds, both for successful connection of the UFI device, as well as when you disconnect it. The disconnection sound recently has changed to occur up to a minute after you disconnect the device. Still, these sounds can help you quickly verify the USB connection status of the UFI USB device during normal use.

2. Accessing the Device Manager list

As mentioned above, when the USB interface in the UFI device is correctly 'registered' with the operating system, there will be two entries in the Device Manager list associated with the UFI device USB interface. Any problems with the drivers will show up on this list as well. Accessing this list on your computer can be an important task!

The USB Driver installation discussed above will normally be painless and successful. If so, you do not need to worry about the Device Manager list, unless the instructions for your UFI Device indicate that the 'Com Port' number must be between Com1 and Com8. You will need to use the Device Manager list to check and adjust this setting (if necessary), which is described in more detail in section 4 below. We have also occasionally run into problems with the operating system or other applications somehow corrupting the UFI USB drivers on customer's computer. This is not a fault with the USB drivers or the UFI system. Still, the Device Manager list is the place to go for this too.

When you need to access the Device Manager list for some reason, the directions below explain how to do this. First, note this.

***Note that the UFI Device
must be connected to a PC port on your computer
using a standard USB cable
before it will show up on the Device Manager list!***

Directions are included below to access the Device Manager list for a number of recent PC operating systems. You do NOT need to read all these! **Just find the directions that apply to YOUR computer!**

And newer versions of the operating system (Vista* especially) will often ask you to give permission for the action you are trying to perform. Just click over the 'ok', 'yes', or 'continue' button to grant permission and continue.

2.1 Determining your Operating System version

We need to stop here and first verify what operating system version you are using. This is very important, because accessing the Device Manager list varies substantially depending on which operating system version your computer has! If you know for sure which operating system your computer is using, you can skip this section. But if you are not sure, the descriptions below can help you identify this.

For these operating systems, we carefully describe both the 'task bar' that usually runs along the bottom of the screen, as well as the window-like icon that normally shows in the **lower left** of the computer screen, at the left end of the task bar. **This icon is always the 'start button'!** Hopefully, you can tell from these descriptions what you have.

And, for each operating system, we also supply abbreviated directions [inside square brackets] to access the actual operating system details page on your computer so you can verify your operating system version. This is a very helpful exercise, even if you already know which operating system you have. ***The Device Manager list is usually just one or two clicks away from this operating system details page!***

Visually verifying operating system version:

-- 98*

The bar along the bottom is solid (usually gray). A very small, stylized (blocky) icon is to the left of the word 'start' in a button at the left end of this bar. This is the start button.

[start>>settings(hover)>>control panel>>system]

-- Xp*

The bar along the bottom is a solid color (usually blue). A small, stylized icon is to the left of the word 'start' in a button at the left end of this bar. This is the start button.

[start>>control panel>>system]

-- Vista*

The bar along the bottom is thinner, still solid, but shaded to give the impression of curvature vertically. The button and the word 'start' are gone, and the stylized icon is enlarged and placed in a circle with a blue background and light highlighting is added over the top to supply the impression of depth, as if the icon is floating in a sphere or bubble. The circle is larger in diameter than the vertical height of the bar along the bottom. The circle is the start button.

[start>>control panel>>system]

-- 7*

The bar along the bottom is translucent, allowing the desktop image color and some details through. The icon in the lower left corner is smaller in diameter than the bar, but is still round with a blue background, and encloses a stylized, colored window, and light highlighting is still added over the top to supply the impression of depth, as if the icon is floating in a sphere or bubble. The circle is the start button.

[start>>control panel>>system and security>>system] or

[start>>control panel>>system]

-- 8.1*

(Many computers now have touch enabled screens. Tapping once on the screen is the same as clicking once with the mouse.)

This version supplies two main 'views', and usually starts up in the App Tile view where a bunch of various sized and labeled buttons can direct you to various apps. Find the button labeled 'Desktop' and press that, in order to transition back to the more familiar desktop view, where this description applies. The bar along the bottom is still translucent, but with more of a blue tint. The icon is the shape of a window, in plain white, and viewed at an angle, so is trapazoidal in appearance (left side is shorter than the right side). There is no enclosing circle. The icon is the start button. (Note that clicking over the Start Button *just takes you back to the App Tile view.*)

Verifying the actual operating system is a little more complex for 8.1*. If your computer screen is touch enabled, slowly slide a finger from the outside of the screen, then perhaps an inch in from the Right (like when you turn your computer off). The same thing can be accomplished by moving the Mouse pointer to the Top Right corner of the screen. Either way, a column of five icons will float in from the right. Click or Tap over the bottom icon (it looks like a gear, and is labeled 'settings'). A larger 'settings' pane will move in also from the right. The text label 'control panel' should be near the top on the left, click/tap that. From there, select 'system and security' then 'system'. Shorthand, this looks as follows.

```
[float icon>>control panel>>system and security>>system] or  
[float icon>>control panel>>system]
```

By the way, if your computer says you still have just version 8* (i.e. not 8.1*), you should consider upgrading to 8.1*. This should be a free upgrade. You may be prompted (prodded) to upgrade to version 10*, but this is a major change if you are used to 8*.

-- 10*

(Many computers now have touch enabled screens. Tapping once on the screen is the same as clicking once with the mouse.)

This version returns to the single view approach. The bar along the bottom is solid black with fields of other colors as well as the usual smaller icons to the right. The left end icon is the shape of a window, in plain white, and viewed at an angle, so is trapazoidal in appearance (left side is shorter than the right side). There is no enclosing circle. The icon is the start button.
[start>>settings>>system>>about]

2.2 Accessing the Device Manager list

If you need to adjust the Com Port assigned to your UFI USB device, or if you are having trouble with your UFI software communicating with the UFI device, you may need to check the Device Manager list in order to evaluate the state of the driver connections between the UFI device USB interface and the operating system. The Device Manager list is how you check this. **The focus of this section is simply getting to the Device Manager list on your computer!** The actual use of the Device Manager list is covered in the following sections (3 & 4).

Operating system versions:

-- 98*

- a. Click over the start button (lower left corner of the screen). This brings up a vertical menu with a list of items.
- b. Just MOVE the mouse pointer over the 'settings' item in the list shown; you don't need to click. This is known as 'hovering'.
- c. Locating the pointer over the 'settings' item will bring up a sub-menu to the RIGHT. Click over the 'control panel' item.
- d. This brings a new 'control panel' window that shows a list of the various components of the operating system. Find the component named 'system' (towards the bottom), and double-click over it.
- e. This brings up a new window showing the actual operating system details (as mentioned above). Along the top, you will notice tabs set up to look like a card file. You can select the various tabs. Click over the 'device manager' tab (second from left).
- f. This brings up the Device Manager list. You have two options, make sure 'view device by type' is selected.

-- Xp*

- a. Click over the start button (lower left corner of the screen). This brings up a 2 column vertical menu list.
- b. Click over the 'control panel' item (right hand list, roughly center).
- c. This brings up a new window labeled 'control panel', that shows the components of the operating system in icon form. (You can actually pick one of 5 ways of viewing these items using a 'views' button, top right, but the name and arrangement of the icons don't change.)
- d. Click over the 'system' icon. This brings up the operating system details page (as mentioned above). The window is labeled 'system properties', and also shows two rows of tabs along the top.
- e. Click over the 'hardware' tab. This new view supplies a number of buttons.
- f. Click over the 'Device Manager' button.
- g. This brings up the Device Manager list.

-- Vista*

- a. Click over the start button (lower left corner of the screen). This brings up a 2 column vertical menu list.
- b. Click over the 'control panel' item (right hand list, below center).
- c. This brings up a new window labeled 'control panel', that shows the components of the operating system. >If 'control panel home' is highlighted to the left, the items in this list attempt to gather items together into larger groups. Click over the 'system and maintenance' item, which brings up a new list, so click over the 'system' item. >If 'classic view' is highlighted to the left, you will just see a long list of components. Click over the 'system' item.
- d. Either of these two approaches will take you to the system information page mentioned above. There are no tabs, but the first item in the 'task list' to the left shows 'device manager', so click over that.
- e. This brings up the Device Manager list.

-- 7*

- a. Click over the start button (lower left corner of the screen). This brings up a 2 column vertical menu list.
- b. Click over the 'control panel' item (right hand list, below center).
- c. This brings up a new window labeled 'control panel' and 'adjust your computer's settings', that shows the components of the operating system. >If 'view by category' is showing (upper right), the items in this list attempt to gather items together into larger groups. Click over the 'system and security' item, which brings up a new list, so click over the 'system' item. >If 'view by large icons' or 'view by small icons' is showing (upper right), you will just see a long list of components. Click over the 'system' item.
- d. Either of these two approaches will take you to the system information page mentioned above. There are no tabs, but the first item in the list to the left shows 'device manager', so click over that.
- e. This brings up the Device Manager list.

-- 8.1*

(Many computers now have touch enabled screens. Tapping once on the screen is the same as clicking once with the mouse.)

- a. >If your computer screen is touch enabled, slowly slide your finger in from the RIGHT side of the screen edge until a vertical set of five icons float into view from the right. >Otherwise, move the Mouse pointer into the upper RIGHT corner of the screen and keep it there until a vertical set of five icons float into view from the right.
- b. The bottom icon looks like a gear, and is labeled 'settings'. Either tap over that bottom icon, or else move the mouse pointer over the bottom icon and click over it.
- c. A new window will slide in from the right. It is labeled 'settings' at the top. This is probably the same window you use to turn your computer off. In the upper left of this new window is a text label 'control panel'. Either click or tap over that label.
- d. This brings up a new window labeled 'control panel' and 'adjust your computer's settings', that shows the components of the operating system. >If 'view by category' is showing (upper right), the items in this list attempt to gather items together into larger groups. Click over the 'system and security' item, which brings up a new list, so click over the 'system' item. >If 'view by large icons' or 'view by small icons' is showing (upper right), you will just see a long list of components. Click over the 'system' item.
- e. Either of these two approaches will take you to the system information page mentioned above. There are no tabs, but the first item in the list to the left shows 'device manager', so click or tap over that.
- f. This brings up the Device Manager list.

-- 10*

(Many computers now have touch enabled screens. Tapping once on the screen is the same as clicking once with the mouse.)

- a. Click or tap the start button. This opens up a large, rather confusing block of items. The 8.1* Tiles are moved to this block, to the right. For our purposes, you just need to locate the small 'settings' label (next to a gear) near the lower left corner.
- b. Click or tap over the 'settings' label. This will bring up the settings window that holds a collection of fairly large icons.
- c. Click or tap over the icon that looks like an open notebook, and has 'system' right below it. This brings up the 'system' window. A list of items is arranged vertically down the left side. And when one of these items is selected, the relevant content is displayed in the right side of the window.
- d. Click or tap over the 'about' item at the bottom of the list on the left. The operating system details along with a bunch of other details are shown in the right side of the window. Use the scroll bar (or scroll wheel if your mouse has one), and scroll all the way to the bottom of the content in the right half of the system window. Find the Device Manager text item near the bottom.
- e. Click or tap over the Device Manager text item. This brings up the Device Manager list.

3. Device Manager list View and Troubleshooting

Note 1: *You should have already followed the directions above to install the USB drivers for your UFI device BEFORE actually working through this section! The two distinct entries in the Device Manager list that accompany the UFI USB device will NOT be present if the proper USB Drivers have NOT yet been installed!*

Note 2: *If you have performed the installation of the software and USB drivers for the UFI device, and everything is working fine, you do NOT need to do anything! But, if you are having problems, please continue.*

Note 3: *For the purposes of inspecting the Device Manager list to evaluate the quality of the UFI device USB connection, the UFI device should be connected to a USB port on your computer, and should also be turned OFF! (Power is supplied to the USB interface by your computer.)*

3.1 Inspection and Initial Troubleshooting suggestions

Evaluating the connection between a UFI USB device and the operating system is performed by inspecting relevant entries in the Device Manager list. A (poor) screen image (picture) of this list is included at the end of these notes, and you can reference this. You can also pull this list up on your computer to help you grasp the details of the discussion below. If you are trying to resolve a communications problem with a UFI device, then you probably should pull up the Device Manager list on your computer at some point. Note however, that the UFI USB device will ONLY show up on the Device Manager list IF it is currently connected to a USB port on your computer! In other words, the two entries in the list that normally accompany the connection of the UFI USB device are only present when that device is actually connected (plugged in).

The Device Manager list is just that, a list of entries that represent devices that are interfaced to the operating system. Note the following about this list:

- a. The entries are included in this list, top to bottom, in alphabetic order.

- b. Each entry, each line has the following components.
- Small right facing triangle (clicking over this expands that particular list item with any more sub-items below it.)
 - Small picture (icon) to represent the device (a yellow triangle enclosing a black question mark will be added over this icon if there is a problem with the device interface.)
 - Text description of the device / function

For the purpose of exploring or troubleshooting UFI USB devices, we only care about the folloing **three entries** in the Device Manader list:

```
...
...
> [ ] Other Devices
> [ ] Ports (COM & LPT)
...
...
> [ ] Universal Serial Bus controllers
```

The 'Other Devices' item is only important because, if there is a problem, the operating system may move the UFI device USB interface component there. And we have used a set of square brackets where the icon would be since we can't easily reproduce the icons. And we will consistently shorten 'Universal Serial Bus controllers' to 'USB controllers' in the discussion that follows.

Now, if you click over the triangles in front of both the 'Ports (COM & LPT)' and 'USB controllers' lines, you should see something similar to the Device Manager list picture included at the end, where we have expanded these same two main groups to show everything inside (under) each of these two main device groups.

Connected and properly operating, the UFI USB device shows up as two items on the Device Manager list (note the two arrows):

...

...

v [] Ports (COM & LPT)

...

[] USB Serial Port (ComX) <-----

(X is the port number assigned by the operating system)

...

...

v [] Universal Serial Bus controllers

...

...

...

[] USB Serial Converter <-----

And, there should NOT be small, yellow triangles enclosing a question mark over the small icon of either of these two lines! If this is what you see on your computer (these two specific lines with no yellow triangles), you can safely conclude that the USB interface in your UFI device is correctly interfaced to the operating system!

IF the two items with the arrows above are present, and IF neither icon has a yellow triangle added, THEN the USB interface to the UFI device is working correctly!!!

If the UFI software is STILL having problems communicating with your UFI device:

- you should check the Com Port number assigned to the UFI device by the operating system, and adjust it if necessary (section 4)
- you should verify that the UFI device is actually able to respond to the software (section 5)

IF either of the two Device Manager list items indicated above are NOT present, or if either or both of them have a small yellow triangle enclosing a question mark, then there are issues with the UFI USB interface that require attention. The discussion that follows can surface some helpful options.

3.2 Handling "Other Devices" issues

If the operating system did not recognize the UFI USB device for some reason, it may place it under the 'Other Devices' item in the Device Manager list. There will also be the yellow triangle that encloses a question mark over the icon for this device. When this happens, the actual interface module name (FT232RL) is usually what is posted as a sub-item under 'Other Devices'.

This is important, because there may be other Device Manager list issues with other devices on your computer that are causing the operating system to add items under the Other Devices list item. **IF the item found under Other Devices is NOT "FT232RL" (or something very similar), then this is some other device/interface on the computer, and NOT the UFI USB device!!!** In other words, problems flagged under the 'Other Devices' item **may or may not** be related to the UFI USB device. Checking for the actual interface module name (FT232RL) should resolve this.

If the device under Other Devices is NOT the UFI USB device, we would expect that the two usual Device Manager list entries for the UFI USB device would also be present in the Device Manager list, and you can ignore the 'Other Devices' items if so. Of course, we can only make recommendations regarding UFI instruments!

The most likely cause for the UFI USB device ('FT232RL') being placed under 'Other Devices', is that drivers have not yet been installed for the UFI USB device. You can address this from the Device Manager list. And note that there are two components to the USB drivers for the UFI device.

- a. "Alt-click" (click with the mouse button you do not normally use) over the FT232RL item under 'Other Devices'. This should bring up a menu list of items that you can select.
- b. "Click" over 'Update Driver Software', the top item in this menu. A new window will open asking you where the operating system should look for the proper drivers.
 - b1. If your computer is connected to the internet, you can select the top item, 'Search automatically...', and the operating system should go online, search, and find the driver, then complete the installation.
 - b2. Otherwise, you should select the 'Browse my computer...' option. Your computer will expect you to browse to the location of the UFI USB Drivers on your computer, usually from the Drivers folder on the CD that came with the UFI device, and usually in a folder with the phrase "WHQL Certified" in the name, or something similar. Once you have browsed to that location, select 'Next' to direct the operating system to pull the drivers from the CD and complete the installation.
- c. Either of the above approaches should be followed by an 'in process' installation window, followed by a completion window. Press Close to close this last window, and go back to the Device Manager list.

If your operating system is Vista* or older, the Device Manager list may not update automatically. You will need to close the Device Manager list and all other windows, then access the Device Manager list again from the start button. If your operating system is 7* or newer, the Device Manager listing will automatically update to reflect the change in the Driver status.

As mentioned above, there are two components to the UFI USB drivers. It is unlikely that a single pass through the above procedure will totally resolve the problem. The item under Other Devices may remain, but now show "USB Serial Port", and will still show the yellow triangle over the icon. You will need to walk through steps 'a' through 'c' above **AGAIN**, to install the second half of the USB driver package. The steps are identical.

When you are done with the second 'driver update' step, and after allowing the Device Manager list to update, the expected two items (as shown under "**Connected and properly operating**" above) for the UFI USB interface should be present in the Device Manager list, and neither icon should hold the yellow triangle. Once this is done, the USB interface between the UFI device and the operating system should be working correctly. And the UFI USB device should NOT show up under 'Other Devices' either.

3.3 Troubleshooting USB issues

The above section (3.2) about 'Other Devices' usually addresses issues encountered the first time you are trying to bring the UFI system up. **If the overall system has been working fine, and then stops working for some reason** (the UFI software is suddenly unable to communicate with the UFI device), you should still inspect the Device Manager list. However, any problems found were caused by either the operating system or another program or update active on your computer.

In addition, and by way of an overview, there are really only two possible troubleshooting approaches for both of these Device Manager list items. You can try updating the USB Drivers (which basically duplicates the process outlined above), or you will need to completely un-install BOTH USB Drivers for the UFI device, and start over with a 'cold install'.

3.3.1 Resolving Transient Driver Problems

The supplier of the USB solution we use has indicated that there is a specific order involved when dealing with the two items that show up in the Device Manager listing. In general, the 'USB Serial Converter' item (under USB controllers) needs to be handled (repaired) first, since it provides the basis upon which the 'USB Serial Port' item is able to work. As a result, when you need to deal with issues with either of these two items, you need to start with the 'USB Serial Converter' item, and get driver issues with that corrected first. The approach followed is similar to what we recommend above for installation.

3.3.2 Evaluating / Repairing the 'USB Serial Converter' entry

Look at this item associated with the UFI USB device under the 'USB controllers' main item in the Device Manager list. Again, the list item associated with the UFI device should read 'USB Serial Converter'. If you have already installed the drivers, and if the UFI device is plugged in to a USB port on your PC, this list item should be present.

Carefully check the 'icon' for this list item.

> **If** there is **NO** yellow triangle over this icon, the operating system is not showing a problem with this item, so skip down to section 3.3.3 below.

> **IF** there **IS** a yellow triangle over this icon, the operating system **IS** showing a problem with this item. Attempt to repair this problem by seeking to 'update' the drivers by re-installing the correct drivers. Do this as follows:

- a. "Alt-click" (click with the mouse button you do not normally use) over the 'USB Serial Converter' item under 'USB Controllers'. This should bring up a menu list of items that you can select.
- b. "Click" over 'Update Driver Software', the top item in this menu. A new window will open asking you where the operating system should look for the proper drivers.
 - b1. If your computer is connected to the internet, you can select the top item, 'Search automatically...', and the operating system should go online, search, and find the driver, then complete the installation.
 - b2. Otherwise, you should select the 'Browse my computer...' option. Your computer will expect you to browse to the location of the UFI USB Drivers on your computer, usually from the Drivers folder on the CD that came with the UFI device, and usually in a sub-folder with the phrase "WHQL Certified" in the name, or something similar. Once you have browsed to that location, select 'Next' to direct the operating system to pull the drivers from the CD and complete the installation.
- c. Either of the above approaches should be followed by an 'in process' installation window, followed by a completion window. Press Close to close this last window, and go back to the Device Manager list.

Now wait a full minute before continuing, to allow the operating system to complete any other related tasks. Note that, after performing this process on both items, we will recommend turning your computer off, then back on. You don't need to again concern yourself with the icon for the 'USB Serial Converter' list item yet.

3.3.3 Evaluating / Repairing the 'USB Serial Port (ComX)' entry

Look at this item associated with the UFI USB device under the 'Ports (COM & LPT)' main item in the Device Manager list. Again, the list item associated with the UFI device should read 'USB Serial Port (ComX)' where X is the Com Port number assigned by the operating system; Com3 or whatever. If you have already installed the drivers, and if the UFI device is plugged in to a USB port on your PC, this list item should be present.

Carefully check the 'icon' for this list item.

> **If** there is **NO** yellow triangle over this icon, the operating system is not showing a problem with this item, so skip down to section 3.3.4 below.

> **IF** there **IS** a yellow triangle over this icon, the operating system **IS** showing a problem with this item. Attempt to repair this problem by seeking to 'update' the drivers by re-installing the correct drivers. Do this as follows:

a. "Alt-click" (click with the mouse button you do not normally use) over the 'USB Serial Port (ComX)' item under 'Ports (COM & LPT)'. This should bring up a menu list of items that you can select.

b. "Click" over 'Update Driver Software', the top item in this menu. A new window will open asking you where the operating system should look for the proper drivers.

b1. If your computer is connected to the internet, you can select the top item, 'Search automatically...', and the operating system should go online, search, and find the driver, then complete the installation.

- b2. Otherwise, you should select the 'Browse my computer...' option. Your computer will expect you to browse to the location of the UFI USB Drivers on your computer, usually from the Drivers folder on the CD that came with the UFI device, and usually in a folder with the phrase "WHQL Certified" in the name, or something similar. Once you have browsed to that location, select 'Next' to direct the operating system to pull the drivers from the CD and complete the installation.
- c. Either of the above approaches should be followed by an 'in process' installation window, followed by a completion window. Press Close to close this last window, and go back to the Device Manager list.

Now wait a full minute before continuing, to allow the operating system to complete any other related tasks. As above, don't worry about checking for changes in the icon just yet.

3.3.4 Computer Reboot and Repair Evaluation

Please carefully follow this procedure to restart your computer, and then evaluate the results of your attempted repair of the UFI USB Drivers.

- a. Wait a minute after performing any actions using the Device Manager list. Next, close the Device Manager window, and any other windows opened to access it.
- b. Make sure all other applications are closed, then turn your computer off. We do not recommend Sleep or Hibernate, please select Shut Down to turn your computer completely off.
- c. Wait 30 seconds, then unplug the UFI device from your computer.
- d. Wait 30 seconds more, then start your computer back up, and let it fully complete the usual start-up process (wait 5 minutes just to be sure).
- e. Plug the UFI USB device back in to your computer.
- f. Wait another minute
- g. Open the Device Manager list (as required by your operating system).
- h. Click over the small triangle in front of the 'Ports (COM & LPT)' and 'USB controllers' list items to show sub-items.
- i. Now carefully check the icons for the 'USB Serial Port (ComX)' and 'USB Serial Converter' items.

> **IF EITHER icon STILL shows a yellow triangle** with a question mark, there is still a problem. Proceed now to section 3.4 for directions how to remove the UFI USB drivers, and then perform a 'cold install' of these drivers.

> **IF both icons show NO yellow triangle** with a question mark, the driver repair has been successful. However, if the UFI software is STILL having problems communicating with your UFI device, something else is causing this problem.

- you should check the Com Port number assigned to the UFI device by the operating system, and adjust it if necessary (section 4)
- you should verify that the UFI device is actually able to respond to the software (section 5)

3.4 Uninstalling the UFI USB drivers for a new, 'Cold Install'

According to the supplier of the USB solution we have been using, some driver issues can only be resolved by completely uninstalling the USB drivers, and starting over with a completely new Driver installation (a 'cold install'). As complex as the operating system has become, this should surprise nobody! This course of action is generally only required in the case that some other action in the operating system has somehow damaged drivers that worked fine up to a particular point in time. This condition seems rare in our experience to begin with, but it may take two passes through this entire process to finally resolve the issue.

As mentioned above, there are two components to the drivers for the UFI USB interface, one for each of the two items that show in the Device Manager list. Further, the actual uninstall process must follow a specific order; the 'USB Serial Port (ComX)' item needs to be uninstalled first, then the 'USB Serial Converter'. The directions below follow this requirement.

By way of setup, the UFI device must be connected to your computer, and turned off. And you will need to use the Device Manager list to perform the uninstall, so bring that up (if not already done), and expand the 'Ports (COM & LPT)' and 'USB controllers' items to show the two items associated with the UFI device USB interface. Finally, check again to verify that the yellow triangle is still shown over the icon for one or both of these two Device Manager list items -- 'USB Serial Port (ComX)' and 'USB Serial Converter'. (If there are no triangles, you don't have to do anything!)

3.4.1 Uninstalling the 'USB Serial Port (ComX)' item and driver

- a. "Alt-click" (click with the mouse button you do not normally use) over the 'USB Serial Port (ComX)' item under 'Ports (COM & LPT)'. This should bring up a menu list of items that you can select.
- b. "Click" over 'Uninstall', near the center of this menu. A new window will open asking you if you are SURE you want to continue with the uninstall. **DON'T** HIT 'OK' YET!!!
- c. There is a check box next to a note "Delete the driver software for this device" -- CHECK THIS BOX!!! This will result in deleting the drivers as well as the device entry, which is what we want.
- d. AFTER checking this box, NOW you can press the 'OK' button to continue with the uninstall. You may run into permissions windows on some computers, click 'ok' or 'yes' and continue.

When this process is complete, you should be back at the Device Manager list, and the 'USB Serial Port (ComX)' item should not be present for newer operating systems. Ignore it if it is still present, for now anyway.

3.4.2 Uninstalling the 'USB Serial Converter' item and driver

- a. "Alt-click" (click with the mouse button you do not normally use) over the 'USB Serial Converter' item under 'USB Controllers'. This should bring up a menu list of items that you can select.
- b. "Click" over 'Uninstall', near the center of this menu. A new window will open asking you if you are SURE you want to continue with the uninstall. **DON'T** HIT 'OK' YET!!!
- c. There is a check box next to a note "Delete the driver software for this device" -- CHECK THIS BOX!!! This will result in deleting the drivers as well as the device entry, which is what we want.
- d. AFTER checking this box, NOW you can press the 'OK' button to continue with the uninstall. You may run into permissions windows on some computers, click 'ok' or 'yes' and continue.

When this process is complete, you should be back at the Device Manager list, and the 'USB Serial Converter' item should not be present for newer operating systems. Ignore it if it is still present, for now anyway.

3.4.3 Reboot your computer (disconnect the UFI Device)

- a. Wait a minute after performing any actions using the Device Manager list. Next, close the Device Manager window, and any other windows opened to access it.
- b. Make sure all other applications are closed, then turn your computer off. We do not recommend Sleep or Hibernate, please select **Shut Down** to turn your computer completely off.
- c. Wait 30 seconds, then **unplug the UFI device** from your computer.
- d. Wait 30 seconds more, then start your computer back up, and let it fully complete the usual start-up process (wait 5 minutes just to be sure).

3.4.4 Repeat the USB Driver installation process

At this point, your computer should be up and running, and in a state before any UFI Device USB drivers have been installed. The UFI device should also NOT be connected to your computer.

YOU NOW SHOULD install (re-install) the USB Drivers required by your UFI device; put them back on your computer. Carefully follow the instructions found in Section 1 (above) in order to perform a first time installation of the USB drivers required by the UFI device.

3.4.5 Next Step

If working through the driver uninstall and reinstall process outlined above (maybe twice) does not correct the problem, well it may be a problem with the USB interface module inside your UFI device. We have never seen one of these devices fail like this (yet), but this is always a possibility. Still, if you have done everything we recommend, and you are still having problems, then contact us, and we will see if we can help!

4. Com Port Assignment -- Checking and Changing

A number of our more recent programs have been coded to access the USB interface directly. For such software, the actual Com Port NUMBER that your computer assigns to the USB interface inside the UFI device DOES NOT MATTER.

The rest of our software accesses the USB interface inside the UFI device as a Com Port. For such software, the Com Port number assigned to the UFI device by your computer MUST BE between Com1 and Com8 or the software will **NOT** be unable to communicate with the UFI device!

The Instruction Manual for your specific UFI device should clarify if the Com Port setting matters or not!!!

This section shows how to check, and adjust if necessary the Com Port setting for the USB interface inside the UFI device. Before you proceed, make sure that the USB drivers have been successfully installed, and that the UFI device is connected to a USB port on your computer (which actual USB port doesn't matter). Then carefully work through the following steps as required.

- a. Refer to section 2 in order to bring up the Device Manager list on your computer. Press the little arrow to the left to show the items under 'Ports (COM & LPT)' on the list.
- b. The USB port in the UFI Device should show as an item that reads 'USB Serial Port (ComX)' under the main 'Ports (COM & LPT)' list item. Where it shows "ComX", the "X" will be a number, 1, 2, 3, etc. This number is the Com Port number your computer has already assigned to the UFI Device.

> If this item shows between Com1 and Com8 [for example, maybe it shows 'USB Serial Port (Com6)'], then the computer has assigned an acceptable Com Port number to the UFI Device. You can close the Device Manager and all associated windows. The goal of this section has been fulfilled; the Com Port number assigned to the UFI Device by your computer is between Com1 and Com8.

> **If this item shows a Com Port assignment higher than Com8 [for example, maybe it shows 'USB Serial Port (Com11)'], then the computer has assigned a Com Port number to the UFI Device that will prevent the UFI software from accessing the UFI Device.** You will need to continue with this process (below) to change the Com Port number assigned to the UFI device by your computer.

- c. "Alt-click" (click with the mouse button you do not normally use) over the 'USB Serial Port (ComX)' item under 'Ports (COM & LPT)'. This should bring up a menu list of items that you can select.
- d. The bottom menu list item reads "Properties", click over that.
- e. On the new window, click over the 'Port Settings' tab along the top.
- f. The next window shows Port Settings, but you can't change the Com Port assignment from this window. Press the 'Advanced...' button (roughly center) to access a new window.
- g. This new window is titled 'Advanced Settings...' The top control on this window allows you to change the Com Port assignment. Press the button, which will bring up a list control allowing you to select a new Com Port number for this device from a list of Com Port numbers. We recommend that you change it to Com8 or Com7. The list may include a note that this particular Com Port number is already in use, but you should make the reassignment anyway. Once you have selected the new Com Port number, the control should collapse, and again show just a single button with the new Com Port number on it. The operating system may open a message window to again ask you if you want to proceed with the re-assignment. Select 'Yes' to continue with the re-assignment.

Reassigning over an 'in use' Com number like this is usually not a problem. A Serial USB device could have been connected to the operating system at one point, but it is not likely that the device is still connected. If another Serial USB device was connected to your computer in the past, even briefly, the operating system will try to reserve the assigned Com number for that device, even if it is never again connected to your computer. However, if you find this reassignment causes problems with some other device on your computer, reassign the UFI device to a different Com Port number, but still between Com5 and Com8.

After this reassignment is made, the Advanced Settings will close, again showing the Properties window.

h. Close the Properties window to again view the Device Manager list. For newer operating systems, the new Com Port number should show right away. For older operating systems, you will need to close the Device Manager, wait 30 seconds, then open the Device Manager list again. Once the Device Manager list shows that the Com Port number assigned to the UFI USB device is between Com1 and Com8, the software should be able to 'find' or 'locate', then access the UFI device.

Note: As mentioned above, not all UFI software programs care about the Com Port number that your computer assigns to the UFI device!!! Check the documentation for your specific UFI system to verify this, one way or another!

5. The 'Find' or 'Locate' process

As a first step, most UFI software programs provide a 'Find' or 'Locate' process. The goal of this process is that the software knows, 'finds out', which Com Port or USB ID to use, in order to access the UFI device. This process starts automatically on some programs. For most UFI software, you need to press a button to start this 'Locate' process before you can take any other actions. And other actions are usually disabled until the software is successful in obtaining connection information for the UFI device through this process.

The 'Locate' process works by the UFI software opening up a port, one at a time, and then looking for the correct response, which will only be provided if a UFI device is connected to that port. Some UFI Devices (such as the Baercom) are programmed to simply send a pre-defined data structure over and over, and the Baercom-PC software just looks for this data structure. Other UFI Devices (such as our Biologs and Simple Scopes) wait for a specific 'Locate' command, sent by the software, then they return a clearly defined response to that command. The software sends the query command out the ports, one at a time, and waits for the proper response from that port. This process continues until the correct response is received.

The software will check ports across a range, which is typically Com1 through Com8 for Serial Port handling versions of UFI software. For software that accesses the USB port directly, all of the links available are checked, but this is usually a very small number. If the software finds the expected response on a particular port, the search stops, and this port is used for all subsequent accesses of the UFI device. If the expected response is not found, the software notifies the user, and limits functionality of the UFI software due to the inability to access the UFI device.

Of course, the USB link (drivers on the operating system and the USB module in the UFI Device) needs to be operational before the 'Locate' process will be able to complete successfully. However, there is usually some other 'setup' that needs to be performed on the UFI device before the 'Locate' process even can be successful.

a. All UFI devices have a fixed 'start-up' time. If you direct the software to attempt to 'Locate' the UFI device during this start-up time, the UFI device will not be able to respond, and the software will be unable to find the UFI device. As a rule of thumb, wait at least 30 seconds after turning the UFI device on, before directing the software to attempt to 'locate' or 'find' the UFI device.

b. Some UFI devices require user setup prior to directing the software to attempt to 'locate' the UFI Device. For example, the Baercom-PC software will only be able to 'locate' the Baercom if the Baercom function switch (top left) is in the 'Show' or 'Review' positions. The Baercom only sends data to the PC for these two switch positions. The 'Locate' process will fail otherwise. As another example, the 3991 Biologs start up normally in the data collection mode, and actually disables communications with the PC. While the firmware version information is posted on the LCD display, you need to hold down both Event Mark buttons to actually direct the Biolog to enter the PC Link mode instead, where the link to the PC is left active. If you don't do this setup, the 'Find' process will fail.

The goal of this section is simply to point out that the setup of UFI Devices can affect the success or failure of the UFI software's ability to 'find' and communicate with the UFI Device!

Conclusion

The USB solution that we have selected for inclusion in UFI systems has proven to be both simple and robust, even through dizzying cosmetic upgrades in the operating system. And we have seen very few of the USB modules in the UFI devices fail! Hopefully these notes can help you get things up and running quickly. If not, by all means, contact us! We will do what we can to get things fixed.

UFI

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* -- The operating system names are trade-marked by Microsoft corp.

Typical Device Manager list showing entries that accompany connection to UFI devices:

