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Troubleshooting CBP to PC Communication

A walkthrough guide to solving CBP bipotentiostat communication issues

This technical notes addresses communication issues that can arise when using the Pine Research Instrumentation AFCBP1 bipotentiostat interfaced to a PC, which controls the bipotentiostat through AfterMath™ Data Organization Software. There are several layers of software and hardware between AfterMath and the CBP bipotentiostat. Each layer must be functioning properly for AfterMath to communicate correctly and efficiently with the potentiostat. When troubleshooting communication issues, a systematic approach must be used to diagnose the problem. Refer to this technical note for the suggested approach.

1. DEVICE DRIVER SOFTWARE

The proper device driver software must be installed on the computer. The device driver is from National Instruments and is called "DAQmx". Older versions of the driver were called "NIDAQ". These drivers are available as (very large) downloads from National Instruments web site (*http://www.ni.com/white-paper/6909/en*); however, most customers should have the device driver on a DVD that was shipped to them along with the interface board.

1. Pine maintains links to the National Instruments download area (and advice about which versions of the device driver to use) on the following web page:
   http://www.voltammetry.net/pine/afcbp1/driver

2. An easy way to tell if DAQmx is present on a computer system is to look for a utility program called "MAX" (which stands for Measurement and Automation Explorer). This is usually on the desktop of any computer which has DAQmx installed. If not, it should be located in the START menu under the "National Instruments" folder.

2. PROPER BOARD INSTALLATION

The physical interface board must be installed in the computer in a full-size PCI slot. Sometimes, after a computer has been moved, the interface board may partially slide out of the slot. Always check to assure that the board is secured in the PCI slot and held in place by a screw.

1. When installing a new board in a new computer, it is generally best to first install the DAQmx driver, then turn off the computer, then install the interface board, and then turn the computer back on. Doing the steps in this sequence helps to assure that Windows properly recognizes the new board after it is installed.

3. WINDOWS RECOGNITION OF INTERFACE BOARD

Confirm that Windows recognizes and can communicate with the interface board. This is done by using the Device Manager (CONTROL PANEL → SYSTEM → DEVICE MANAGER) to look at a list of the hardware devices presently installed on the computer. The interface board should appear somewhere in the list. If it doesn't, then Windows can't see the board, which means that DAQmx can't see the board, which means that AfterMath can't see the board.

1. An example of how the interface board appears in the Device Manager can be seen here:
   http://www.voltammetry.net/windows/device_manager

2. If Windows stubbornly refuses to see the board, it is sometimes necessary to remove the board, restart Windows, shut down Windows, reinstall the board in a (preferably different) PCI slot, and restart Windows.

3. Windows can sometimes be tricked into "rediscovering" the board by using the "Scan for Hardware Changes" option in the "Actions" menu of the Device Manager.

4. DAQmx COMMUNICATION TO INTERFACE BOARD

Confirm that "DAQmx" can "see" the interface board. This is done by using the MAX utility (Measurement and Automation Explorer). The interface board should appear as one of the attached devices (often under the "Data Neighborhood" or "Legacy Devices" category).

1. There are many different versions of the MAX utility. The link below gives an overview of what actions can be accomplished using the MAX utility: *http://www.ni.com/white-paper/4638/en*

2. It is possible to use the "Test Panels" feature of the MAX utility to see if the board is "awake" or malfunctioning. Typically, running one of the "Counter" tests is the easiest approach. Just turn on one of the counters (Counter 0 or Counter 1) and a big green indicator on the Test Panel should turn on. This is a pretty good sign that the board is alive and well.

5. AfterMath COMMUNICATION WITH AFCBP1

Confirm that AfterMath can "see" the interface board. When AfterMath starts, it senses the presence of the installed board and a "Pine AFCBP1" entry will appear in the lower-left pane of the AfterMath window. AfterMath will attempt to cold start the instrument and establish some initial "idle" conditions.

1. If AfterMath can see the AFCBP1, but it is not possible to perform any experiments, then a "permissions file" is probably missing from the AfterMath installation. Permissions files can be obtained by contacting Pine. Permissions files are usually located in the folder shown at the link: *http://www.voltammetry.net/pine/aftermath/user/activation*.

2. If AfterMath appears to be in a continuous loop, repeatedly trying to "cold start" the instrument, then the cable is probably loose, or the instrument is not in the proper "External Control" state (see below).

6. CABLE CONNECTIONS

Verify that the interface cable is secure on both ends. It is very common after moving the instrument or the computer for the cable to come loose from one of the two end connectors.

1. If the cable is secure, but communications problems persist, remove the cable and examine both ends of the cable for bent pins.

2. It is rare (but possible) that the interface port cable located inside the potentiostat may be loose. If this is suspected, disconnect the potentiostat from the power source, remove the cover of the potentiostat, and examine the internal ribbon cables which connect from the back panel down to the main analog circuit board.

7. AFCBP1 CONTROL MODE

Verify that the potentiostat is turned on and that the Control Mode is set to "external".

1. The "Control Mode" button is located on the lower-left part of the front panel. It must be pushed and held for about one second to change the control mode to "external".

CONCLUSIONS

If all of the above verification steps have been taken, and the AfterMath is still unable to communicate with the CBP bipotentiostat, then the unit may need to be returned to the factory for repair. Contact Pine to arrange a return authorization.