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# **PAX Maintenance Console (PMC)**

## **Software Manual**

**DOC-0319 Revision C-1**

**Software Version 1.0.1**



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## 1.0 Introduction

The PAX Maintenance Console (PMC) is a LabVIEW-based program that allows users to perform the following tasks:

1. Transfer PAX data to another computer using FTP (through the PAX Ethernet port)
2. Display data file contents in a time-series chart
3. Manipulate data for post-processing analysis
4. Examine real-time data (through the PAX serial or Ethernet port)

The PMC can connect to multiple PAX instruments, although connections are done sequentially rather than concurrently—that is, users must disconnect from one PAX before connecting to another.

The PMC has a tab-based structure. PMC menu items and tabs are described below.

Because file transfers can be time-consuming, the PMC has separate processing loops for file transfers and for data and results display. This enables the user to perform other tasks while files are transferring. This manual describes version 1.0.1 of the PMC software.

## 2.0 Installation

To install the PMC, insert the USB drive included with your PAX into a USB port on the computer where you would like to view files. Navigate to the PMC/Installer directory and click on Setup.exe. Accept all licensing agreements. The installer should place a PMC icon on the desktop.

For the PMC Ethernet-based functions to work, the PAX instrument needs to be connected to a network and have a static IP address. This connection must be done through the PAX Ethernet port. A trained IT professional should be consulted when putting the PAX on the network.

## 3.0 Basic Operation

### 3.1 Opening the PMC and Connecting to a PAX

To open the PMC, click on the PMC icon on the local computer desktop:



Figure 1: PMC Software Icon

When the program opens, you will see a table listing the available PAX instruments. If no PAXes are listed, you can type IP addresses directly into the **Address** field (Figure 2).

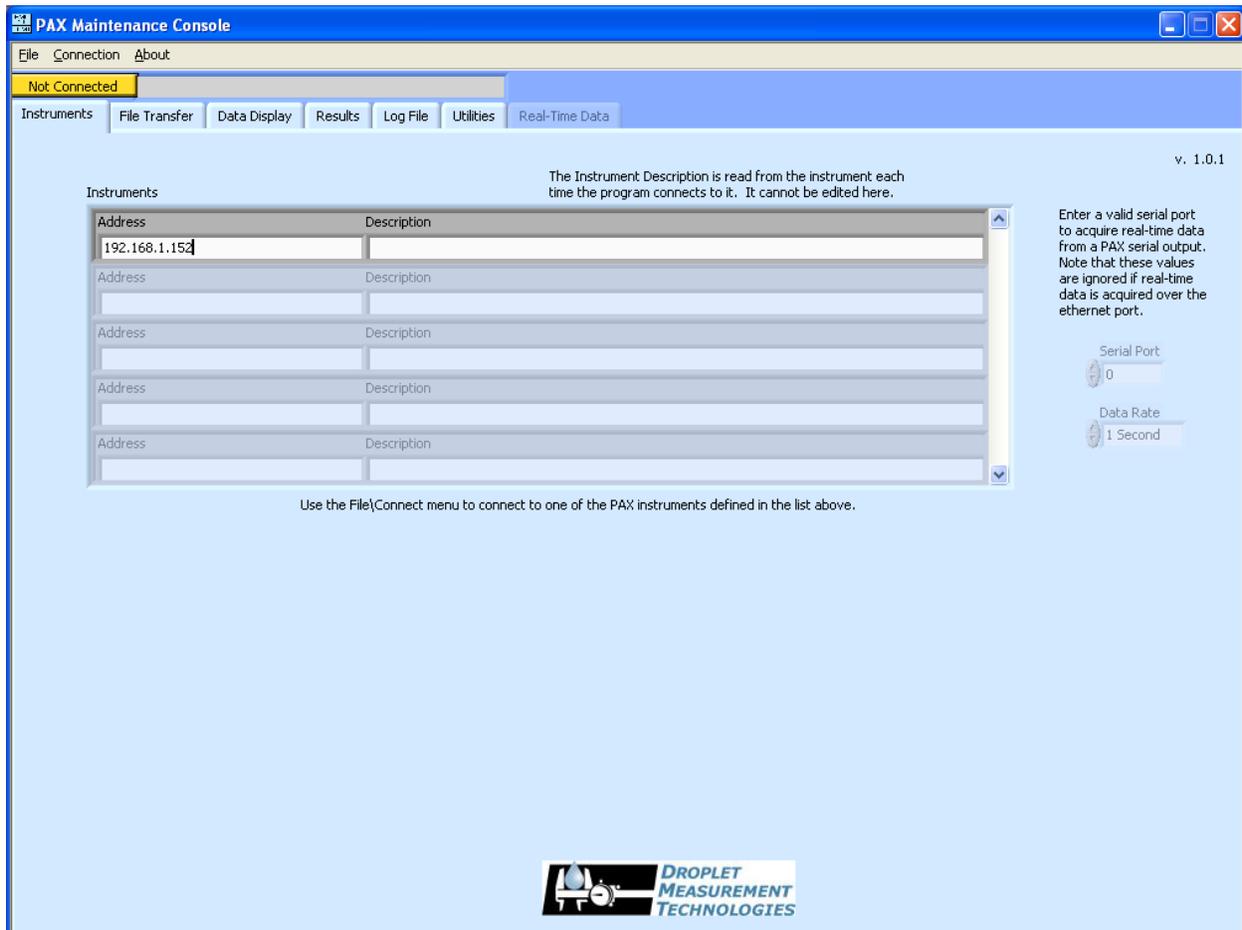


Figure 2: Typing IP Addresses into the Instruments Table

Once the table displays the PAX you want to connect to, click on the **Connection** menu item and select **Connect**. Then select the PAX that you want to work with. The indicator in the upper left should change from **Not Connected** to **Connected to:**. If this indicator says “Connection Failed,” there is a problem with the IP address or the network connectivity that needs to be fixed.

### 3.1.1 Disconnecting / Connecting to a New PAX

You must disconnect from one PAX in order to connect to new one. To disconnect, click on **Connection > Disconnect**. You will then be able to reconnect to a new PAX using **Connection > Connect**.

## 3.2 Closing the PMC

To exit the program, click on the **File** menu item and select **Exit**.

## 4.0 Program Tabs

### 4.1 Instruments Tab

The **Instruments** tab (Figure 2) displays all the PAX instruments available for connection via the PMC. To connect to an instrument, follow the instructions in section 3.1.

PAX instruments are displayed in a table. If you only have one PAX, only one instrument will appear in the table. If you have many PAXes, you can view them all using the scrollbar on the right side of the table.

If the PMC is connected to a PAX, it will display an ID window in the bottom half of the **Instruments** tab. This window provides additional information about the currently connected PAX.

#### 4.1.1 Instruments Table: Address and Description Parameters

The **Address** parameter displays the PAX IP address.

The **Description** parameter describes each PAX. This field is read from the instrument each time the PMC connects to it. The description includes the PAX station ID, serial number, and IP address. You cannot change the serial number, but you can modify the station ID and IP address from the PAX touch screen **Setup** page.

#### 4.1.2 Serial Port Parameters

Serial port parameters are not currently enabled. In the future, they will be used to specify real-time data parameters.

## 4.2 File Transfer Tab

The **File Transfer** tab (Figure 3) allows you to transfer data from the PAX computer to your local computer. It is essentially an easy-to-use FTP program.

The top panel of the window allows you to manage Data files, while the bottom panel allows you to manage Configuration and Log files.

If files are created or deleted on either computer by processes outside of the PMC program—e.g., by the PAX software or through Windows Explorer on your local machine—the file lists can become outdated and not reflect the current contents of the computers. If you suspect that this has happened, click on **Refresh File Lists** to update the file display for both the PAX and the local computer.

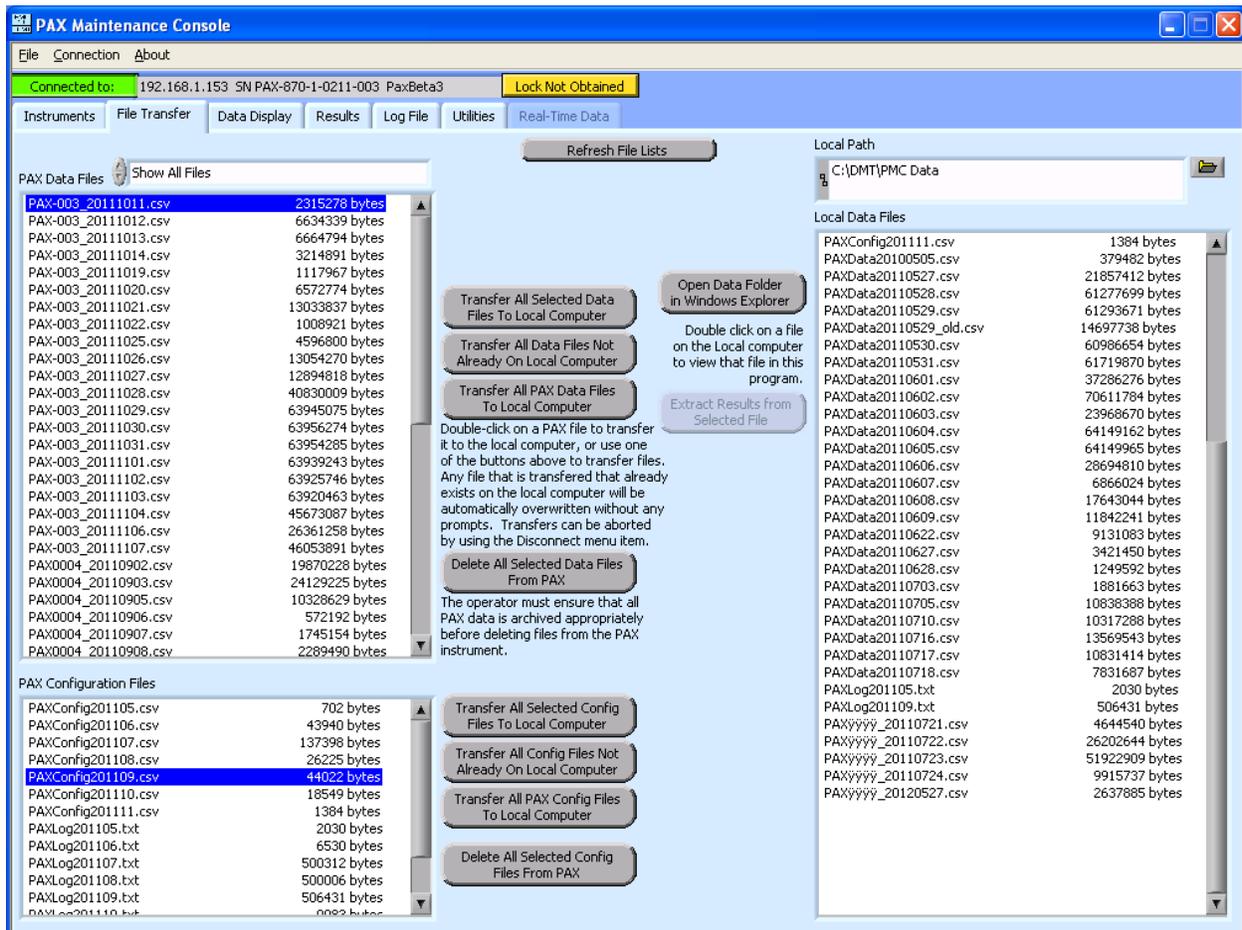


Figure 3: The File Transfer Tab

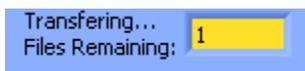
## 4.2.1 Transferring PAX Data Files to the Local Computer

To move PAX data files to the local computer, first select the desired directory on the local computer where files should be stored. You can do this by typing the directory name (e.g., C:\DMT\PMC Data) into the **Local Path** field. You can also click on the folder icon  , select the desired folder, and click on **Current Folder**. The default root destination for the PMC program is C:\DMT\PMC Data.

There are several ways to move PAX data files into the **Local Path** directory:

- 1.) *For single files:* Double-click on the file name in the **PAX Data Files** window.
- 2.) *For single or multiple files:* Select the desired files using the mouse. Then click on **Transfer All Selected Data Files to Local Computer**. (A range of files can be selected by clicking on the first file and then shift-clicking on the last. A selection of non-consecutive files can be selected by control-clicking on each file.)
- 3.) *To transfer only new files:* Click on **Transfer All Data Files Not Already On Local Computer**.
- 4.) *To transfer all files, regardless of whether they are new or not:* Click on **Transfer All PAX Data Files To Local Computer**. **Warning:** Any file that is transferred that already exists on the local computer will be overwritten.

While the files are transferring, the PMC will display a status indicator in the window header:



## 4.2.2 Deleting Data Files

To delete data files from the PAX, select the data files you want to delete in the **PAX Data Files** window. Then click on **Delete All Selected Files from PAX**. **Warning: you are responsible for ensuring that data and configuration files are properly archived in another location before deleting files on the PAX.**

**Caution:** Do not delete the current day's data file from the PAX. Doing so will stop data recording. If you accidentally delete this file, you will need to turn off the PAX, wait two minutes, and then turn on the PAX again. This will restart recording.

To delete data files from the local computer, click on **Open Data Folder in Windows Explorer**. This will open a Windows Explorer window that shows the contents of the specified local path. You can then delete files using normal Microsoft windows mechanisms. After deleting files, you will need to click the **Refresh File Lists** button for the **Local Data Files** window to reflect the changes that were made outside of the PMC program.

### 4.2.3 “Extract Results from Selected File” Button

Pressing this button extracts results from the data file selected in **Local Data Files** list. For more information, see sections 4.4.1 and 0.

### 4.2.4 Transferring Configuration and Log Files

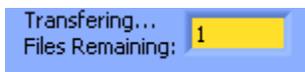
Transferring configuration and log files works very similarly to transferring data files. These file transfers are performed using the buttons in the lower part of the **File Transfer** tab.

The PMC transfers files from the PAX to the **Local Path**.

You have four options for transferring configuration and log files:

- 1.) *For single files:* Double-click on the file name in the **PAX Configuration Files** window.
- 2.) *For single or multiple files:* Select the desired files using the mouse. (A range of files can be selected by clicking on the first file and then shift-clicking on the last. A selection of non-consecutive files can be selected by control-clicking on each file.) Then click on **Transfer All Selected Config Files to Local Computer**.
- 3.) *To transfer only new files:* Click on **Transfer All Config Files Not Already On Local Computer**.
- 4.) *To transfer all files, regardless of whether they are new or not:* Click on **Transfer All Config PAX Files To Local Computer**. **Warning:** Any file that is transferred that already exists on the local computer will be overwritten.

While the files are transferring, the PMC will display a status indicator in the window header:



### 4.2.5 Deleting Configuration and Log Files

To delete configuration and log files from the PAX, select the files you want to delete in the **PAX Configuration Files** window. Then click on **Delete All Selected Config Files from PAX**. **Warning: you are responsible for ensuring that files are properly archived in another location before deleting files on the PAX.**

To delete configuration and log files from the local computer, click on **Open Data Folder in Windows Explorer**. This will open a Windows Explorer window that shows the contents of the specified data directory. You can then delete files using normal Microsoft windows mechanisms. After deleting files, you will need to click the **Refresh File Lists** button for the **Local Data Files** window to reflect the changes that were made outside of the PMC program.

### 4.2.6 Aborting File Transfers

To abort the transfer of all files, click on the **File** menu and select **Disconnect**.

## 4.3 Data Display Tab: Displaying all Output Channels

The **Data Display** tab displays information from the file listed in the **Data File** field. The tab has a time-series graph that displays two user-selectable data channels. In addition, a table in the bottom of the tab displays tabular data for all channels during all sampling intervals. For definitions of these channels, consult DOC-0301, the *PAX Operator Manual*.

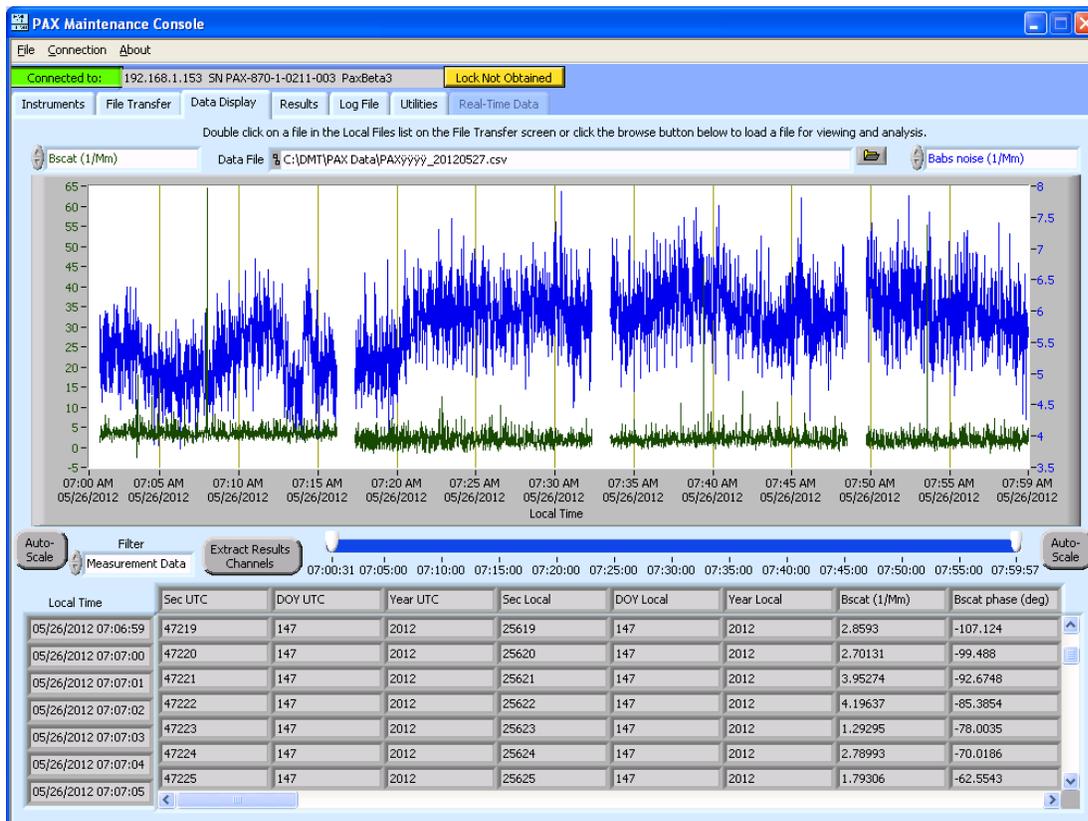


Figure 4: Data Display Tab

### 4.3.1 Loading Data for Viewing

To select a data set to display, you have several options:

- Type in the data file path and name in the **Data File** field
- Click on the folder icon  and select the desired file
- On the **File Transfer** tab, double click on the file name in the **Local Data Files** list

Note that PAX data files can be quite large and can take some time to load, depending on file size and the speed of your computer. While a data file is loading, a yellow warning appears in the upper left corner of the PMC window indicating that the file is being loaded:

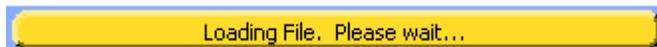


Figure 5: File Loading Button

### 4.3.2 Loading Config File for Viewing

You can also load a Config file for display. To load a config file, you have two options:

- Click on the folder icon , navigate to the desired directory, and click on a .csv file
- Click on the **File Transfer** tab and double-click on the config file in the **Local Configuration Files** list

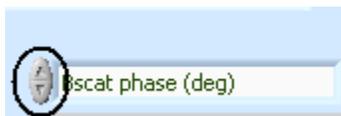
**Warning:** Do not try to Extract Results from a config file. Extracting Results is for data files only.

### 4.3.3 Time-Series Graph

The top part of the **Data Display** tab displays two-user selectable data channels in a time-series graph. The channel shown in the upper left is displayed in green, while the channel in the upper right is displayed in blue.

#### 4.3.3.1 Changing the Displayed Channels

To change the channel being displayed, you have two options. You can use the arrows to the left of the channel name to select available channels.



*Figure 6: Changing the Displayed Channel Using Arrows*

Alternatively, you can click on the field (Figure 7) to bring up a drop-down list of available channels, from which you can select the one you want displayed.

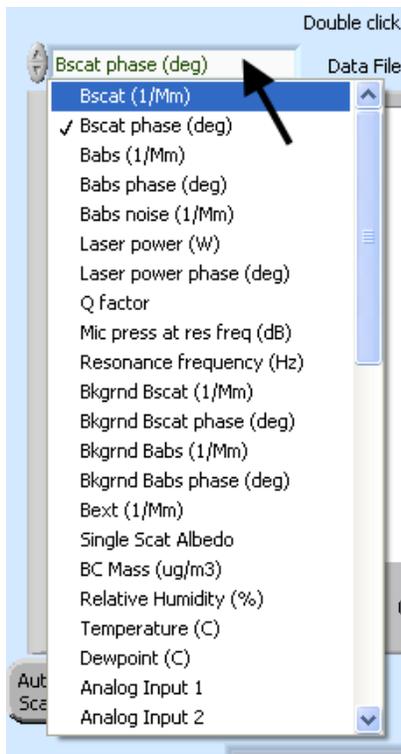


Figure 7: Selecting a Display Channel using the Drop-down List

#### 4.3.3.2 Changing Scales



The y-axis for the two displayed channels can be auto-scaled by clicking on their respective buttons. Note that Auto-Scale scales relative to all the data, not only the data displayed in the graph's time interval.

To change the x-axis (time) scale, you can also use the slider control below the graph. Move the start and end sliders (Figure 8) to change the time scale.

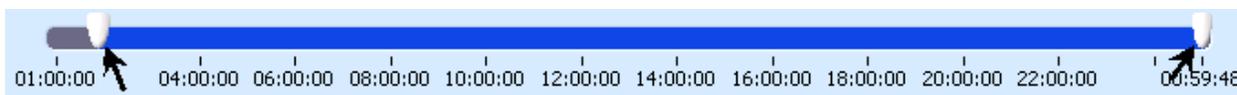


Figure 8: Start and End Sliders for Setting Time Scale

You can also change the scale of for either channel's graph by typing numbers directly into the minimum or maximum axis labels. This works for both y-axis scales and for the x-axis scale. Remember the y-axis for the blue channel appears to the right of the graph.

If Auto-Scale is selected and you change y-axis numbers by typing new values into the labels, you will need to click on the Auto-Scale button twice to get the data to auto-scale.

### 4.3.3.3 Filtering Data

The **Filter** control allows you to filter the graph data to remove readings taken when the PAX is in zero, flush or acoustic calibration mode. If you select “Measurement Data,” the graph will only display data acquired when the PAX was in measure mode. If you select “All Data,” the graph will display all data, regardless of the PAX mode.

### 4.3.4 “Extract Results Channels” Button

Pressing this button extracts Result channels from the current data file. For more information, see sections 4.4.1 and 0. This button only appears when data have not yet been extracted.

### 4.3.5 Data Table

To navigate around this table, use the scroll bars on the bottom and right sides. Channel names are displayed in the first row.

## 4.4 Results Tab: Displaying Channels of Scientific Interest

The **Results** tab is shown below.

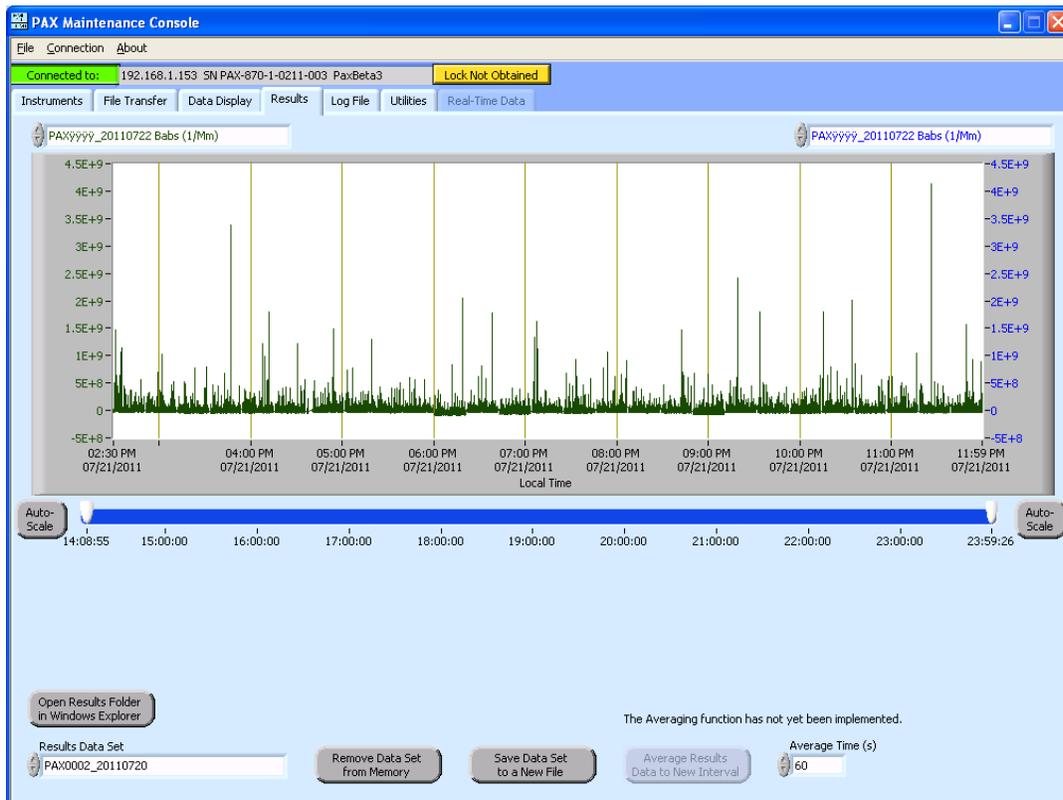


Figure 9: Results Tab

#### 4.4.1 What are Results?

“Results” are channels of scientific interest:

- Babs (1/Mm)
- Bscat (1/Mm)
- Bext (1/Mm)
- Sing Scat Albedo
- BC Mass (ug/m3)
- # of Points

The first five channels are PAX output channels. The PMC calculates **# of Points**. This channel currently always has the value of 1, but in the future it will store data related to the averaging function.

Note that all Results data are filtered. When you extract Results, the PMC removes readings taken when the PAX was in zero, flush, or acoustic calibration mode. Only readings taken during measure mode are retained.

## 4.4.2 Why am I Not Seeing Results?

Results must be extracted before you can view them. By extracting results, you can view these channels without the distraction of housekeeping channels. In addition, Results channels can be averaged over time and written to a Results file, and Results from multiple PAX instruments can be viewed together.

There are two ways to extract results:

- 1.) On the **File Transfer** tab, select the data file from which you wish to extract results. This file will be listed under **Local Data Files** (*not PAX Data Files*). Then click on **Extract Results from Selected File**.
- 2.) On the **Data Display Screen**, select and load the **Data file** from which you want to extract results. You can load the file by clicking on the folder icon  and double-clicking on the file name. After the file is loaded, click on the **Extract Results Channels** button.

While results are being extracted, you will see a status indicator in the PMC program header:



Note that extracting results may take several minutes, depending on file size and the speed of your computer. Once results have finished loading, they are displayed in the **Results** tab.

The **Results** tab time-series graph is similar to the **Data Display** graph, except different channels are available for display. For information on selecting channels to display and changing the graph's scales, see section 4.3.3.

## 4.4.3 Managing Results Files

Extracting results does not automatically save these results to a file. To save results on the local computer, click on **Save Data Set to a New File**. This will create a .csv file of Results channels. This file is stored in the **Local Path** (as defined on the **File Transfer** tab.) The default file name is the PAX data file name with "Results" appended to it.

The **Results** tab displays information from all data files from which the user has extracted results during the current PMC session. To clear out results from a data file, select that file in the **Results Data Set** field and then click on **Remove Data Set from Memory**.

To delete, move or copy Results files stored on the local computer, click on **Open Data Folder in Windows Explorer**. You can then manage the Results files according to normal Windows mechanisms.

#### 4.4.4 Averaging Channels

The averaging function is not currently functional.

### 4.5 Log File Tab

The Log File tab allows you to view PAX log files. To view a file, load it in one of the following ways:

- Type its name in the **Log File** field
- Click on the folder icon  and navigate to the desired log file
- On the **File Transfer** tab, double-click on the log file in the **Local Data Files** list (not the **PAX System Files** list)

After the file is loaded, it will be displayed in the **Log File** window (Figure 10).

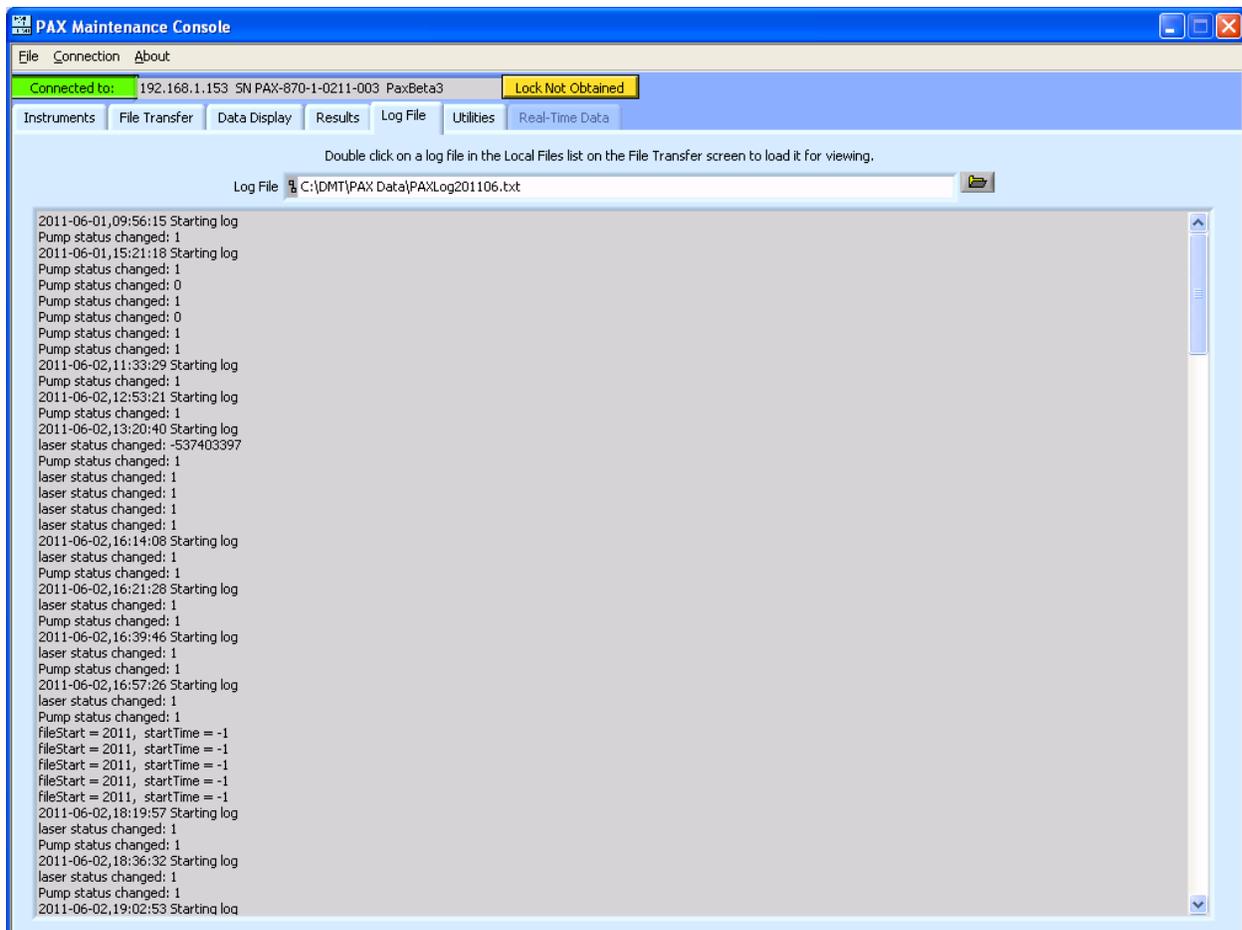


Figure 10: The Log File Tab

To view later log entries, use the scroll bar to scroll down.

## 4.6 Utilities Tab

The **Utilities** tab (Figure 11) allows you to control the PAX via the PMC. For instance, you can instruct the PAX to begin a zero calibration, or you could reset its laser power. This is done by resetting the values of PAX parameters. You will need a password, or “lock,” in order to use this feature. Any changes made on the **Utilities** tab apply to the currently connected PAX only.

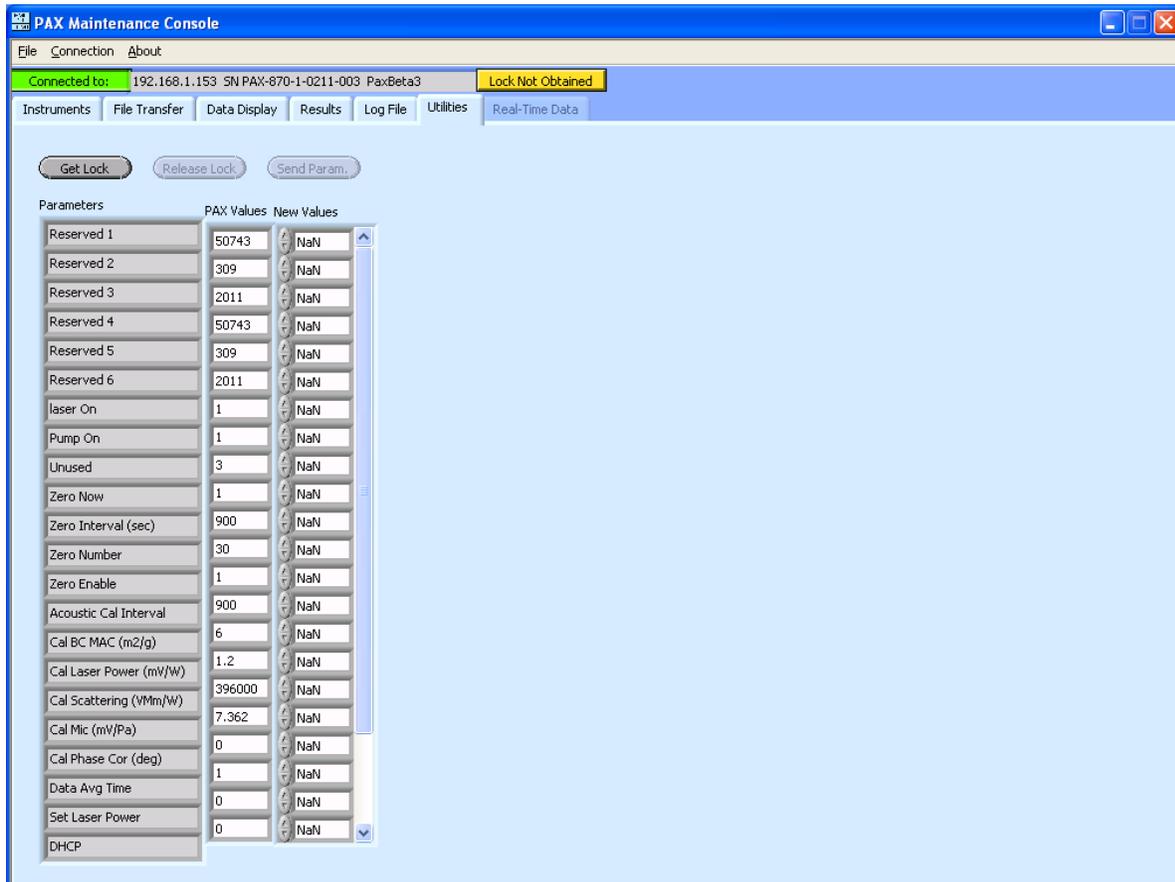


Figure 11: Utilities Tab

Modifying PAX parameters from the PMC rather than from the PAX is useful if you have numerous changes to make. The PAX touch screen interface is slower than the PMC’s interface, so updates take longer. In the future, the **Utilities** tab will be modified to further facilitate parameter changes.

### 4.6.1 Changing PAX Parameters via the PMC

To change PAX parameter values, follow the steps below.

- 1.) Click on **Get Lock**.
- 2.) In the pop-up window that appears, type in the PAX password.
- 3.) Click **OK**.

- 4.) For each parameter you want to change, enter a value in the **New Value** field. You can use the scrollbar to access all the available parameters. Any parameters with the value NaN (Not-a-Number) will be ignored and the PAX will retain its current value for those parameters.
- 5.) Click on **Send Param.**
- 6.) Click on **Release Lock.**

## 5.0 Program Menus

### 5.1 File Menu

The File menu offers two options:

- **Save Screen to jpg** saves the current screen to a .jpg file. By default, images are saved in the “PAX Data” sub-folder of the Local Path (specified on the **File Transfer** screen). By default, file names are PAX1.jpg, PAX2.jpg, etc. You can change the destination directory and the file name in the pop-up window that appears when you select **Save Screen to jpg**.
- **Exit** allows you to quit the PMC program.

### 5.2 Connection Menu

- **Connect** allows you to select a PAX for the PMC to connect to. Note you will not be able to connect to a new PAX until you have disconnected from the current one.
- **Disconnect** disconnects from the currently connected PAX. This option can be used to abort file transfers or deletions.
- **Delete** allows you to delete particular PAXes from the instruments available for connection. Once a PAX has been deleted, it will no longer be displayed on the PMC **Instruments** tab. If you accidentally delete a PAX from the PMC, you can type in its IP address to restore it.
- **Real Time Data** is not currently functional. In the future, this option will allow you to specify how the system receives real-time data.

### 5.3 About Menu

If you click on the **About** menu, a window appears that gives information about the PMC version number and copyright date. You can close this window by clicking anywhere inside it.

## 6.0 Troubleshooting

*The PAX doesn't seem to be recording data.*

One possibility is that you have deleted the current day's data file. If this happens, turn off power to the instrument, wait two minutes, and turn the PAX on again. Data recording will resume.

***My data has problems—I'm getting big spikes in the channels  $B_{abs}$  and  $B_{scat}$ , with values so high they can't be correct. How can I fix this?***

One possibility is that you need to filter the data so it includes measurement data only. On the Dta Display tab, make sure the **Filter** control is set to "Measurement Data."

***The time axis on my graph is showing strange values—I'm getting some dates back as far as the year 1904. What could be causing this?***

The data file could have incomplete lines in it, due to minor corruptions when the instrument was started or stopped. Another possibility is that the time stamps could be irregular if the PAX clock was reset during data acquisition. In either case, if you have saved your original data file, revert to this file and delete the current one.

## Appendix A: Installing the PMC

To install the PMC on a local computer, insert the USB stick with the PMC installer. Navigate to the Setup.exe program. Double-click on the file name.

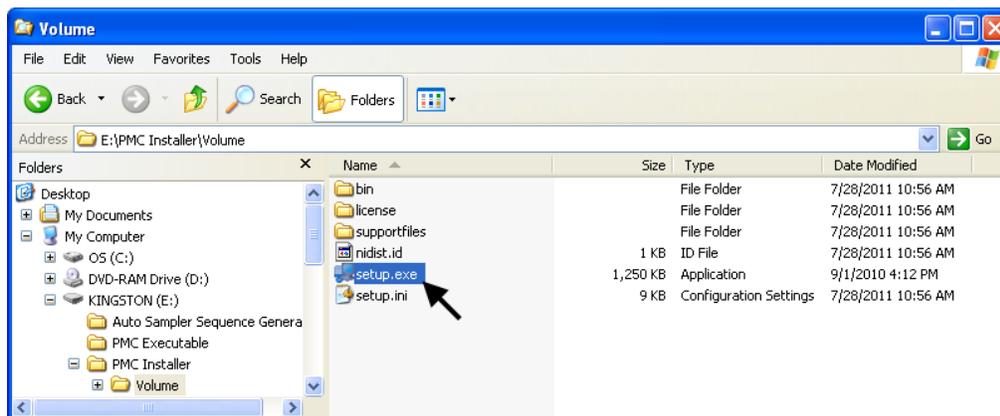


Figure 12: Installing the PMC

A window will appear asking you to select the Destination Directory. Click on **Next**.

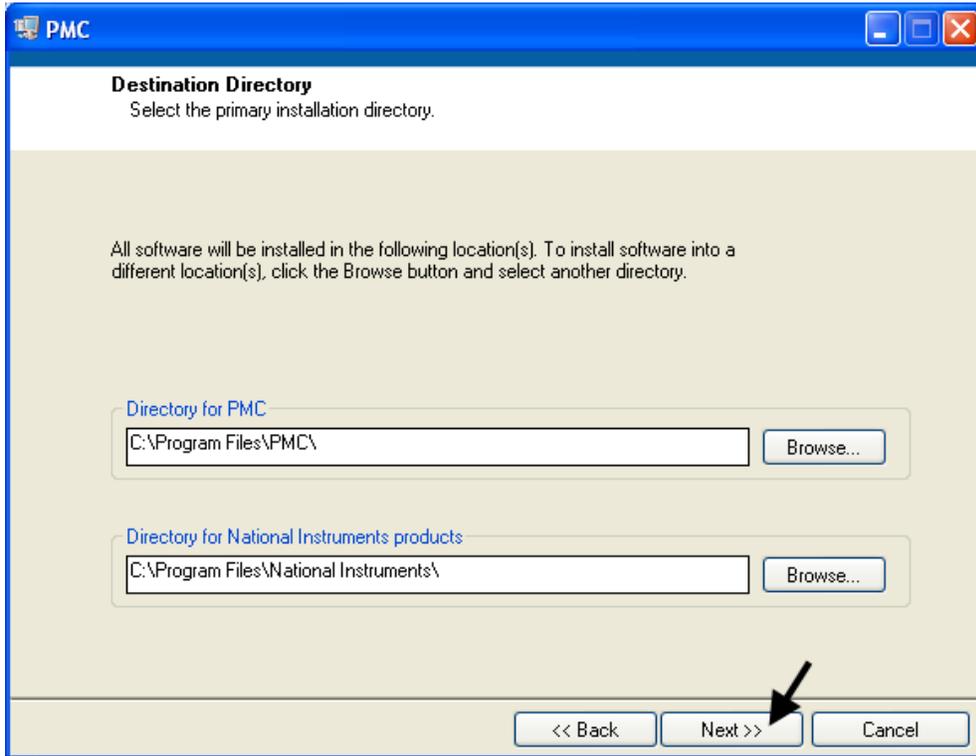


Figure 13: Approving the Destination Directory

Accept all license agreements. The PMC will install on your computer.

## Appendix B: Revisions to Manual

Rev. Date	Rev. No.	Summary	Section
11/7/11	B	Updated manual to reflect new menu and File Transfer Tab	1.1, 1.1.1, 2.1, 2.2, 3
4/23/12	C	Added Installation section	2.0
7/27/12	C-1	Added caution that PAX stops recording data if the current day's data file is deleted.	4.2.2, 6.0