Ponemah

Model: PNM-P3P and PNM-P3P-POST
Manual: MU00060-002
Revision 55

Signal conditioners

Implantable telemetry

Plethysmographs

External telemetry

DSI™

Contents

On-Line Keys   128

Files   131

Overview

Introduction

Purpose of the Ponemah System

Ponemah is designed for the research investigator whose protocol demands flexibility along with accurate, continuous, non-interrupted data acquisition and analysis in a validated, standardized environment. **Ponemah's** systems combine specialized hardware and software in a personal computer, transforming it into a scientific workstation. This unique, comprehensive research tool can be used in the laboratory to provide investigators with continuous data storage and an analysis of the results of their experiments either as they occur, or during a subsequent replay.

Overview of the System

The **Ponemah** system is a combination of hardware and software that is installed in a personal computer. A unique concept in Digital Acquisition, Analysis & Archive systems, the **Ponemah** system configuration is custom-designed by the User based on needs, budget, and convenience without the need for extra programming. The system software architecture is modular in nature.

The **Ponemah** system can communicate with a variety of different types of hardware that can provide analog or digital signals to the system. The hardware interface either converts the voltages of an analog input signal into digital values or communicates with digital equipment allowing up to 16-bits of resolution at a sampling rate that ranges from 5Hz to 50kHz aggregate (initial default setting) 10kHz/channel (samples per second/channel). For example, if the investigator selects a sampling rate of 250Hz, the voltage generated from up to 16 laboratory instruments is measured by the computer and converted into discreet values 250 times per second, or every four milliseconds.

The computations required for on-line data analysis are carried out through the use of the host computer's CPU. The digitized, raw experimental data and computer-derived data are generated from the A/D system and the host's CPU, and stored directly to the resident hard disk drive.

The **Ponemah** software is written primarily in the C/C++ programming language and runs in Windows® 7 64 bit or Windows 10 64 bit. This allows very efficient use of the computer and allows modification of the software by **Ponemah**, should the need arise. Files containing the derived values from the **Ponemah** system are in standard XLSX format and are readily imported by a variety of spreadsheet, database, and statistics programs either on the host computer, other personal

computers, minicomputers, or mainframes. Communication with other computers can be achieved through a network.

Acquisition

Its ability to continuously acquire up to 256 channels of biological signals and simultaneously perform a sophisticated analysis in real time makes **Ponemah** unique among digital data acquisition systems. **Ponemah** provides 100% continuous, non-interrupted real time and retrospective physiological signal acquisition and analysis. Each analog to digital sample point is saved to the hard drive during the experiment. This allows for total reconstruction and re-analysis of the experiment during post-processing.

Analysis (Signal Processing)

Utilizing 100% digital analysis, our sophisticated software emulates signal integrators, differentiators, and tachometers that eliminate the problems of precision, drift, and difficulty of calibration that are characteristic of analog systems.

DSI/Ponemah programs are turnkey systems. There is no need to spend valuable time designing or writing spreadsheets, macros, or software for different application and experimental protocols. The analysis of the digitized raw signals uses pre-programmed, validated algorithms, constructed as independent software modules that allow User customization of individual system configurations. These algorithms are based upon accepted formulas for derived parameters extracted from scientific literature. The algorithms use standardized logic for each type of biological signal, eliminating User programming. The limits and ranges of the algorithms' logic can be changed from model to model. These criteria do not affect the sequence of the logic to detect Events, but change the acceptable range and limits for each logical process.

Validation of Analysis

DSI/Ponemah systems have a built-in validation feature. Validation of the algorithms is done on a beat-by-beat basis while the system is acquiring and analyzing data in real time or during replay of the digitized signal. The precise point in time where parameters are being measured can be marked on the graphic display of the physiological signals. This allows the User to visually verify the accuracy of the system and provides on-line confirmation that measured parameters are being properly identified by the program. NOTE: The acquisition process does not save the validation marks, but the replay system allows the regeneration of the marks.

Archiving

Digitized waveforms and raw data are stored in a binary file format. All the signals from an experiment may be archived on optical disk or CD-ROM/ DVD-ROM and replayed through the system for additional post acquisition analysis. Derived data is stored in an Excel file format and is suitable for import into other graphics, spreadsheets, or summary software packages.

Graphics

Ponemah provides the researcher with numerous graphic and data list views while on-line or during subsequent replay. Derived data and raw signals can be displayed graphically on the monitor simultaneously with flexible X and Y scales in a number

of User definable formats. The plotting of two signals against each other, such as pressure-volume loops, is also possible. The system can support a wide variety of monitors and graphics cards - from low-resolution single monitor systems to high-resolution dual monitor systems - allowing for greater flexibility to meet a researcher's needs and budget. Hard copies of derived data can be printed.

System Configurations

Ponemah applies state of the art digital technology to the types of experimentation that are routinely performed in physiology, pharmacology, and toxicology laboratories. Encompassing interchangeable software modules, investigators can configure a system specifically to their needs, addressing applications such as Hemodynamics, Pulmonary Mechanics, Tissue Baths, and ECG analysis. Each system maintains the capability of on-line simultaneous data acquisition and analysis.

Organization of the Manual

The Software Reference Manual is designed to help the User learn about and proficiently use **DSI's Ponemah** Acquisition & Analysis Software packages.

Manual & Menu Details

This software reference manual is written for a wide range of options that are available for the **Ponemah** Platform. Not every option pertains to all systems, and these will be noted in the manual under the section that the option pertains to. A list of these options is listed below.

- **Post Analysis System** has the replay-only mode and does not allow the system to acquire data. All menu and dialog items will be grayed out or will display a warning message if the item is accessed.

Installation

Software Installation

System Requirements

The following system requirements are recommended for operation of Ponemah Physiology Platform (Ponemah) software:

- The following supported operating systems:

    o Microsoft® Windows® 7 64 bit or Windows 10 64 bit

- 2.0GHz Pentium 4 computer or better

- 8GB of RAM

- AGP/PCI video graphics board capable of 1280x1024 (1024x768 minimum)

- 500GB hard disk (1GB minimum)

- Ponemah software license and software key

Hardware Interfaces

Connect the software key (USB) supplied by DSI, to the corresponding port on the system. The software key must correspond with the software license file to be installed on the system.

Connect all necessary hardware according to manufacturer's directions.

Ponemah Software Installation

Warning: **For installs, the User must be logged in with administrator privileges; otherwise an error message will appear and installation of the software cannot be done.**

For any of the Acquisition Interfaces to operate correctly, the software must be installed onto the hard drive of the personal computer.

1. Insert the DVD-ROM into the DVD-ROM drive.

2. If the Ponemah Setup program is automatically displayed, go to Step 5.

3. If the Ponemah program is not automatically displayed, from the Windows Start button, select **Run**.

4. Browse to the location of the User DVD-ROM drive and double click on **Install.exe**. Now click on the **OK** button in the Run dialog box to bring up the Ponemah Setup program.

    The **Ponemah Setup** program will automatically install the following:

    - Ponemah

    - Ponemah Analysis Modules

    - Data Security Option

    - Ponemah Video Components

    - Manuals

    - SQL Server 2014 Express with Tools

5. To install the Ponemah application, click on **Install Ponemah**.

6. The **Choose Destination Location** dialog will display the default location to install the Ponemah software. Click on the **Next** button to use the default, **C:\Ponemah**, or specify a User-defined location.

7. Click on the **Next** button for an overview of the current Install configuration.

8. Click on the **Next** button to **Start Copying Files**. The files will start to be copied.

Non Recommended Software

There are various types of software that are not recommended to be running/installed while Ponemah is installed. That list includes:

- Virus scanning software

- Services starting virus scanning software

- Network downloading/updating software

- Services starting network downloading/updating software

For a complete list of recommendations for software and service that should not run refer to the Ponemah IT Guide.

There are also other various items that should be done:

- No CD/DVD activity

Starting Ponemah

The SQL Database is currently being auto-installed. After the Ponemah software is installed and the **Finish** button is selected, the following message will appear.
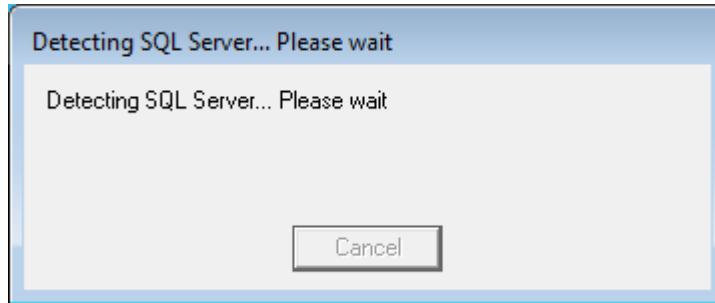
At this point the Ponemah install is checking to see if the SQL Server exists (from previous Ponemah installations). Once that is completed it checks to see if the instances are installed. If they are not, a dialog similar to the one below will appear.
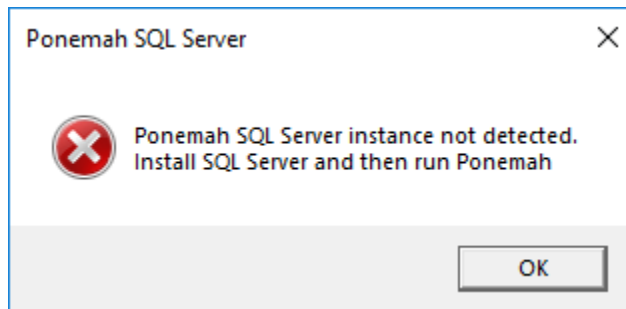
NOTE: **Ponemah will need to be started, at a minimum, one time with an Administrator logged on to Windows.**

The system will need to be restarted.

Once the system is restarted and the Ponemah application is started, the following will appear.
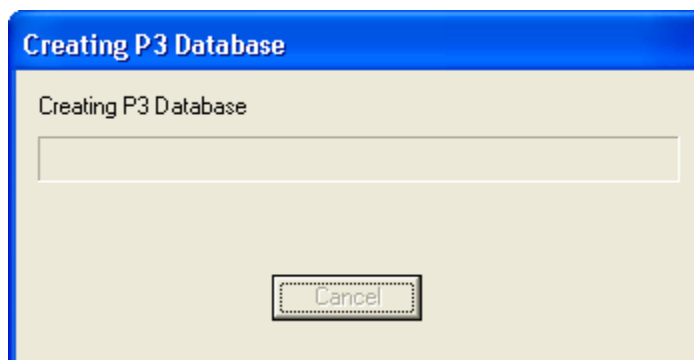
Ponemah needs to create the database prior to running. After this has been created Ponemah will start.

If Ponemah was not started with an Administrator logged on to Windows, the following dialog will appear.

NOTE: **Depending on previously installed versions of Ponemah or other programs utilizing SQL, the installation may be slightly different than described above.**
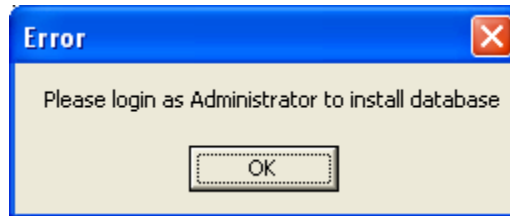
Log as an Administrator to Windows and start Ponemah. This is needed to create the database.

Software Uninstallation

If for any reason the software needs to be removed from the system, the User can uninstall the software through Windows **Add/Remove Programs**.

To uninstall the **Ponemah** software, follow the steps listed below:

1. Select the **Add/Remove Programs** from the **Control Panel** menu and Highlight the **Ponemah** version to be uninstalled.

2. Click on the **Change/Remove** button.

3. Click **Remove** to remove all components.

4. Click on the **OK** button to confirm the removal of the Ponemah software.

5. Restart Windows.

Starting the Ponemah Program

After the software has been installed, start Ponemah by clicking on the **Ponemah** icon or selecting it from the **Ponemah** folder under the **Start** menu.

New Installs

The following steps are for new installs on a system. If a license file has already been installed on the system, proceed to License File Upgrades.

If the software has been installed correctly, the system will display a dialog that the application needs a license file.
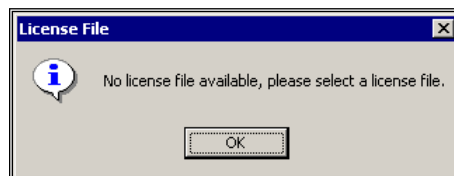
License File Message

1. Upon startup, the following message will appear, "No license file available, please select a license file." Click on the **OK** button.

2. Insert the Ponemah software license file disk into the CD drive on the computer (the license file number must match the number on the software key).

3. In the **Select License File** dialog, navigate to the CD drive and select the license file (.LIC) and click **Open**. Upon clicking **Open**, the license file will be installed on the system.

License File Upgrades

The following steps are for upgrading a license file on the system.

1. Select **View License** from the **Help** menu.

2. If the License File is on a CD: Insert the Ponemah software license file into the CD drive on the computer (the license file number must match the number on the software key). Select **Load New License File** and browse to the CD location and select the .lic file.

3. If the License File is from the FTP site: Save the license file from the FTP site. Select **Load New License File** and browse to the location where the license file was saved and select the .lic file.

4. Restart the Ponemah application. The new license file will not take effect until the application is restarted.

System Startup (Non-Secured Systems)

Upon startup of the Ponemah application, the system will begin with a startup dialog; the appearance will depend upon whether the system has or has not been secured (per Data Security Option, refer to the **Data Security Option Manual** for more information). For non-secured systems, the **Ponemah** dialog will appear, as displayed below:
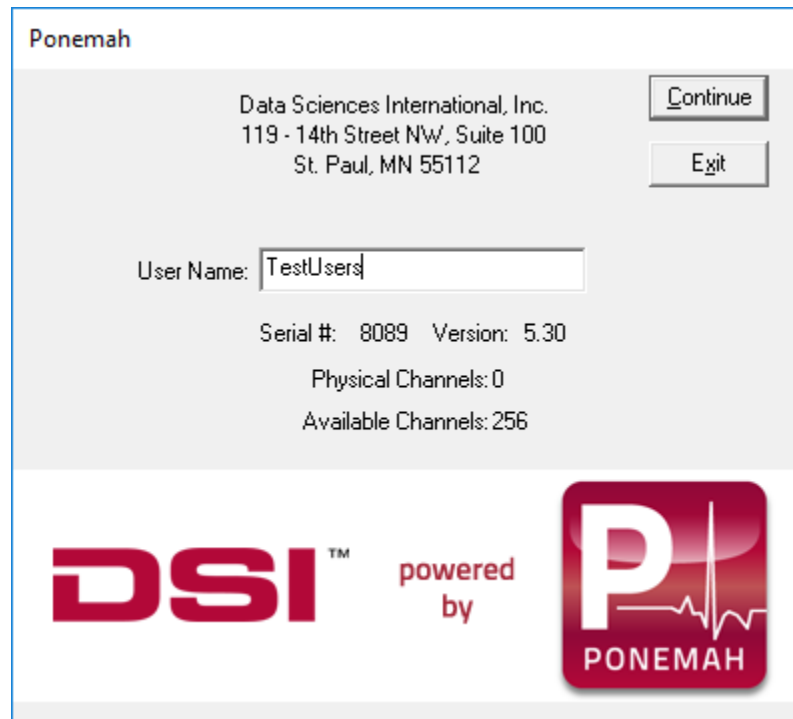
Ponemah Dialog (non-secured system)

Upon starting the system for the first time, enter a name in the **User Name** edit field. The User Name that is entered will be recalled automatically the next time the system is started and will be used on all printouts and audit logs for identification of the data collected.

After clicking on the **Continue** button, the Main Menu screen is displayed as below. The User is now ready to begin setting up, acquiring, and analyzing the User input data.
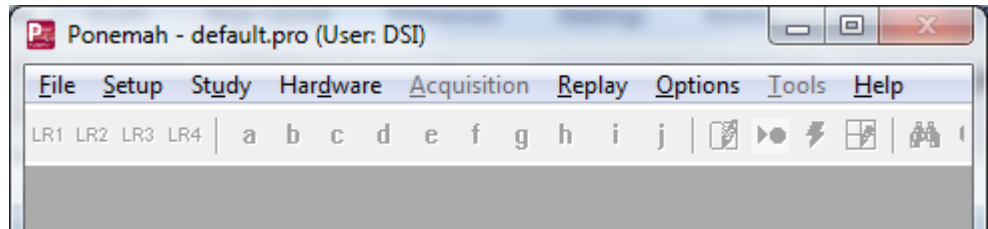
Ponemah software includes a "default" test setup to help the User get started. If a problem occurred during the installation, the system will report the error. See the Troubleshooting Appendix at the end the manual for more information.

For information regarding starting a secured system, refer to the **Data Security Option Manual**.

Hardware Selection

The user should now select their hardware. This is done by selecting **Application Configuration** from the **Options** menu and selecting the **Acquisition Interface** tab. The dialog is shown below.
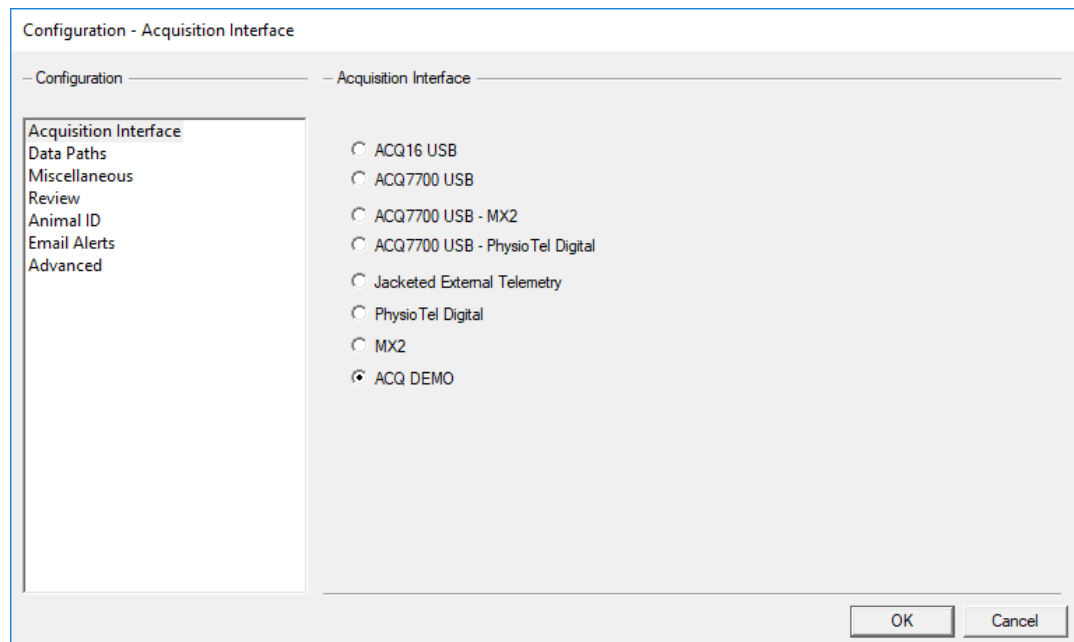
Application Configuration Dialog

View the **Acquisition Interface** section for more details.
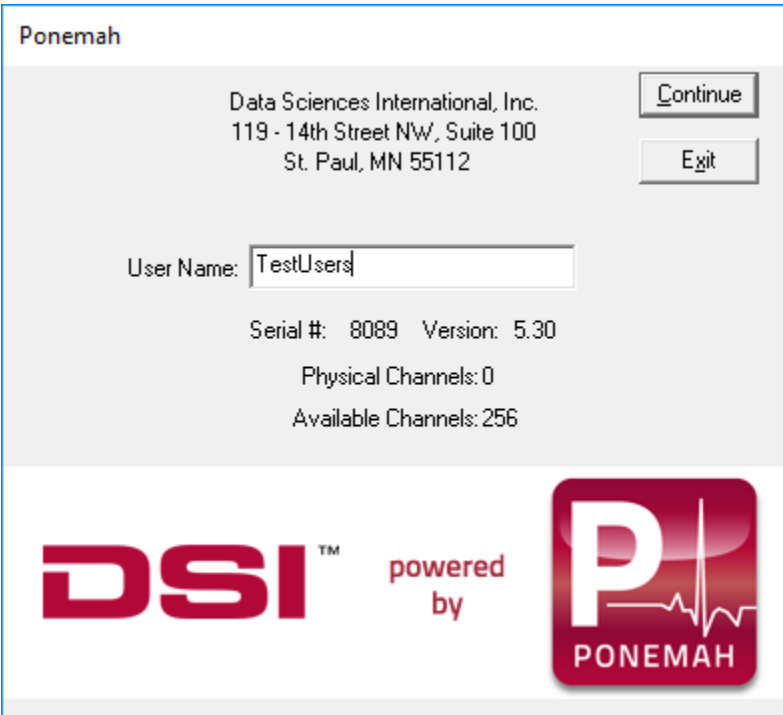
Menu System

Main Window

When the program starts, the **Ponemah** dialog will be displayed.

Ponemah Dialog (non-secured system)

Note: For a secured system (per Data Security Option), refer to the **Data Security Option Manual** for complete details on how control authorized access to the Ponemah system.

After **Continue** is selected, the **Main Window** will be displayed:
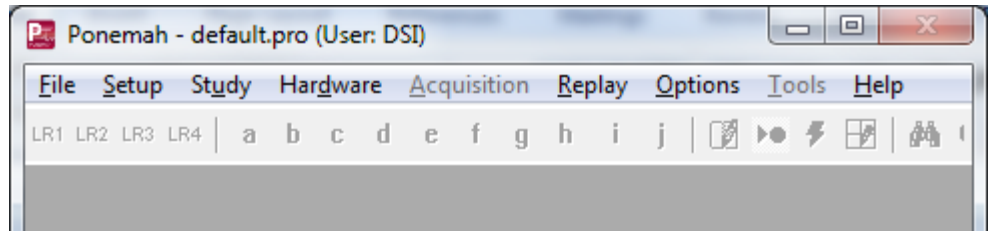
From the idle Mode of Ponemah, the User can access the following menus:

- **File** allows the User to:
  - Open existing protocol files
  - Open Review files
  - Save protocol files
  - Save As (Copy) protocol files
  - Verify files for integrity (Data Security Option)
  - Manage files
  - Import DSI ART files
  - Combine Raw Files
  - Print files
  - Set up the printer
  - Exit the Ponemah application
  - Open recent Protocol files
  - Open recent Review files

- **Setup** allows the User to configure all information for a protocol, including:
  - P3 Setup
    - Channel Input Setup
    - Template Setup
    - Groups
    - Events
    - Digital Display Setup
    - Alarm Setup
    - Experimental Header Protocol
    - Print RAW Data Setup
    - Data Reduction Setup
    - Variability Analysis
    - Graph Setup
    - Binary Data Convert
    - Settings

- Remote Connection

- SEND

- Data Parser Setup

- Auto Configure Protocol

- Data Storage Scheduler

- Review Print Setup

These settings can be saved in a protocol file for later use when running the same experiment or as a template for similar experiments.

- **Study** option allows the User to access menus that contain the settings for the definition of a complete study, and the selection of which animal/day/dose to acquire data for.

- **Hardware** allows the system to be calibrated to User-defined units before any data is acquired and analyzed. This is only used for the **Acquisition** mode, not the **Replay** mode.

- **Acquisition** starts the acquisition and analysis of data. How the system acquires and analyzes the data is defined through the **Setup** menu.

- **Replay** allows the replay of saved, acquired data for re-analysis.

- **Options** allow the setting of Audit Reason Codes, viewing of the Application Log, and Application Configuration items.

- **Tools** allow the setup and maintenance of a secured system. Refer to the **Data Security Option (DSO)** manual for complete details.

- **Help** displays the Help screen.

At the bottom of the screen is a bar with ET, DT, DS, Data Set, Save ON/Save OFF, Video ON/OFF, and the RAW file name.

At the top of the window is a tool bar. The tool bar allows quick access to certain functions during acquisition or replay.

File Menu

When **File** is selected, the **File** menu is displayed.
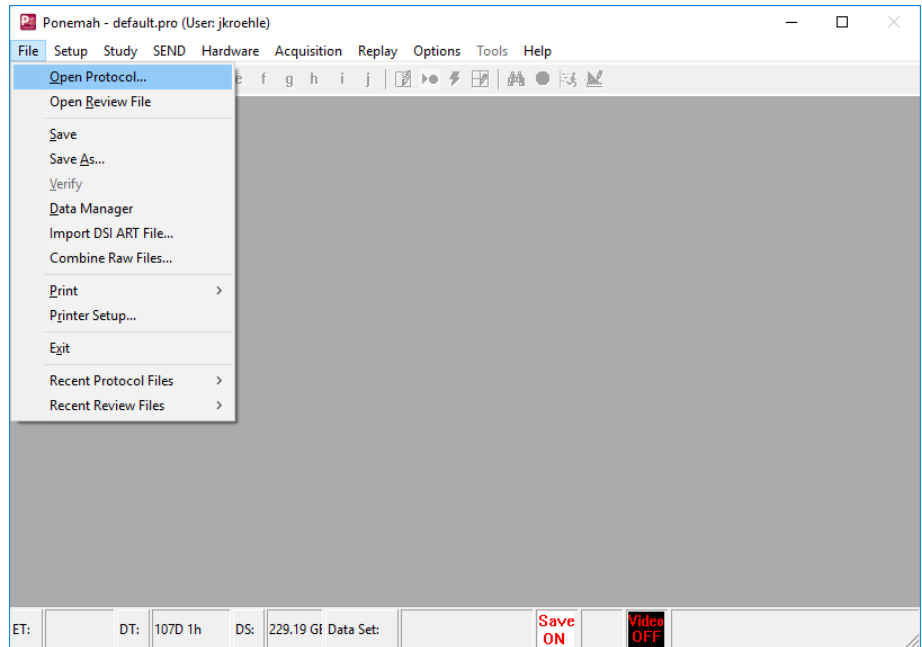
File Menu

- **Open protocol** allows the User to recall an existing protocol file and reuse it either for Acquisition or Replay.

- **Open Review** allows the User to open an existing Review file (.RVW).

- **Save** saves the current protocol file.

- **Save As** allows the User to save a pre-existing protocol file with a new name.

- **Verify** allows any of the data files to be checked for being valid. That is, that the data files have not been modified from their original state after the files have been initially acquired. This option is only available if the Data Security Option is enabled in the system's license file.

- **Import DSI ART File** allows Dataquest files to be converted to the Ponemah file format (.RAW).

- **Data Manager** allows data files to be moved or copied from the system to another storage medium and allows permanent deletion of data files.

- **Print** allows the User to print the .RAW data header, calibration values, or a summary of a protocol file.

- **Printer Setup** allows the User to specify which Windows installed printer to use.

- **Exit** exits the system and releases any allocated resources back to Windows.

- **Recent Protocol Files** allows the User to quickly select one of the last four protocols used.

- **Recent Review Files** allows the User to quickly select one of the last four review files used.

Open Protocol

After selecting **Open Protocol**, a window similar to the following will appear.
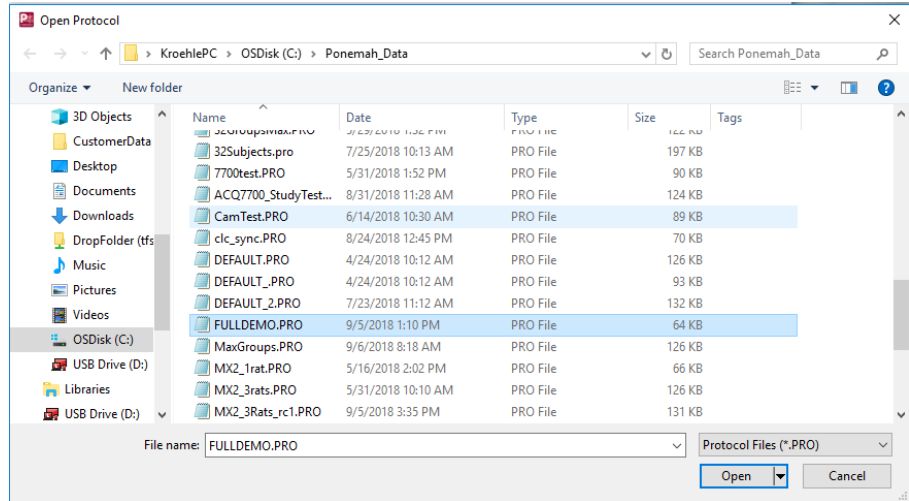
Open Protocol Dialog

From this window, the User can select any of the protocol files displayed in the file name box. After highlighting the desired filename, select **Open**. The system will load all the attributes associated with the selected protocol (.PRO file) and display the protocol file name on the title bar of the main window.

After selecting a protocol file, any of the attributes associated with the file may be changed. The changes will not be permanently saved in the file unless the file is saved.

If the User does not select a protocol file through this window, the default protocol file specified in the PPP3.INI file will be loaded.

Open Review

See the **Data Review Option Manual** for information regarding **Open Review**.

Save

Select **Save** to save any changes to an existing protocol.

Save As

This option allows the User to save the current protocol file (and any changes) with a different file name. This way the original protocol file is not changed; this is useful when using a file as a template.

When the User selects **Save As**, the system displays the **Save Protocol** dialog. Enter a valid file name into the dialog and select **Save**. Upon saving, the system automatically attaches the .PRO extension to the file.
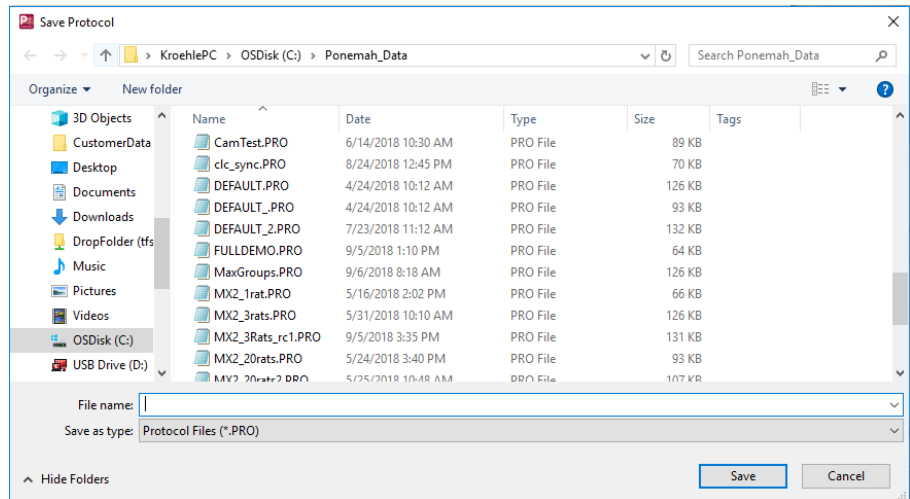
Save As Dialog

Verify

This menu item is only available on secured systems. Please refer to the **Data Security Option** manual for details on this menu.

Data Manager

The Data Manager utility allows the User to copy or move Ponemah generated data files to and from an archive device more easily. In addition, Data Manager allows the User to permanently delete data files.

Very little information is needed to copy, move, or delete data files from the system. The Data Manager only needs to know the experiment name (Test Name) and it will manage all the file extensions, as well as maintain the integrity of electronic signature information linked to electronic records. Upon executing the Move, Copy, or Delete functions, the system will enter an entry into the Application log file (for information regarding types of .LOG files, see .LOG - Log files) indicating the activity with all audit trail information.

NOTE: **Since .RVW files, .WAV files, Application .LOG files, .TPL Template files, .WMV Video files, and .MDB files do not share the same name as the experimental name, they will have to be moved separately. Additionally, the Log files generated by the Study Protocol Option will need to be archived separately, as well. These files are contained in the SQL database.**
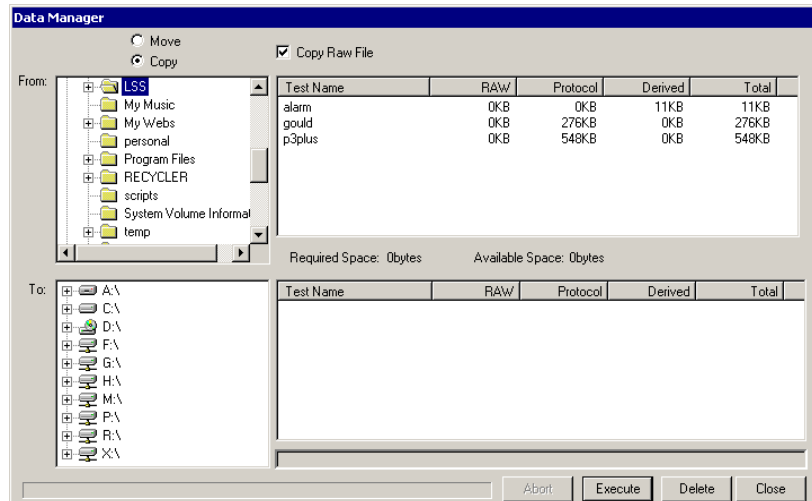
Data Manager Dialog

Move/Copy

These radio buttons allow the User to specify the activity to be performed by Data Manager. If **Move** is selected, then Data Manager will move all files (extension files) associated with the experiment name (**Test Name**) to a new User-specified location. Upon moving the files, Data Manager will delete all files from the original directory. If **Copy** is selected, then Data Manager will copy all files to the User specified location while also maintaining the files in their original location.

Copy RAW File

This check box allows the User to specify whether the .RAW file associated with the experiment name (**Test Name**) should be copied or moved along with all other files associated with the experiment name.

Selecting this check box will allow Data Manager to move/copy the .RAW file. If the **Move** option is selected, the **Copy RAW File** check box will change to **Move RAW File**.

If the **Move RAW File** option is not selected while moving files around, the .SIG file associated with the data set will be split. The section of the .SIG file associated with the .RAW file will stay in the original location. If the .RAW file is then moved without using Data Manager, the file will not show up as being signed. This is only an issue if security is being used.

From

This section has two items: a tree view (on the left) and a list of files (on the right). The tree view allows the User to select the path from where files will be moved, copied or deleted. Mapped network drives will be displayed as well.

The list of files allows the User to select which files will be moved, copied or deleted. It also lists the sizes for .RAW, .PRO and derived data files for each experiment.

To

This section has two items: a tree view (on the left) and a list of files (on the right). The tree view allows the User to select the path to where files will be moved or copied. Mapped network drives will be displayed as well.

The list of files allows the User to see the current files listed in that directory to quickly see if the files that they are moving or copying might overwrite existing files. If files already exist and the User attempts to overwrite them, a warning message will appear asking if the User wants to overwrite.

It also lists the sizes for .RAW, .PRO and derived data files for each experiment. The User should verify that the destination area has sufficient space for the source files to be copied or moved.

If the user wants to copy data to a CD, the CD writing software must allow other applications the ability to write to the CD.

Abort

This button allows the User to terminate execution of a **Copy** or **Move** function performed in Data Manager.

Execute

This button allows the User to carry out the **Move** or **Copy** functions.

Delete

This button allows the User to delete data files from the **From** section. All files associated with the **Test Name**, including .RAW and .SIG files will be permanently deleted from the directory.

Import DSI ART File

The import DSI ART File function allows Dataquest files to be converted to a Ponemah readable format (RAW file). When this function is selected, the following dialog appears allowing the selection and conversion of Dataquest files.
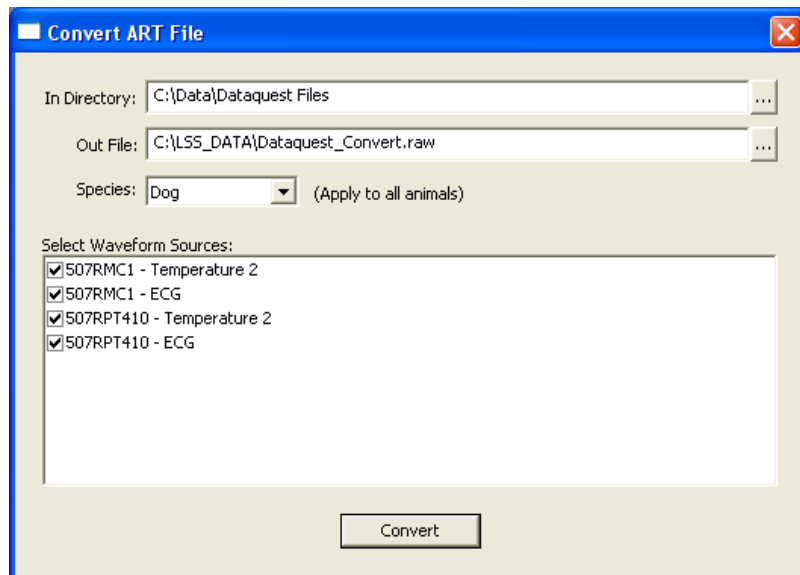
Convert ART File Dialog

In Directory

This selection allows the user to browse to the directory containing the Dataquest files for conversion. Clicking on the button to the right of the path will bring up a Browse dialog to allow a specific location to be selected.

Out File

This selection allows the user to specify a name for the converted file as well as the location of the file to be outputted. Clicking on the button to the right of the path will bring up a Browse dialog to also allow a location to be selected.

Species

The Species selection will automatically set specific attribute settings for analysis based on the species selected (specifically, ECG analysis). If the species utilized is not listed, it is recommended to set the species to the animal model that is nearest in heart rate with the model being used.

Select Waveform Sources

This list view will show all Dataquest files located in the specified directory. To select a signal for conversion, click in the check box to the right of the file name/description. It is not necessary to select all signals for conversion. Check only those signals which are needed for conversion.

Convert

The Convert button will convert all of the selected signals into the Ponemah RAW format (additional files, Protocol and Review, are also created). Once all desired signals are selected, click on Convert. The converted files will be placed in the specified Out File location. Additionally, one Ponemah RAW file will be created with all of the signals selected and these signals will be placed in the RAW file in the order that they are listed in the dialog.

A progress dialog will be displayed showing the progress of the conversion. A Cancel button is available on the progress dialog to cancel the process at any time.

Files Created During Conversion

Converting Dataquest files will result in the creation of a RAW file which contains the waveform data originally collected in the Dataquest ART system. During conversion, Ponemah will automatically create a Protocol file (configuration file) and the corresponding Review file used for post processing the data.

The Protocol file contains information about the sources (animals), analysis, channel count and other information. Ponemah will place each source (animal) in its own separate Group in the Protocol. Additionally, the Groups will be labeled with the animal name from the Dataquest file. Ponemah will also assign a specific analysis module to the signal if that information is contained in the Dataquest file. For example, if the signal was collected using ECG as the analysis in Dataquest, Ponemah will automatically assign that channel to the ECG analysis module.

Upon conversion, the Protocol file and Review file will be added to the most recently used lists (Recent Protocol Files and Recent Review Files).

Events/Dataquest ART Markers

If Markers are present in the Dataquest files, converting the files will result in the Markers being mapped to Ponemah Events. The Markers will be mapped to the ten

available Event letters (letters a through j) and if the number of Markers exceeds the limit of Ponemah Events, the Markers will be added using x as the symbol.

Conversion using the Data Security Option

See the Data Security Option manual for details.

Note: If more than two sample rates exist in the Dataquest files, the lowest sample rates will be increased so that only the two highest sample rates exist. Ponemah only supports two sample rates.

Combine RAW Files

This feature allows the combining of RAW files into a single file. In the event of a catastrophic failure, acquisition is stopped unexpectedly. To continue the acquisition, a user must create a new file name and continue collecting data which creates two sets of files for a single collection period. These two sets of files must be managed when reporting results of the data.

For long duration acquisitions, it is not advantageous to manage multiple files to report final results of the data. Therefore combining RAW files allows the user to create a single RAW file for the collection period if acquisition is stopped unexpectedly.

NOTE: This feature does not allow all files to be combined together. The files must have the exact same configuration and must have been collected within a short period of time (days) from one another.
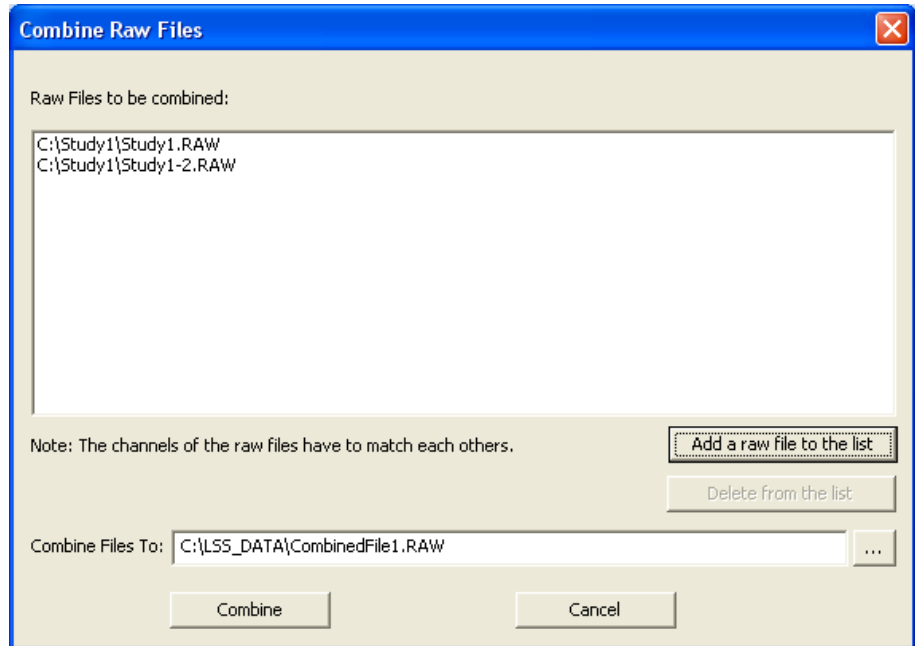
To select the RAW files to combine, click on the **Add a raw file to the list** button. Browse to the location of the files and select the desired files (Use Open or double click the mouse). These files will then be displayed in the box under the header **Raw Files to be combined**. Next, specify a location for this file in the **Combine File To** box. Clicking on Combine will create the single file in the location specified.

The **Delete from the list** button will remove the selected RAW file from the list.

Print

When **Print** is selected, a submenu is displayed.
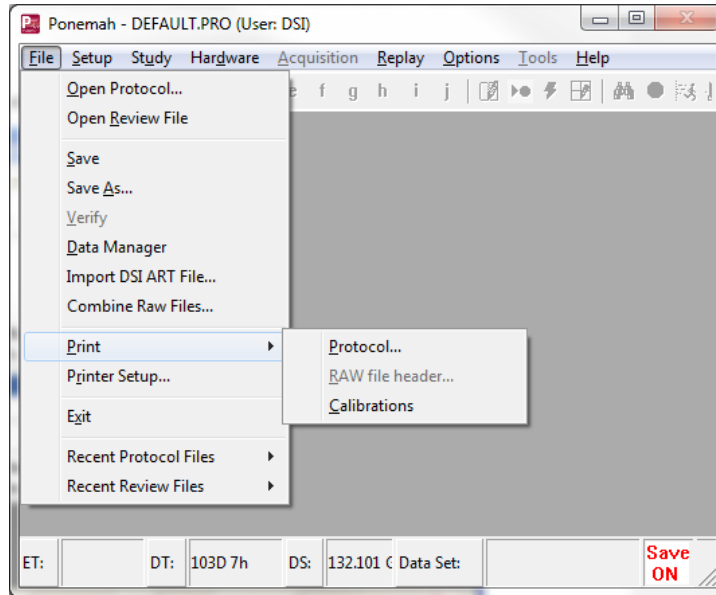
Print Submenu

Protocol

This option allows the User to print a summary of the currently loaded protocol in a text file format (**PRO.TXT**).

Raw file header

This option allows the User to print the .RAW data file in a text file format (**RAW.TXT**). This is useful for a documentation trail.   If a .RAW file is not selected for replay or created for an acquisition, then this option will be grayed,

The .RAW data file header contains information including:

- Name of the .RAW file

- Date of acquisition

- Start time of acquisition

- Channel type

- Channel identification

- Calibration values

- Other miscellaneous items

Printer Setup

When **Print Setup** is selected, the standard Windows **Print Setup** dialog is displayed.
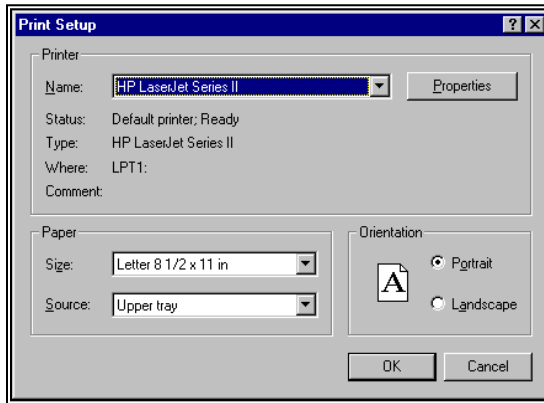
Print Setup Dialog

Exit

Exit allows the User to exit the program. After **Exit** is selected, the system asks for a confirmation.
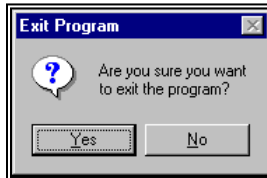
Exit Program Dialog

- **Yes** exits the program. This is the only way to exit the system safely. Due to different configurations of the system, certain files may have not been purged and updated until the User exits through this menu. **Data loss can result if this is not followed**.

- **No** returns the User to the program.

Setup

When **Setup** is selected, the **Setup** menu is displayed.
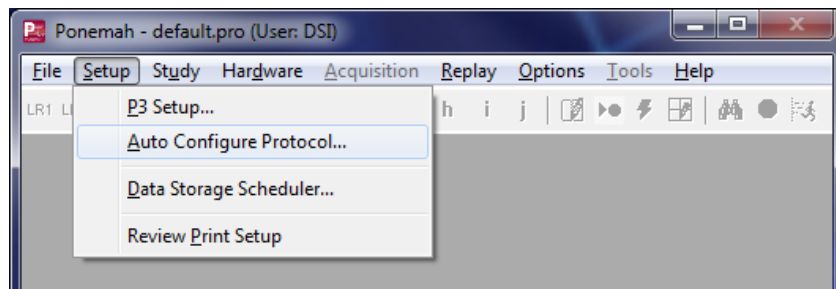
Setup Menu

This pull-down menu allows the User to access different dialogs to set up a protocol. Once the protocol has been defined, it can be saved in a protocol library and recalled to be re-used at any time for both acquisition and replay of data.

From this menu, the User can access the following selections:

- **P3 Setup** allows the User to define the various settings for a protocol.

- **Auto Configure Protocol** allows the User to automatically populate certain protocol settings within the P3 Setup dialog based on device type. Auto configuration is compatible with the PhysioTel, PhysioTel Digital and JET acquisition interfaces

- **Data Storage Scheduler** allows the User to define a schedule of the time that the RAW file and derived data sets are saved to disk. This feature is useful for long-term studies where disk space is a concern. For example, the system can be set up to collect data for ten minutes, every hour.

- **Review Setup** allows the User to set up information for the Data Review option, which permits the User to modify the placement of validation marks on segments of waveform data while relying on Ponemah to calculate derived parameters based on the newly placed validation marks. For more information, refer to the **Data Review Option Manual**.

- **Review Print Setup** allows the User to set up the hardcopy configuration in order to print information from the Data Review option. For more information, refer to the **Data Review Option Manual**.

P3 Setup

P3 Setup allows the User to define the various settings for a protocol. Upon selecting **P3 Setup**, the **PPP3 Setup** dialog appears (upon opening the **PPP3 Setup** dialog, the dialog defaults to the **Channel Input Setup** configuration). By selecting the various protocol categories listed in the dialog on the left-hand side of the dialog, the User can configure all protocol information.
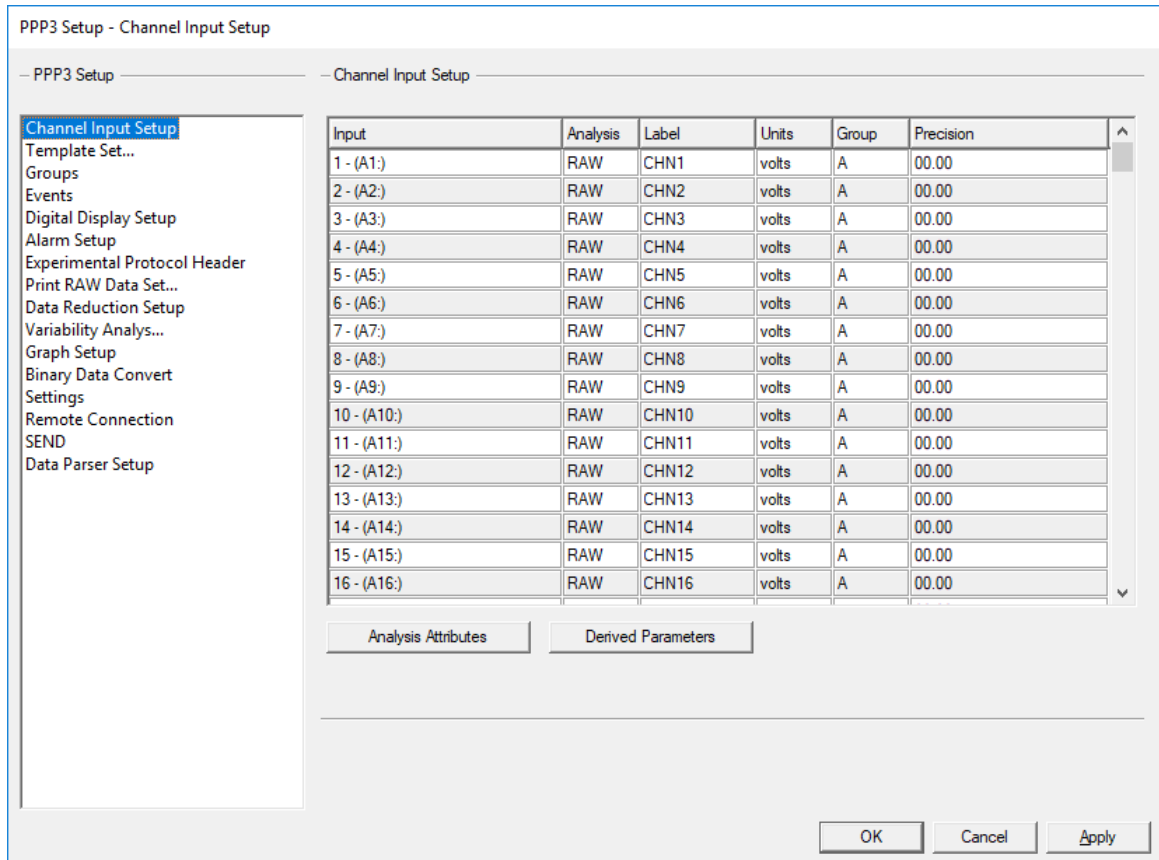
PPP3 Setup Dialog

The User is able to set up information for the following protocol categories:

- **Channel Input Setup** allows the User to define a physical input to the system (channel), assign the type of analysis to be performed on the input signal and assign a Label, Unit, Group, and Precision to each input.

- **Template Setup** used with Template Analysis (ECG PRO) to associate the templates with a template library.

- **Groups** allows the User to assign a label to each Group (Groups A - AF), define a trigger channel for each Group and assign a label to each predefined Event (Events a - j) to be selected during acquisition, replay or review modes.

- **Events** allow the user to define the text that is associated with a particular event.

- **Digital Display Setup** allows the User to define up to 33 digital display windows that will display selected derived parameters or secondary information (Timer or Clock information) during acquisition or replay modes.

- **Alarm Setup** allows the User to define up to 32 alarm conditions. Each alarm can be assigned to a derived parameter with low and high alarm limits. When the derived data goes above or below the alarm limits, an alarm will be triggered. Alarms conditions can also be set up for the Timer features.

- **Experimental Protocol Header** puts the information in the Experimental Protocol Header information in the beginning of each derivation file created. A derivation file is created for each Group. The Experimental Protocol Header information is contained in **Group*n*** tables of the Excel file.

- **Print RAW Data Setup** allows the User to set up traces to be printed to the attached windows device (printer) in a chart recorder type format.

- **Data Reduction Setup** allows the User to set up an Event and timed triggered protocol that reduces the derived data set. It allows control values to be sampled, the tracking of maximum/minimum data values during a period, and calculates the average, delta, percent change and standard deviation of a defined period.

- **Variability Analysis** allows the User to configure the analysis of Heart Rate Variability. Refer to MU00196_Review manual for details on using this feature.

- **Graph Setup** allows the User to configure various graphing options. The User can choose Primary (raw analog signals), Trend, XY-Loops, and Scatter graphs to be displayed during acquisition or replay modes. The User can configure up to 8 graph pages.

- **Binary Data Convert** allows the selection of which channels and derived analog signal to be converted from binary to ASCII format in the replay mode (using the **Measure** function).

- **Settings** allows the User to define **Acquisition Defaults**, **Replay Defaults**, **Data Separator**, **Time Format**, and **Global Settings**.

- **Remote Connection** allows a user to setup a TCP/IP communication link between Ponemah and an external piece of equipment that request derived data.

- **SEND** allows the user to configure certain features of Ponemah to tag the generated data during Acquisition or Review in a SEND domain compliant format. Refer to the SEND User Guide for more information.

- **Data Parser Setup** allows the User to configure rules that will be used in Review.

Channel Input Setup

The **Channel Input Setup** configuration allows the User to define the physical inputs to the system, the types of analysis that will be performed on the input signals, as well as the Label, Group information, and Units used to reference the input. The User also has the ability to set up the attributes and derived parameters for each analysis. For more information regarding attributes and derived parameters, refer to the **Ponemah Analysis Modules Manual**.
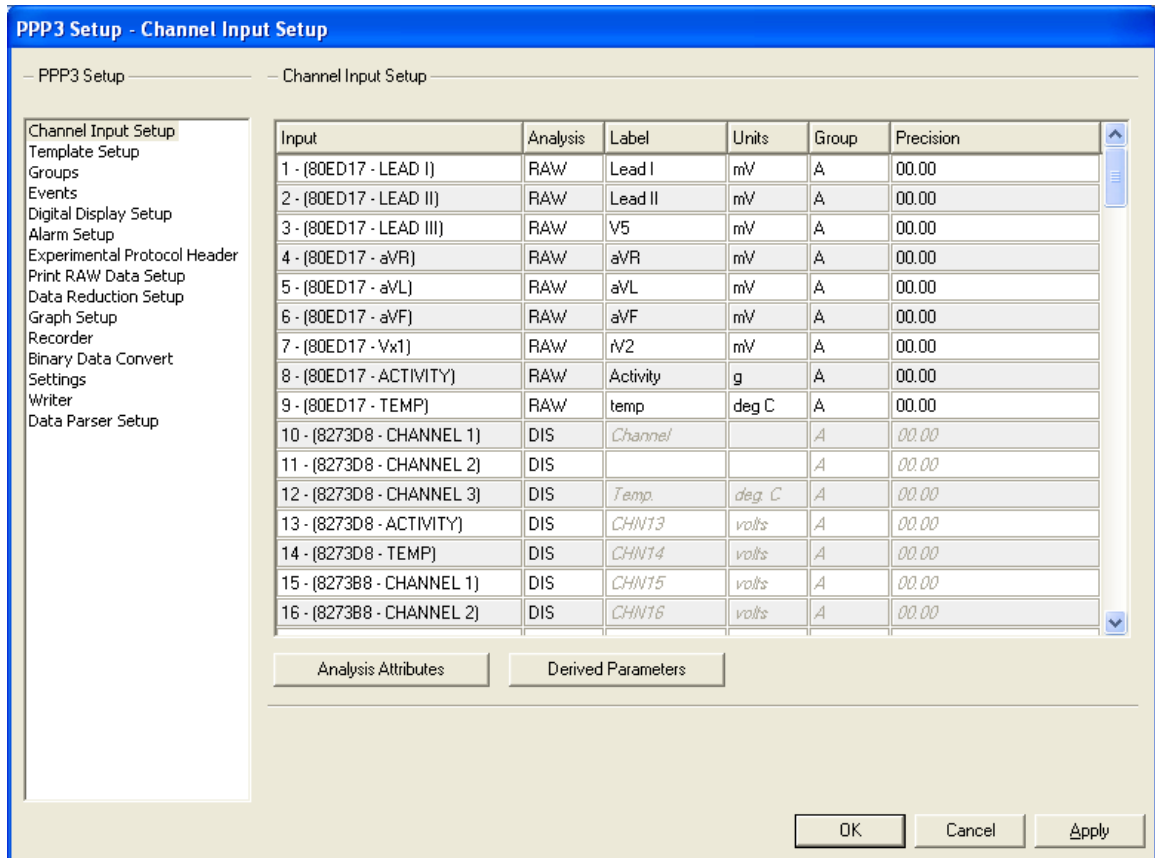
Channel Input Setup Configuration

The Context Menu (shown below) can be opened by right clicking on the input that needs to be modified.
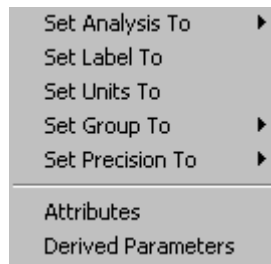
Channel Input Setup Context Menu (right click menu)

Input

This static field displays the physical channel number. The number of channels available is dependent upon the number enabled in the User's license file.

Note: If an ACQ-7700 acquisition unit is connected to the system, then this field will also list the label that references the ACQ-7700 configuration.

If Data Sciences International (DSI) transmitters are configured for the system, this field will also list the type of input signal.

If JET devices are configured for the system, this field will also list the type of input signal.

Analysis

Displays the current type of analysis to be performed on the channel.

Single Channel - To select an analysis for a specific channel, left click on the appropriate cell under the **Analysis** column and select the appropriate option from the drop down list box.

Multiple Channels - To select the same analysis for multiple channels, highlight multiple rows, right click, select **Set Analysis To** from the context menu, and select the appropriate analysis from the list.

Note: For all channels not being used, the User should set the **Analysis** to "DIS" (Disabled). The data will not be saved in the raw data file, and therefore, space will be conserved in the .RAW file.

Label

This edit field allows the User to document the channel with a text string (up to eight characters). The Label will appear in the Excel file in the Experimental Protocol Header and on the graphic screens.

Single Channel - To set up a label for a specific channel, left click on the appropriate cell under the **Label** column and type in a label into the edit field.

Multiple Channels - To set up the same label for multiple channels, highlight multiple rows, right click, and select **Set Label To** from the context menu, and type in a label into the edit field in the **Change Label** dialog.

Multiple Channels (Advanced) - To setup a single label for multiple channels, click on the **Advanced** button in the **Change Label** dialog. Select the **Step Through** check box, enter an alpha or numeric value in the **Starting With** edit field, and a numeric value in the **Stepping By** edit field.

Units

This edit field (up to eight characters) allows the User to document the type of units being analyzed on the channel. When the channel is calibrated, it will reference these units.

Note: Units defined here are used only for documentation, and therefore, has no bearing on how the channel will perform calculations.

Single Channel - To set up a unit for a specific channel, left click on the appropriate cell under the **Unit** column and type in a unit into the edit field.

Multiple Channels - To set up the same unit for multiple channels, highlight multiple rows, right click, select **Set Units To** from the context menu, and type a unit into the edit field in the **Change Units** dialog.

Multiple Channels (Advanced) - To setup a single Unit for multiple channels, click on the **Advanced** button in the **Change Label** dialog. Select the **Step Through** check box, enter an alpha or numeric value in the **Starting With** edit field, and a numeric value in the **Stepping By** edit field.

Group

This list box allows the User to assign channels to different Groups so that each group of channels can be analyzed as a single entity. The derived data for each group of channels will be placed in a separate Excel sheet. Grouping channels makes managing the data easier because each group will have its own derivation sheet and data reduction sheet rather than having all of the data in one large sheet.

To set up a Group, the User selects a single character (A through AF) to represent the Group. Groups must be configured in sequential blocks (i.e. AAAABBBB vs. ABABABAB) and Group A must be one of the assigned Groups.

Single Channel - To assign a single channel to a Group, left click on the appropriate cell under the **Group** column and select a letter (A - AF) from the list.

Multiple Channels - To assign multiple channels to a single Group, highlight multiple rows, right click, select **Set Group To** from the context menu and select a letter (A - AF) from the list.

Precision

This list box allows the selection of a precision level (**0000.**, **000.0**, **00.00**, **0.000**, or **.0000**). The precision level determines to what significant digit all input data will be recorded and analyzed. If this field has 2 numbers to the right of the decimal point (for example 00.00), this is how all data will be analyzed. If there are no numbers to the right of the decimal point (for example 0000.), then this is how data will be handled.

Single Channel - To assign a precision level to a single channel, left click on the appropriate cell under the **Precision** column and select one of the options from the list.

Multiple Channels - To assign the same precision level to multiple channels, highlight multiple rows, right click, select **Set Precision To** from the context menu, and select one of the options from the list.

Attributes

The **Attributes** dialog allows the User to configure the variables that control how the analysis will be performed for the specific channel. Each type of analysis has its own set of attributes. For more information regarding attributes, refer to the **Ponemah Analysis Modules Manual**.

In order to set up the attributes (attributes can only be setup individually for each channel), right click within the appropriate channel (row), and select **Attributes** from the context menu. Attributes may also be accessed by highlighting the appropriate channel and selecting the Analysis Attributes button. The **Attributes** dialog will appear.

Attributes Dialog - In this dialog, the User is able to configure the variables that control how the analysis will be performed for the specific channel. Please refer to the **Ponemah Analysis Modules Manual** for more information regarding each of the available tabs (i.e.**Std Attrib**, **Adv Attrib**, **Marks**, **Notes**, **Typical Values**, **Additional Channels** and **Precision**).
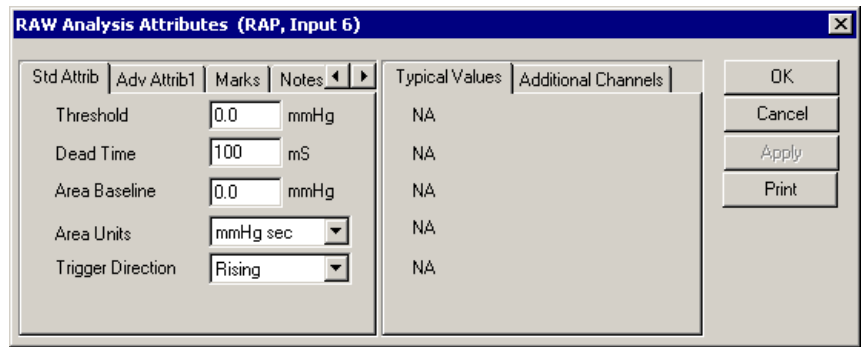
Attributes Dialog (example of the RAW Electrical Mean Attributes)

Derived Parameters

The **Derived Parameters** dialog allows the User to select the derivations and their associated Standard Deviations that the analysis will report for a specified logging period. The selected derived parameters and standard deviations will be calculated and the results will be placed in the derivation files, derivation tables and the on-line text screens during acquisition or replay modes. For more information regarding attributes, refer to the **Ponemah Analysis Modules Manual**. The standard deviation derived parameters are calculated as being the entire population.

Single Channel - To set up the derived parameters that will be reported, select the appropriate channel (row), right click, and select **Derived Parameters** from the context menu. Derived parameters may also be accessed by highlighting the appropriate channel (row) and selecting the Derived Parameters button. The **Derived Parameters** dialog will appear.

Multiple Channels - To assign the same derived parameter for multiple channels (the same analysis assigned to the selected channels), highlight multiple rows, right click, and select **Derived Parameters** from the context menu. The **Derived Parameters** dialog will appear. Derived parameters may also be accessed by highlighting multiple channels (rows) and selecting the Derived Parameters button.

Derived Parameters Dialog - This dialog allows the User to enable or disable the derived parameters allowed for a specific analysis along with a Standard Deviation value to be calculated. In the left-hand side of the dialog, the selected analysis and channel(s) are displayed for the derived parameters that are being set up.

In the Derived Parameters dialog, a list of available derived parameters is displayed. Derived parameters will vary depending upon the type of analysis being performed. To enable/disable each derived parameter, click on the appropriate selection. Clicking on the **Select All** button will enable all derived parameters. The **Deselect All** button will disable all derived parameters (the **Deselect All** button is only available upon enabling all derived parameters).
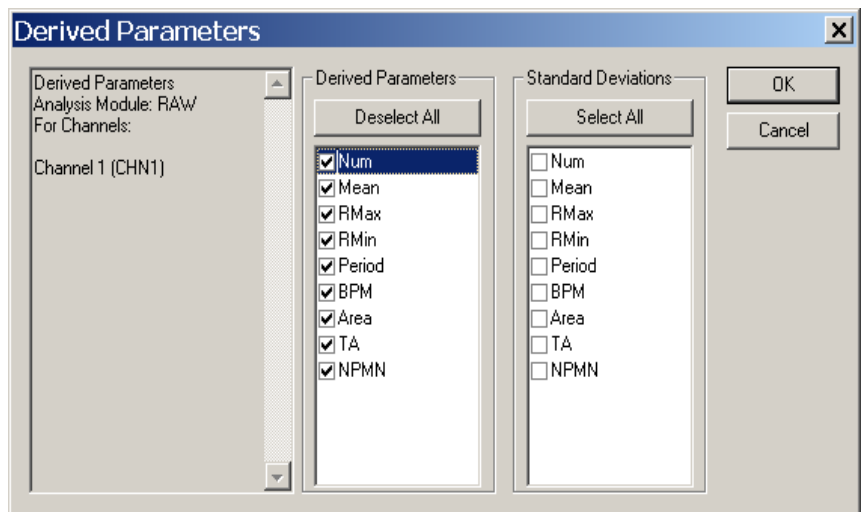
Derived Parameters Dialog

Template Setup

View the Template Analysis Manual (MU00279) for details on the template setup.

Groups Setup

In the **Groups** configuration, the User is able to assign a name (label) to each Group (A - AF) that was assigned in the **Channel Input Setup** configuration and assign a channel in each Group to serve as the trigger channel for that Group. When logging in epoch mode (beat-to-beat), the trigger channel for each Group will update the logging buffer for all channels defined within that Group after the channel completes its analysis.
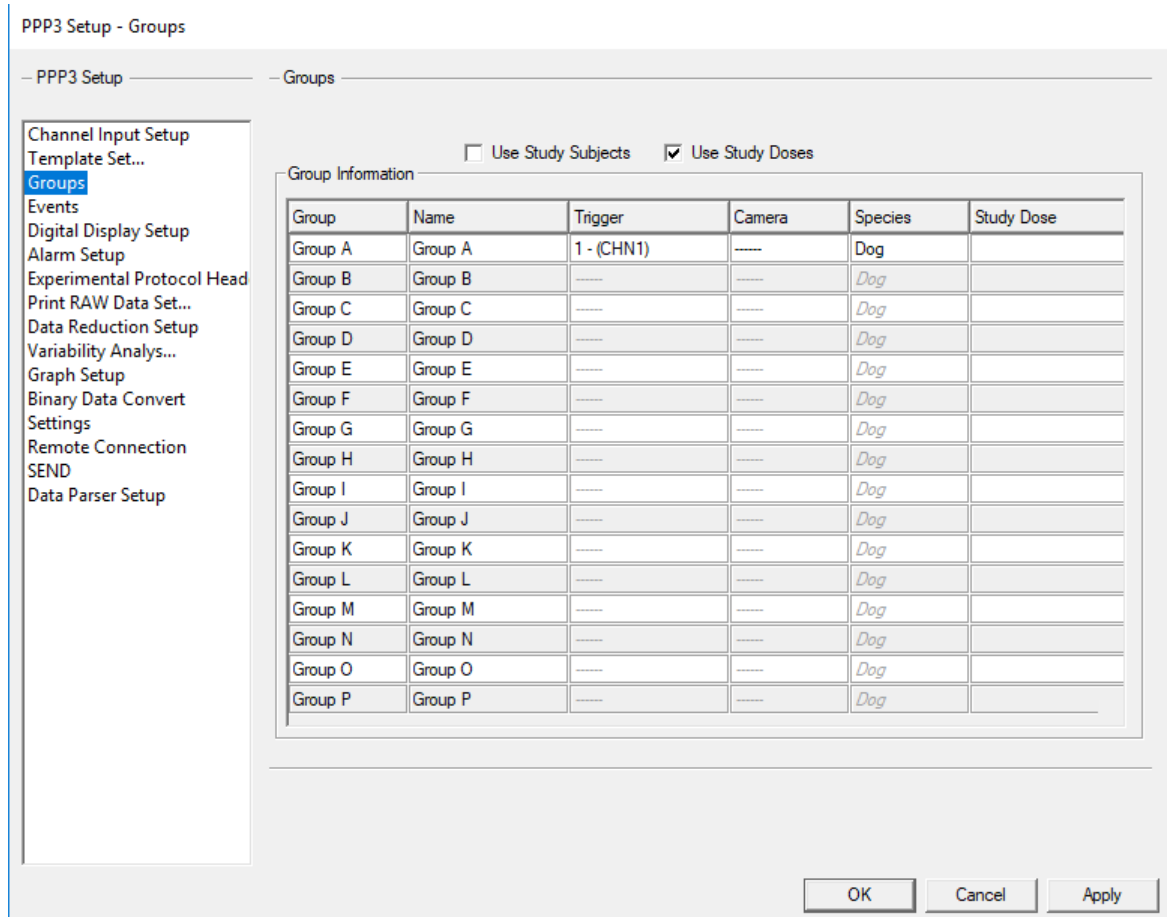
Use Study Subjects

If the Study Option is being used, the Subject IDs that are used in Study will populate the Name automatically.

Use Study Doses

If the Study Option is being used the Doses assigned to the Subjects will populate the Study Dose Colum. This Dose is used in populating the SEND domains if available.

Groups Configuration

```
Set Name To
Set Trigger to     ▶
Set Camera to      ▶
Set Species to     ▶
```
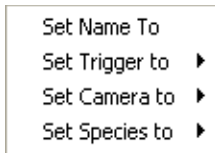
Groups Context Menu (right click menu)

Group

This static field displays the letter designation of the Group (not User-defined).

Name

This edit column allows the User to assign a User-defined label to the individual Group (up to 19 characters). This name is used to label the individual Derivation and Data Reduction windows and the Derivation and Data Reduction sheets in Excel if **Use Group Labels** is checking in the **Settings** page.

Single Channel - To assign a name to a Group, left click on the appropriate cell under the **Name** column and type in a label.

Multiple Channels - To assign a name to multiple Groups, highlight multiple rows, right click within one of the highlighted rows, select **Set Name To** from the context menu, and type in a label in the **Change Name** dialog.

Multiple Channels (Advanced) - To assign a single Group name for multiple channels, click on the **Advanced** button in the **Change Name** dialog. Select the **Step Through** check box, enter an alpha or numeric value in the **Starting With** edit field and a numeric value in the **Stepping By** edit field.

Trigger

This combo box allows the User to select a trigger channel for a Group.

To assign a Trigger Channel to each Group, left click on the appropriate cell under the **Trigger** column and select a channel from the list.

Trigger Channels can also be assigned by right clicking within the appropriate row, selecting **Set Trigger To** from the context menu and selecting a channel from the list.

Camera

This combo box allows the User to select a camera for a Group. See the PONEMAH Video Manual (MU00278) for details on camera setup and use.

To assign a Camera to each Group, left click on the appropriate cell under the **Camera** column and select a channel from the list.

Cameras can also be assigned by right clicking within the appropriate row, selecting **Set Camera To** from the context menu and selecting a camera from the list.

Species

This combo box allows the User to select a species for a Group. The available species selections are: **Dog**, **Monkey**, **Mouse**, and **Rat**. The species selection may alter attribute values for certain analysis modules. See the Ponemah Analysis Modules Manual (MU00231) for details.

To assign a Species to each Group, left click on the appropriate cell under the **Species** column and select an option from the list.

Species can also be assigned by right clicking within the appropriate row, selecting **Set Species To** from the context menu and selecting an option from the list.

Events Setup

The User has the ability to predefine a set of Events (a - j). During acquisition or replay modes, the User can execute one of the predefined Events. The executed Event will be marked in the Primary Graph, derived data files and in the on-line Event list view.

The User has the option to display Events as a string. This will display the complete Event message on the graph screen. To display Events as a string, see **Settings** configuration.

Note: If an Event is not labeled, the Event can still be entered into the derived data files, Primary Graph, and Event list view; however, the Event will not be labeled with a User-defined name, only the assigned alpha character will be displayed.

Note: Events are based on 1 second intervals. If an event is triggered exactly at the time 2.541, the event will be listed at the time 3.000.
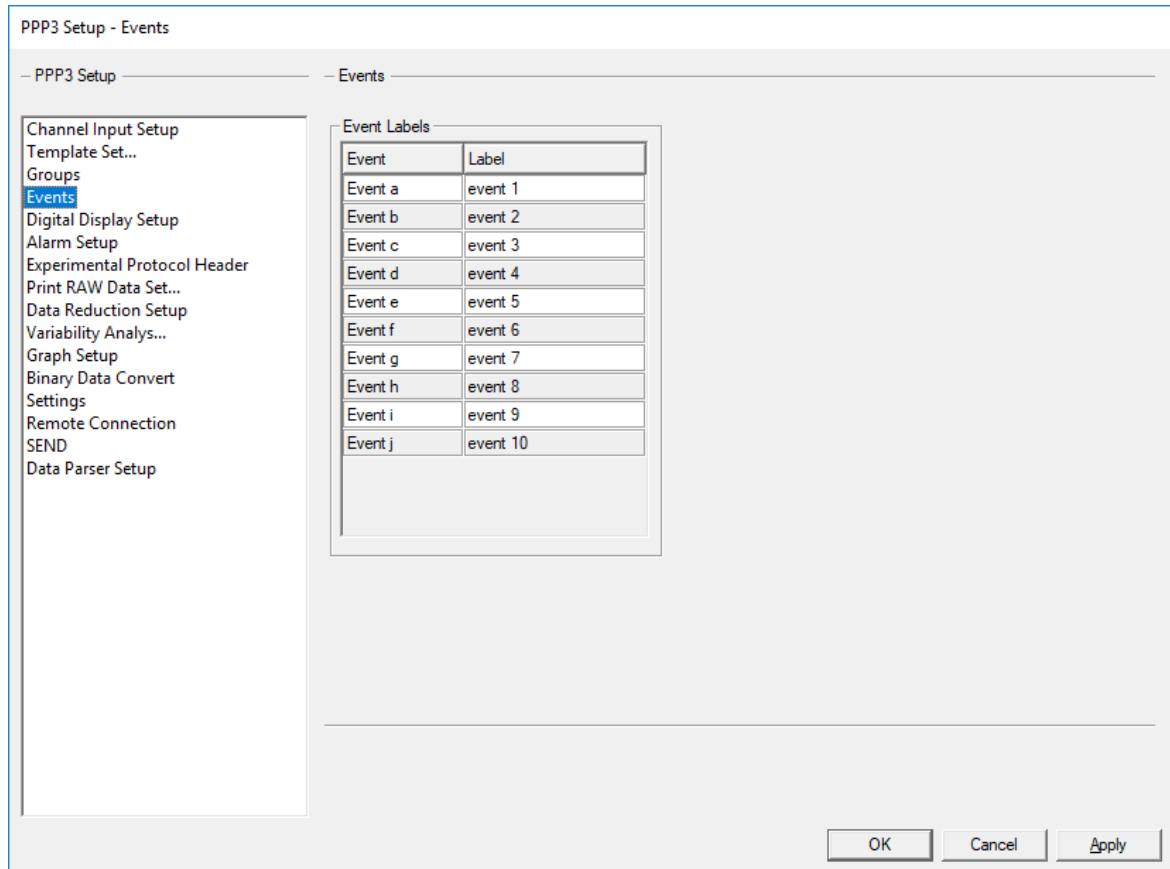
Events Configuration
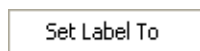
Events Context Menu (right click menu)

Event

This static field displays the letter designation of the Event (not User-defined).

Label

This edit column allows the User to assign a label to an individual Event (up to 19 characters).

Single Event - To assign a label to an Event, left click on the appropriate cell under the **Label** column and type a label in the edit field.

Multiple Events - To assign a label to multiple Events, highlight multiple rows, right click within one of the highlighted rows, select **Set Label To** from the context menu, and type in a label in the **Change Label** dialog.

Multiple Events (Advanced) - To set up a single label for multiple Events, click on the **Advanced** button in the **Change Label** dialog. Select the **Step Through** check box, enter an alpha or numeric value in the **Starting With** edit field and a numeric value in the **Stepping By** edit field.

Digital Display Setup

The **Digital Display Setup** configuration allows the User to set up to 33 digital display windows that will be shown during acquisition or replay modes. The Digital Displays will show selected derived parameter values or secondary information. Digital Displays can also be set up with alarm conditions (see Alarm Setup).

When the User selects derived parameters to be displayed in the Digital Displays, the derived parameter values are shown in the digital display windows during acquisition or replay modes; these values are updated upon each User-defined logging period.

In addition to derived parameters, Digital Displays can also be set up to show secondary information (Timer Up, Timer Down or Clock information).

- **Timer Up** - This feature will show a timer (00:00:00) in the Digital Display that will count up from zero to a User-defined finish time. Upon counting up to the finish time, the User can set up the Digital Display to go into an Alarm Condition (see Alarm Setup) to notify the User that the defined finish time has been reached.

- **Timer Down** - This feature will show a timer (00:00:00) in the Digital Display that will count down from a User-defined start time to zero. Upon counting down to zero, the User can set up the Digital Display to go into an Alarm Condition (see Alarm Setup) to notify the User that the defined finish time has been reached.

- **Clock** - This feature allows the User to show a clock in the Digital Display. The User can select "System Clock" and "Elapsed Time".

- **Disk** - This feature allows the user to show the available "Disk Space" and "Disk Time".
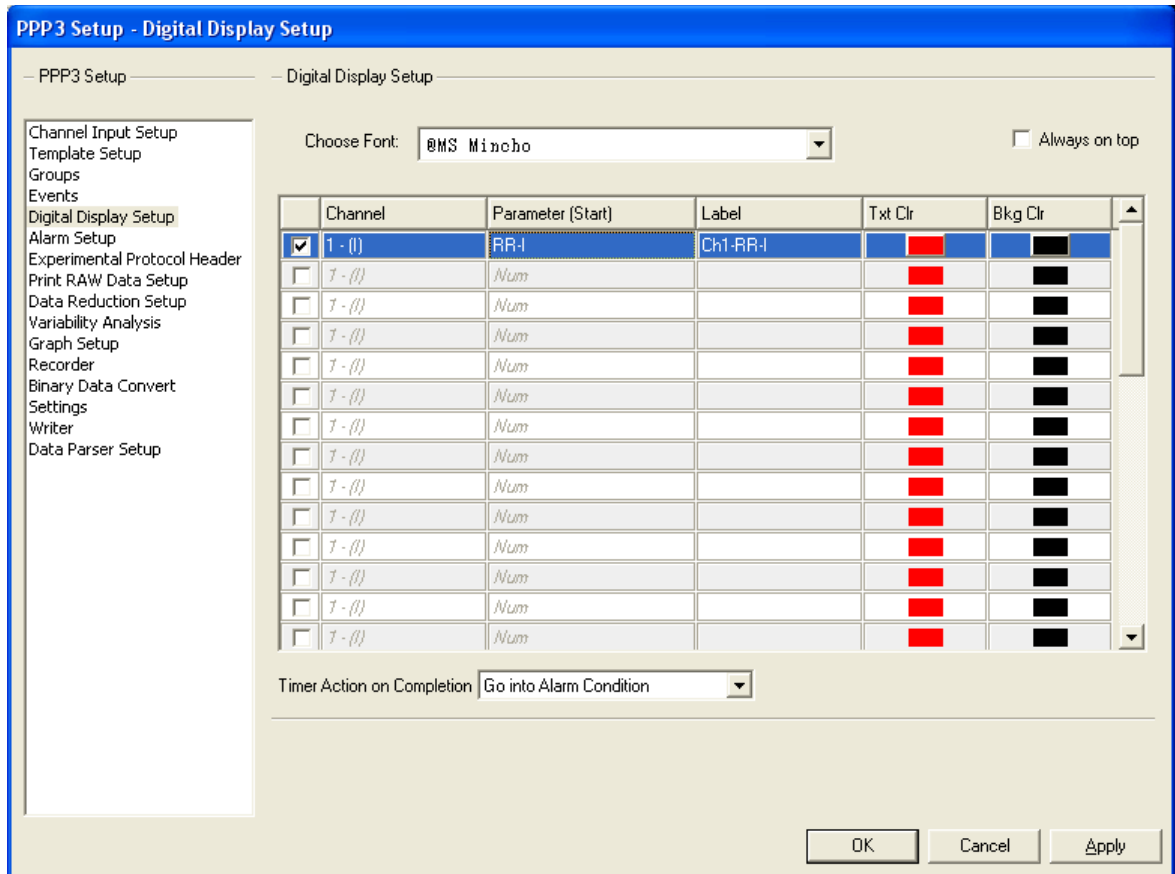
Digital Display Setup Configuration
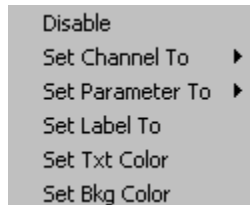
Digital Display Context Menu (right click menu)

Enable/Disable

This check box allows the User to enable or disable each Digital Display (up to 33 Digital Displays). A Digital Display cannot be set up until it has been enabled (a checkmark appears in the check box).

Single Digital Displays - To enable/disable a digital display (up to 33 displays can be enabled), left click on each appropriate check box.

Multiple Digital Displays - To enable/disable multiple digital displays, highlight multiple rows, right click within one of the highlighted row, and select **Enable** or **Disable** from the context menu.

Channel

This combo box column allows the User to select a physical channel (the channel must be enabled; see **Channel Input Setup** configuration) or one of the secondary information categories (Timer Up, Timer Down or Clock).

Single Digital Displays - To assign a channel to the Digital Display, left click on the appropriate cell and select one of the options from the list.

Multiple Digital Displays - To assign the same channel to multiple Digital Displays, highlight multiple rows, right click within one of the highlighted rows, select **Set Channel To** from the context menu, and select one of the options from the list.

Parameter (Start)

This combo box column allows the User to select either a derived parameter or one of the Clock options (System Clock, Elapsed Time, or Disk Space) to be displayed in the Digital Display. The options that appear under the **Parameter (Start)** column will be dependent upon what was selected for the **Channel** column.

Single Digital Displays - To assign a parameter to a Digital Display, left click on the appropriate cell and select one of the options from the list.

Multiple Digital Displays - To assign the same parameter to multiple Digital Displays, highlight multiple rows, right click within one of the highlighted rows, select **Set Parameter To** from the context menu, and select one of the options from the list.

Label

This edit column allows the User to define a label (up to 12 characters) that will be displayed in the Digital Display window.

Single Digital Displays - To assign a label to a Digital Display, left click on the appropriate cell under the **Label** column and type a label in the edit field.

Multiple Digital Displays - To assign a label to multiple Digital Displays, highlight multiple rows, right click within one of the highlighted rows, select **Set Label To** from the context menu, and type in a label in the edit field.

Multiple Digital Displays (Advanced) - To setup a single text label for multiple channels, click on the **Advanced** button in the **Change Name** dialog. Select the **Step Through** check box, enter an alpha or numeric value in the **Starting With** edit field, and a numeric value in the **Stepping By** edit field.

Txt Clr

This combo box column allows the User to specify the color of the text that is displayed in the Digital Display windows.

Single Digital Displays - To assign a text color, left click on the appropriate cell under the **Txt Clr** column and select a color from the **Color** dialog.

Multiple Digital Displays - To assign the same text color to multiple Digital Displays, highlight multiple rows, right click within one of the highlighted rows, select **Set Txt Clr** from the context menu, and select a color from the **Color** dialog.

Bkg Clr

This combo box column allows the User to specify the background color of the Digital Display window.

Single Digital Displays - To assign a background color, left click on the appropriate cell under the **Bkg Clr** column and select a color from the **Color** dialog.

Multiple Digital Displays - To assign the same background color to multiple Digital Displays, highlight multiple rows, right click within one of the highlighted rows, select **Set Bkg Clr** from the context menu, and select a color from the **Color** dialog.

Choose Font

This list box allows the User to specify the type of font that is displayed in the Digital Display windows.

Always On Top

Enabling this check box will position the Digital Display windows to always be the top most window on the screen, therefore, allowing the windows to always be in view since other windows cannot overlay the Digital Display windows.

Timer Action on Completion

This combo box allows the User to choose which action will occur when a timer reaches its end point (if "Timer Up" or "Timer Down" was selected for Channel; see **Channel** under Digital Display Setup). The User may select **Go Into Alarm Condition** or **Reset Timer Automatically**. **Go Into Alarm Condition** will force the Digital Display to flash its colors upon reaching the Timer's end point. **Reset Timer Automatically** will automatically reset the timer when it has reached its end point.

Alarm Setup

The **Alarm Setup** allows the User to set up to 32 alarm conditions. Each alarm can be assigned to a derived parameter with low and high alarm limits. When the derived data goes above or below the alarm limits, an alarm will be triggered. When an alarm is triggered, the following alarm conditions will occur:

- The lines of derived data in the Derivation group sheets containing derived parameters in alarm conditions are marked with a User-defined character under the Alarm column.

- The computer sounds an audible alarm; a .WAV file can be played through the Window's sound system (if set up).

- The alarm list view displays the channel, derived parameter, low and high alarm levels, and current value of the parameter.

- The Derivation list view derived parameter cell that is affected will be grayed along with the Alarm column cell on the same line.

- If the Digital Display list view is concurrently set up with a derived parameter that also has been set up for an alarm condition, the Digital Display will notify the User that the derived parameter is out of range; the text color and background color will invert colors. This feature is available in both acquisition and replay modes.

Alarms conditions can also be set up for the Timer features (see Digital Display Setup).
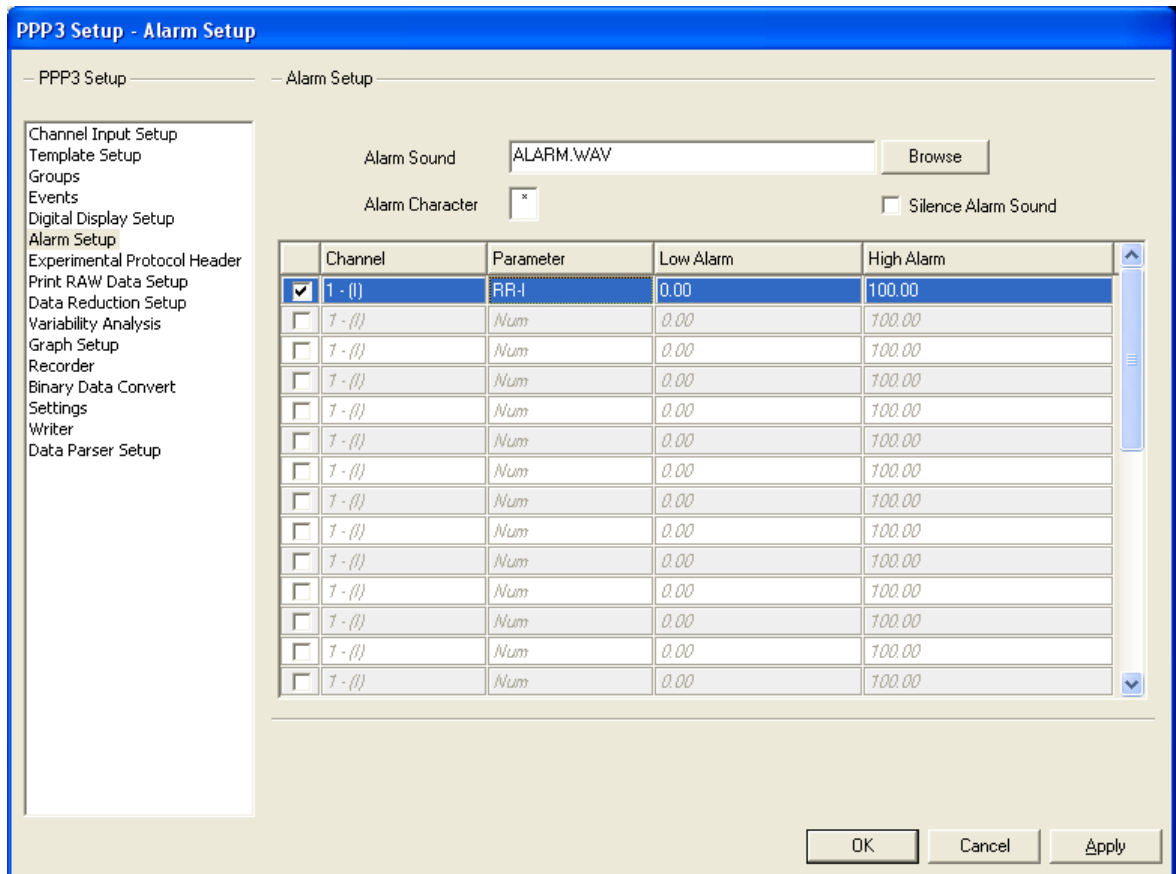
Alarm Setup Configuration
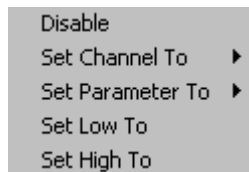
Alarm Setup Context Menu (right click menu)

Enable/Disable

This check box toggles the alarm on/off. To configure the settings for an alarm condition, the alarm must be enabled.

Channel

This combo box allows the User to select a physical channel for which the alarm will be set up. The physical channels that may be selected are dependent upon the inputs enabled (see **Input** under Channel Input Setup).

Single Alarms - To assign a channel to an alarm, left click on the appropriate cell under the **Channel** column and select one of the options from the list.

Multiple Alarms - To setup multiple alarms for the same channel, highlight multiple rows, right click within one of the highlighted rows, select **Set Channel To** from the context menu and type, and select one of the options from the list.

Parameter

This combo box allows the User to select a derived parameter from the **Channel**; this is the derived parameter for which alarm condition will be set up.

Single Alarms - To assign a derived parameter to an alarm, left click on the appropriate cell under the **Parameter** column and select an available option from the list.

Multiple Alarms - To setup the same derived parameter for multiple alarms, highlight multiple rows, right click within one of the highlighted rows, select **Set Parameter To** from the context menu, and select an available option from the list.

Low Alarm

This edit column allows the User to setup the low alarm limit for the selected derived parameter. When the derived parameter value is less than or equal to this value, an alarm will be triggered.

Single Alarms - To assign a low alarm limit, left click on the appropriate cell under the **Low Alarm** column and type in a value into the edit field.

Multiple Alarms - To setup the same low alarm limit for multiple alarms, highlight multiple rows, right click within one of the highlighted rows, select **Set Low To** from the context menu, and type and type in a value in the edit field.

High Alarm

This edit column allows the User to setup the high alarm limit for the selected derived parameter. When the derived parameter value is greater than or equal to this value, an alarm will be triggered.

Single Alarms - To assign a high alarm limit, left click on the appropriate cell under the **High Alarm** column and type in a value into the edit field.

Multiple Alarms - To setup the same high alarm limit for multiple alarms, highlight multiple rows, right click within one of the highlighted rows, select **Set High To** from the context menu, and type in a value in the edit field.

Alarm Sound

This browse field allows the User to select a .WAV file that will be played when an alarm condition exists. In order for this feature to function, the personal computer must have a sound card installed. If no sound card is installed, then this option will be grayed out and the application will beep the speaker in the personal computer when the alarm condition is triggered.

Alarm Character

This single character edit field allows the User to select a character that will be used in the derived data files to represent an alarm condition. The character will be at the end of the derived data line that has the alarm condition. If no alarm condition exists, a space will be at the end of the line.

Silence Alarm Sound

This check box allows the User to disable the .WAV file when an alarm condition occurs.

Experimental Protocol Header

The Experimental Protocol Header allows the User to document the Excel data file and Excel sheets that are created during acquisition or replay.

The User has the option to setup the Experimental Protocol Header for each User-defined Group (see **Group** under Channel Input Setup). The system puts the information entered in the Experimental Protocol Header in the beginning of each derivation file created for each Group.

The **Experimental Protocol Header** configuration allows the User to set up information for each Group (A - AF). Each Group will have fourteen prompts associated with an edit field. Each prompt may be User-defined; prompt changes apply to all Groups.

Experimental Protocol Header Configuration

Group

This tab allows the User to set up Protocol Header Information for each Group (each tab represents a different Group (A - AF)). The User-defined Group name will be viewed in each tab if the User has set up a name for each Group (see **Name** under Groups and Events).

Single Group - To setup Experimental Header Protocol information for a single Group, click on the appropriate **Group** tab.

Multiple Groups - To set up Experimental Header Protocol information for multiple Groups, simultaneously, highlight multiple tabs.

Prompts

The **Experimental Protocol Header** configuration lists fourteen prompts that can be User-defined. The following default prompts are listed:

- Scientist Name
- Date
- Time
- Study
- Treatment
- Agent
- Dose
- Anti-agent
- Dose
- Animal Number
- Sex
- Weight
- Special Notes
- Comment

Changing Prompts - To change prompts, double left click on the prompt and type in a new entry for the prompt. **Note:** Prompt changes apply to all Groups.

Text Entries

For each prompt, the User is able to enter corresponding information in the **Text Entry** field. The **Prompt** and the information entered into the **Text Entry** will appear in the Group's derivation files and ASCII files.

To enter information into the **Text Entry** field, click on the appropriate edit field and type in an entry. If a single **Group** tab is selected, then the entry will only appear for the selected Group. If multiple **Group** tabs are selected, then the entry will be entered for all selected Groups.

Import from File

The user can import data from a comma separated value (CSV) text file to populate the Text Entries.

The text file would contain a line for each Group with the Text Entries on each line separated by a comma.

If a blank group is needed just enter a blank line for that group.

Print RAW Data Setup

The **Print RAW Data Setup** allows the User to configure up to 16 traces of data to be printed on a Windows attached printer in a chart recorder type of format. The printout will consist of the trace data, a 5mm by 5mm grid, date, time, and User information.

The **Print RAW Data Setup** configuration is also available during acquisition and replay modes for ease of configuration.
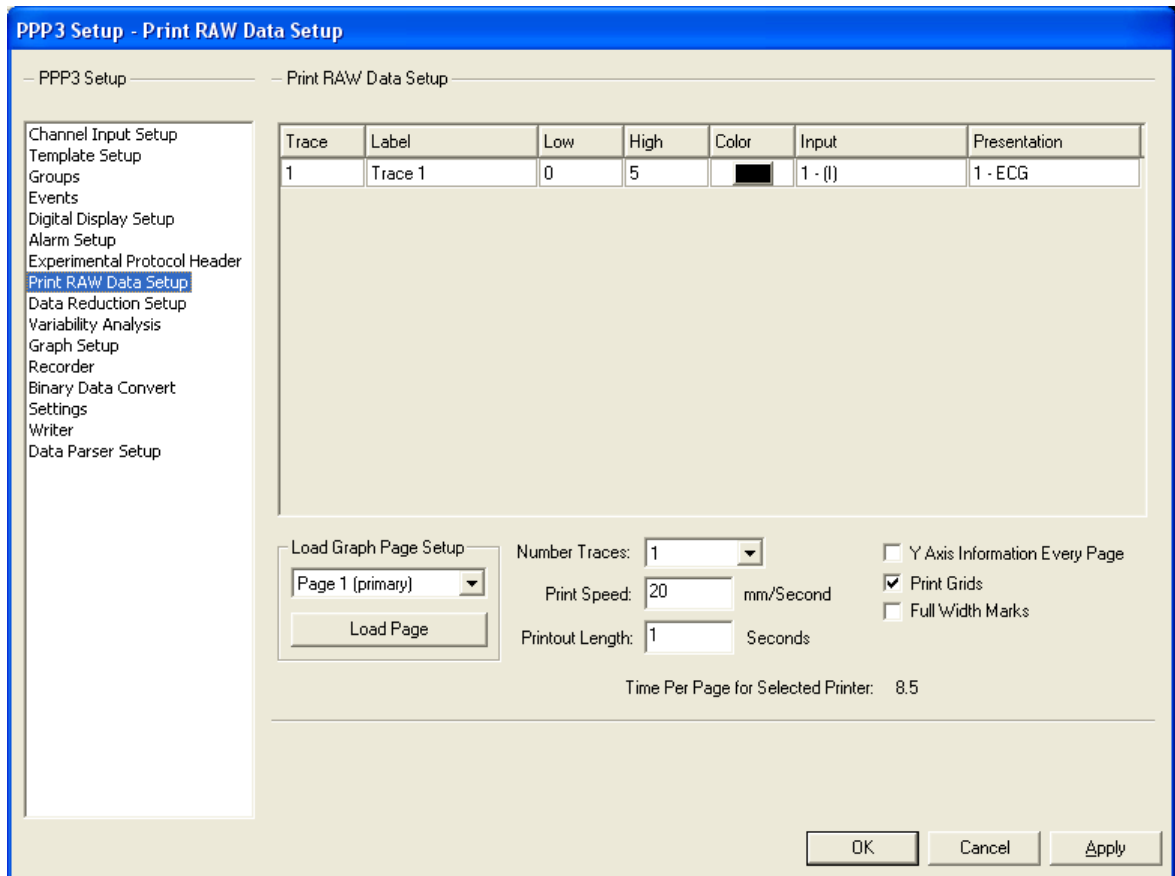
Print RAW Data Setup Configuration
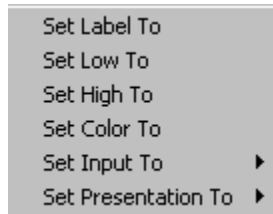
Print RAW Data Setup Context Menu (right click menu)

Trace

This static column identifies the trace area being configured; up to sixteen trace areas may be configured. To add a trace, see **Number Traces**.

Label

This edit field allows the User to assign a label that will be printed along with the trace data. This label is printed in the Y-axis scaling area on the printout.

Single Trace - To assign a label to a trace, left click on the appropriate cell under the **Label** column and type a label in the edit field.

Multiple Traces - To assign the same label to multiple traces, highlight multiple rows, right click within one of the highlighted rows, select **Set Label To** from the context menu, and type in a label in the **Change Label** dialog.

Multiple Traces (Advanced) - To setup a single text label for multiple traces, click on the **Advanced** button in the **Change Name** dialog. Select the **Step Through** check box, enter an alpha or numeric value in the **Starting With** edit field, and a numeric value in the **Stepping By** edit field.

Low

This edit column sets the low Y-axis trace value. If the trace data is greater than this value, the trace data is not clipped.

Single Trace - To assign a low Y-axis value to a trace, left click on the appropriate cell under the **Low** column and type a value in the edit field.

Multiple Traces - To assign a low value to multiple traces, highlight multiple rows, right click within one of the highlighted rows, select **Set Low To** from the context menu, and type in a value in the edit field.

High

This edit column sets the high Y-axis trace value. If the trace data is less than this value, the trace data is not clipped.

Single Trace - To assign a high Y-axis value to a trace, left click on the appropriate cell under the **High** column and type a value in the edit field.

Multiple Traces - To assign a high value to multiple traces, highlight multiple rows, right click within one of the highlighted rows, select **Set High To** from the context menu, and type in a value into the edit field.

Color

This combo box allows the User to select the color of the trace data that will be printed on the printout. If using a color printer, this will match the color selected. If using a laser printer, the printer will print different levels of gray depending on the color selected.

Single Trace - To assign a trace color, left click on the appropriate cell under the **Color** column and select a color from the **Color** dialog.

Multiple Traces - To assign the same color to multiple traces, highlight multiple rows, right click within one of the highlighted rows, select **Set Color To** from the context menu, and select a color from the **Color** dialog.

Input

This combo box column allows the User to define which channel will appear in each trace area; the list will include the available physical channels that have an assigned analysis (see Channel Input Setup).

Presentation

This combo box column allows the User to select the type of signal that will be displayed on the printout. The User may select a RAW signal or a derived signal, depending upon the selected analysis.

Single Trace - To assign a Presentation to a trace, left click on the appropriate cell under the **Presentation** column and select one of the options from the list.

Multiple Traces - To assign a Presentation to multiple traces, highlight multiple rows, right click within one of the highlighted rows, select **Set Presentation To** from the context menu, and select one of the available options from the list.

Load Graph Setup

The User has the option to select one of the enabled Primary graphs and load the same configuration that was set up for the graph in the **Graph Setup** configuration (see Graph Setup). This configuration will be loaded into the **Print RAW Data Setup** configuration.

To load a configured Primary Graph, select a Primary graph (Page number) from the **Load Graph Setup** drop down list box (only enabled Primary graphs will appear) and click on the **Load Page** button. The configuration will automatically appear.

Number Traces

This combo box allows the User to define the number of traces that will appear on the printout (up to sixteen traces). The system divides the page size by the number of traces to distribute all traces on a single page.

To select the number of traces that will appear on the printout, click on the **Number Traces** combo box and select one of the options that appear (1 - 16). Upon selecting a number, the **Print RAW Data Setup** dialog will be updated with the selected number of traces.

Print Speed

This edit field allows the User to define the calibrated paper speed in millimeters/second. The system calculates the amount of data that will fit on a page from this value.

Printout Length

This edit field allows the User to define the length of the printout in seconds. The system will calculate the number of pages required to print this amount of data based on the time defined by the User. If the printout length is greater than a single page, then the system will print the number of pages required to fulfill the time of the printout length and completely fill the page.

Y Axis Information Every Page

This check box allows the User the option to print the Y-axis information on every page of a multiple page printout.

To print the Y-axis information on every page, enable the **Y Axis Information Every Page** check box.

Print Grids

This check box allows the User the option to display the 5 mm grids on the hardcopy. By selecting this check box, the 5 mm grids will be printed on the hardcopy.

Full Width Marks

This check box allows the User the option to print the full width of the Validation Marks across the trace area or print small tick marks along the bottom of the trace area. If this option is enabled (checkmark appears in the box), the validation marks will go from top to bottom of the trace area.

To print either the small tick marks or full width marks, the Validation Marks must be turned on (see **Validation Marks on at Start** under the Settings Setup).

Time Per Page for Selected Printer

This static field will be updated with a value that is dependent upon what the User selected for **Print Speed**. This value reflects the amount of time that can fit on one page of a printout based on the printer selected and the printer settings.

Data Reduction Setup

Data Reduction allows the system to be configured to **reduce** the amount of derived data into separate files. For instance, if the User requires the 1, 5, 10, and 30-minute post dose values, data reduction can be configured to produce this output. This eliminates taking the derived data or data reduction/statistical package on the data after the acquisition is done. The reduced data can then be used in statistical packages in a more usable form.

The **Data Reduction Setup** configuration is used to set up data reduction that will condense the information placed in Excel sheets. Each Group has a data reduction setup associated with it. The results of the data reduction are presented in the main window as well as in Excel sheets. The file name is the same as the data set name. The Data Reduction data will create a **DataReduction***n* sheet for each Group defined.

Data Reduction will report the standard deviation derived parameters that are configured. If Review is opened, the standard deviation derived parameters will be reported as x's.
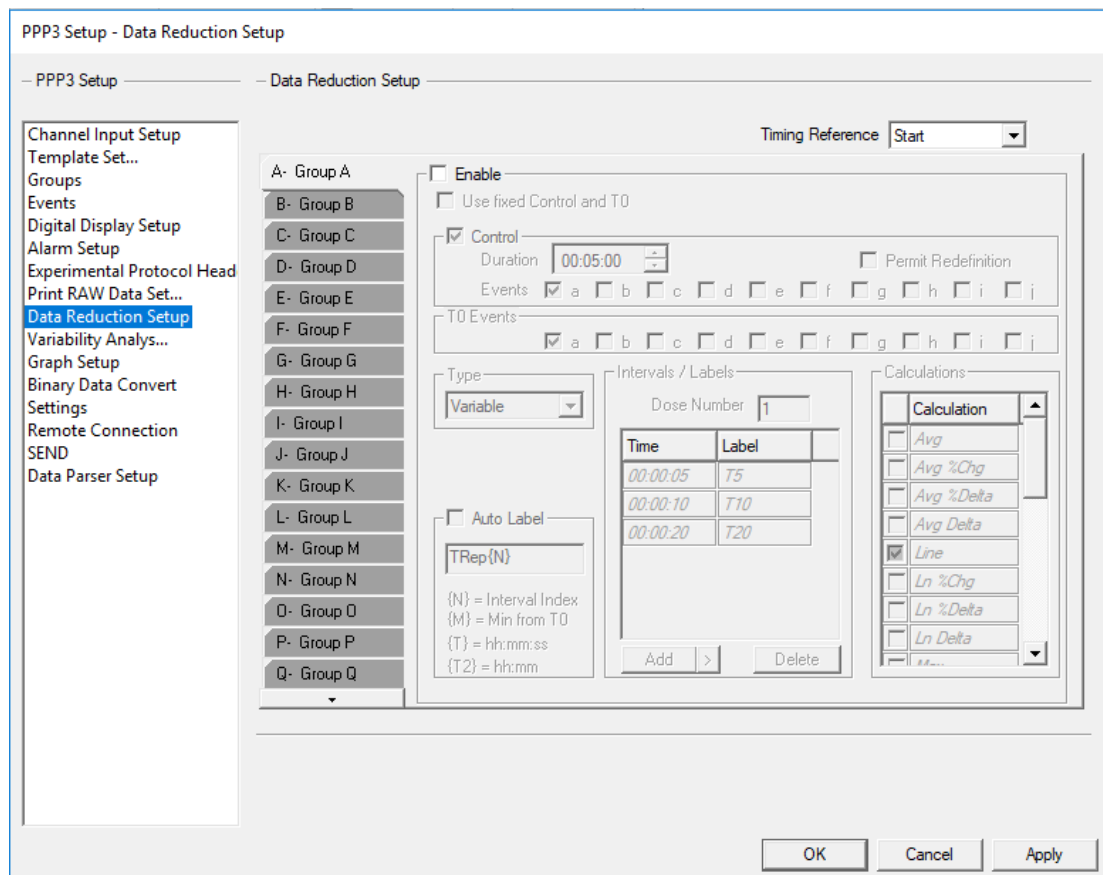
Data Reduction Setup Configuration

Timing Reference

Group

The **Group** tab allows the User to select the Group for which the data reduction information will be modified. Groups A-AF are available (see **Group** under Channel Input Setup). The User can select one group or select multiple groups. If the User has set up a name for the Group, then the User-defined name will be displayed for each appropriate Group within the tab (see **Name** under Groups and Events Setup).

Enable
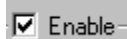
When this check box is selected, the data reduction setup for the specified Group that is enabled and the results of the data reduction will be displayed on acquisition and replay.

Control

This check box enables the Control Period for Data Reduction. If this check box is not enabled, Data Reduction will be triggered by T0; no Control information will be printed and the Control related calculations (%Changes, %Deltas, and Deltas) will not be permitted in the **Selected** column. If any Control related calculations are present in the **Selected** column, prior to disabling Control, they will be removed. The values reported for the SD row of the control are the standard deviation calculations for the entire population.

Use Fixed Control and T0

Control - Duration
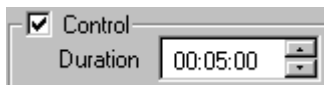
The control period is the time over which logged data is averaged to provide the control values for each parameter. The end of the control period is signaled by one of the Events that are selected in Control - Events.

Control - Events

Events ☑ a ☑ b ☐ c ☐ d ☐ e ☐ f ☐ g ☐ h ☐ i ☐ j

The Events selected here may be used to define a control period. The first time one of these Events is used, a control is obtained. Subsequent use of these Events will define a new control period only if "Permit Redefinition" is checked.

Control - Permit Redefinition

☑ Permit Redefinition

Permit Redefinition is used as a safety check to prevent inadvertent redefinition of the control. If this check box is not checked, control cannot be redefined.

T0 - Events

T0 Events
☑ a ☐ b ☐ c ☐ d ☐ e ☐ f ☐ g ☐ h ☐ i ☐ j

The Events selected here may be used to define a new T0 for the current Group. If a T0 Event is also a control Event, and a control is defined on entering the Event, there will be an overlap of one logged line between control and T0.

When an event is used to mark the end of control, the current logged line is included in the control period and the reported time represents the end of control. When an event is used to mark T0, it is assumed that T0 occurs at the beginning of the current logging interval (i.e. at the end of the previous logging interval).

T0 may be redefined at any time by using one of the selected Events. Thus using a single event to mark control and T0 may not be appropriate depending on the logging rate and the speed with which the drug effect is seen. If long logging rates are used and the drug effect is seen within one logging interval, a separate control and T0 should be used.

A dose should be administered as close to the corresponding T0 event as possible. When using long logging intervals, it is preferable to administer the dose close to the start of a logging interval (i.e. immediately after the previous logged line is recorded) and the corresponding T0 event should be entered before a logged line is reported following dosing.

If multiple data reduction intervals are completed on receiving a logged line of data, all completed data reduction intervals will be reported.

All time measurements are made from the most recent T0. If the control Event is not also used to define T0, the program will wait for a T0 after the end of the control period before proceeding. Until T0 is specified, further data reduction will not occur for the current Group.

If a second T0 Event is triggered while currently running a T0 Event, the previous T0 Event will be aborted and the new T0 Event will start.

Type (Intervals)

There are four methods to reduce the derived data set: **Data Lines or Time** which repeats the selected **Calculations** at a specified interval from an Event (T0), **Variable Intervals** which allows the User to define the time offsets from an Event (T0), and **Parser Segments** which reduces each parsed section of data, using the first parser section as the control if the control is enabled.

- **Data Lines or Time intervals** allows the User to define a single time that will be repeated after the activation of an Event (T0). The User may also assign a label with the interval. **Data Lines** refer to a logged line of data in the data reduction sheet. If the logging rate is set to 10 seconds and six is the number of logged lines of data desired, the interval will report a total of 60 seconds of data.

- **Variable Intervals** allows the User to insert a list of times in the system that will start after the activation of an Event (T0). NOTE: The maximum amount of variable intervals that can be entered is 100.

- **Parser Segments** which reduces each parsed section of data, using the first parser section as the control if the control is enabled. NOTE: If Parser segment is used, during acquisition or replay if a data reduction is triggered, data reduction will be running in Time mode. This is a **Review** only function. See the Review manual for more details.

Intervals / Labels

This feature allows the user to type in individual labels for each reduction interval if Auto Label is disabled. Add and delete buttons allow for interval labels to be added or removed. If Auto Label is enabled, the text placed in the dialog box will automatically be used for each Data Reduction interval along with the Index from the T0 event, {N}, or the time from the T0 event, {M}.

- Auto Label {N} provides and automatic index from T0. The first data reduction interval based on T0 will be 0. Using the default text of TRep, intervals will be TRep0, TRep1, TRep2 and so forth.
- Auto Label {M} provides the time from T0 in minutes. For example, if Data Reduction intervals are set to 30 minutes (time), each interval from T0 will be label at 30 minute increments (TRep0, TRep30, TRep60, etc.).
- Auto Label {T} provides the time from T0 in hh:mm:ss format. For example, if Data Reduction intervals are set to 30 minutes (time), each interval from T0 will be label at 30 minute increments (00:30:00, 01:00:00, 01:30:00, etc.).
- Auto Label {T2} provides the time from T0 in hh:mm format. For example, if Data Reduction intervals are set to 30 minutes (time), each interval from T0 will be label at 30 minute increments (00:30, 01:00, 01:30, etc.).
- Data Parser labels may be linked to Data Reduction. To link Data Parser labels, select "Group Mode in data parser" in the Settings dialog (PPP3 Setup menu). This will allow the user to utilize the labels set up in Data Reduction whenever Apply Rules is selected in the Data Parser dialog. Note that the user may also edit parser segment names in the Individual Segments tab in the Data Parser dialog by clicking in the Label field. However, clicking on Apply Rules in the Parser Rule Setup tab will remove any previously defined names from the Individual Segments tab. If Data Parser segments are not linked to Data Reduction, the software will default to index for the labels.
- If Data Parser segments are linked to Data Reduction, there is a 15 character limit for interval text except for the Control segment which is limited to nine characters.

Calculations

When a Monitoring Time is reached, the following calculations are made available when the next line of data is written out to the Excel file. Also listed for each Data

Reduction interval is the Start Time, End Time and duration of the interval in elapsed time.

A check box is listed next to each calculation. To enable a calculation, select the check box. If a calculation requires a Control Period to be enabled and the Control Period is not enabled, then the Calculation will be grayed.

NOTE: **The User has the option to ignore zeros when performing calculations in Data Reduction, see Ignore zeros in data reduction under Settings configuration.**

Calculation	Description
Line	Current line of data, the same as is written to the Excel derivation sheet.
Ln Delta*	Difference between current data and the control (Current - Control)
Ln %Chg*	Current/Control * 100
Ln %Delta*	(Current - Control)/Control *100
Avg	Average of the logged lines from the last Monitoring Time to the current
Avg Delta*	Difference between the current average and the control (Average - Control)
Avg %Chg*	Average/Control * 100
Avg %Delta*	(Average - Control)/Control *100
SDev Samp	The Standard Deviation of the data between the last Monitoring Time and the current.
SDev Est	The Standard Deviation estimate of the entire population of data between the last Monitoring Time and the current.
Max	The Maximum value of the data between the last Monitoring Time and the current
Max Delta*	Difference between Maximum data and the control (Max - Control)
Max %Chg*	Maximum/Control * 100
Max %Delta*	(Maximum - Control)/Control *100
MaxT	The time at which the Maximum value of the data occurred between the last Monitoring Time and the current
Min	The Minimum value of the data between the last Monitoring Time and the current
Min Delta*	Difference between Minimum data and the control (Minimum - Control)
Min %Chg*	Minimum/Control * 100
Min %Delta*	(Minimum - Control)/Control *100
MinT	The time at which the Minimum value of the data occurred between the last Monitoring Time and the current
Median	The median value of the data logged within the current data reduction interval is reported. If an odd number of data lines are being reduced, the median is calculated by ordering the data to be reduced and reporting the middle value. If an even number of data lines is being reduced, the median is calculated by ordering the data to be reduced and reporting the average of the two middle values.

*Indicates a calculation which cannot be used when **Control** is disabled.

Variability Analysis

See Review manual #MU00196 for details on the Variability Analysis feature.

Graph Setup

The **Graph Setup** configuration allows the User to create customized graphic windows that are displayed during acquisition or replay modes. Up to sixteen graphic windows may be created using four different types of displays: *Primary*, *Trend*, *XY-Loop*, or *Scatter*. Depending on which display the User selects, the graphic windows will display raw (primary) analog input signals or derived parameters. The graph configurations can be changed during acquisition or replay modes.

Primary Graphs - A Primary graph displays the raw (physical) analog format of the signal over a specified period of time. The Primary graph is similar to an oscillographic recorder output in that it displays the analog signal over a specified period of time. Sixteen traces can be set up with up to four signals per trace area. Each trace area has its own scaling information.

Trend Graphs - A Trend graph shows all derived data (such as heart rate, mean blood pressure, or dP/dt$_{MAX}$) from the output of the analyzed input signals; it is similar to a dose response curve. Sixteen trends can be graphed with up to four derived parameters for each trend.

XY-Loop Graphs - An XY-Loop graph allows one analog signal to be plotted against another analog signal. For example, to display pressure volume loops, the User would set up the graph to plot pressure versus volume.

Scatter Graphs - A Scatter Graph allows two derived parameters to be plotted against each other. At the point of intersection, a "+" is drawn to indicate where the values for the two derived parameters intersect. The Scatter graph will only refresh after the User causes the graph to be repainted, which occurs when sized or minimized and then restored. When the Scatter plot is refreshed, the last 2000 data points will be re-drawn.

Page View – A Page View graph is only available in Review and it allows the analog signal to be stacked by time on the graph page.

Template – A Template Graph is only available in Review and it works in conjunction with ECG PRO. See manual MU00279_Template Analysis Manual for the details of this graph type.

Primary and Trend Graphs (Setup)

Black Background

This check box allows the User to display the graph with a black background. If the check box is not selected, then the system will default to a white background. When using a black background, the analysis validation mark colors will change. The black mark becomes white and the white mark becomes black.

Page

This tab identifies the graph page number; each tab represents a different graph window that may be displayed during acquisition or replay modes. Eight tabs exist to allow the User to set up to eight different graphs.

To select the desired graph page, click on the appropriate **Page X** tab, where X = the page number.

Enable Page

This check box allows the User to enable the graph page. Enabling the graph page not only allows the User to configure the information for the graph, but also enables the graph during acquisition or replay modes.

To enable the graph page, select the **Enable Page** check box.

Type

This combo box allows the User to select the display of the graph. The available choices are: *Primary, Trend, XY-Loops,* or Scatter. This combo box is available when setting up all types of graphs.

To select the type of graph page, click on the **Type** combo box and select one of the available options: *Primary*, *Trend*, *XY-Loop*, or *Scatter*.

Label

This edit field allows the User to define a name (up to 11 characters) for the graph. The label will be placed in the title bar of the graph window.

Time

This edit field allows the User to define the time for the X-axis. The time will be defined in units of "seconds" for Primary graphs and units of "minutes" for Trend graphs (depending upon what was selected for **Type**).

Simple View / Advanced View

These radio buttons allow the User to toggle between a Simple View format and an Advanced View format. The Simple View format allows the User to configure one trace per axis (16 axes total). The Advanced View format allows the User to configure multiple traces for each axis (up to 4 traces per axis).

To toggle between each view, click on the desired radio button (**Simple View** or **Advanced View**). Upon selecting the desired option, the **Graph Setup** configuration will display the corresponding view.

Update Labels

When changes are made to the Labels in Channel Input Setup, sing the Update Labels will update the Label column in the graph page setup.

Simple View

The following definitions are described for the *Simple View* format (Primary and Trend graphs, only). If the User has already configured an axis in **Advanced View**, then this information will be filtered into the **Simple View**.
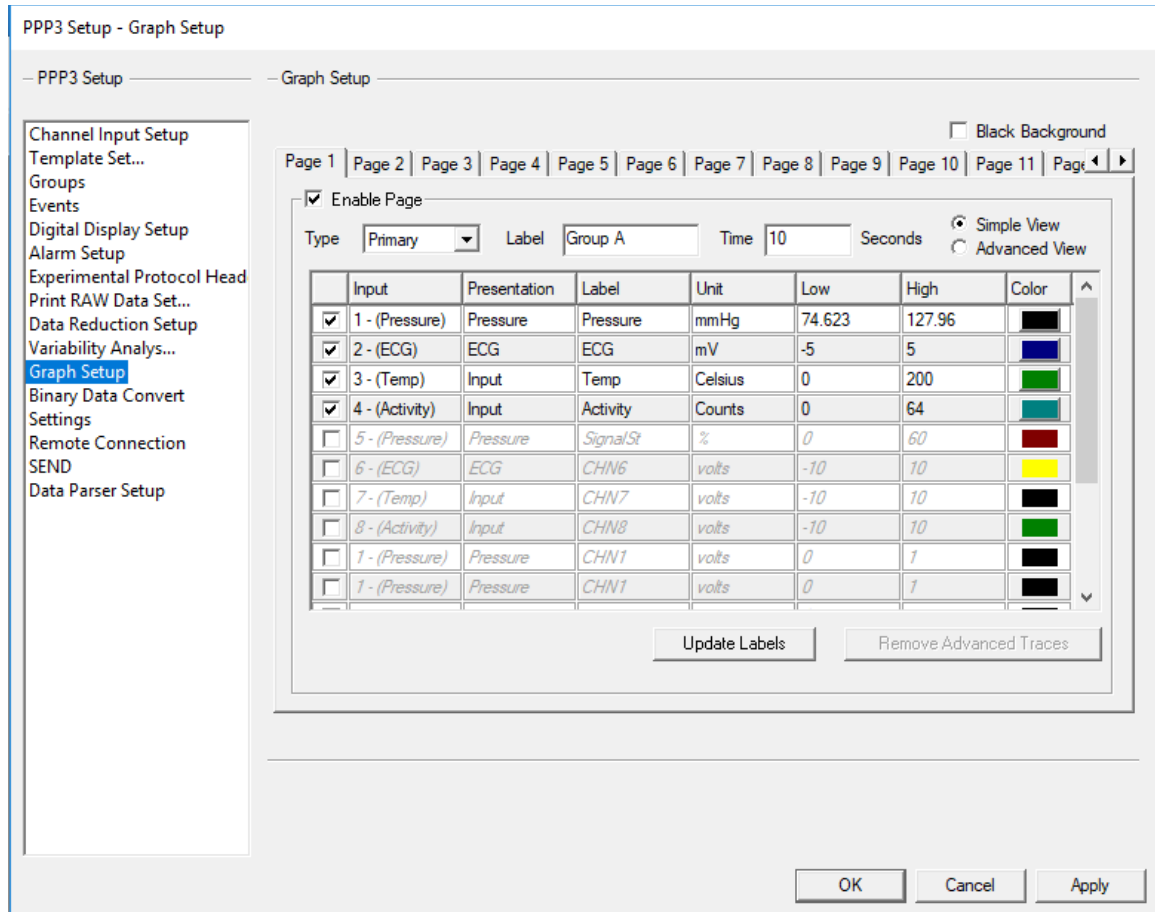
Graph Setup - Primary/Trend (Simple View) Configuration
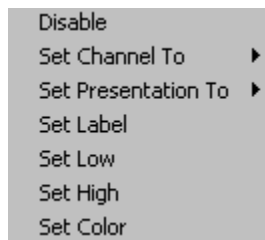
Graph Setup - Primary/Trend (Simple View) context menu (right click menu)

Enable / Disable

This check box allows the User to enable or disable an individual axis. Each row represents a different axis; up to 16 axes may be configured.

To enable an axis, select the appropriate check box (each row represents an individual axis).

Input

This combo box allows the User to select a physical channel. The channels available will be dependent upon the **Inputs** enabled in the **Channel Input Setup** configuration.

Single Axis - To assign a channel, left click on the appropriate cell under the **Input** column and select one of the available options in the sub menu.

Multiple Axes - To assign the same channel to multiple axes, highlight multiple rows, right click within one of the highlighted rows, select **Set Channel To** from the context menu, and select one of the available options in the sub menu.

Presentation / Parameter

This combo box displays the available presentations or derived parameters that may be graphed. **Note:** Depending upon which type of graph was selected from **Type**, the **Graph Setup** configuration will display **Presentation** if "Primary" was selected and **Parameter** if "Trend" was selected.

Single Axis - To assign a presentation/parameter, left click on the appropriate cell under the **Presentation/Parameter** column and select one of the available options in the sub menu.

Multiple Axes - To assign the same presentation/parameter to multiple axes, highlight multiple rows, right click within one of the highlighted rows, select **Set Presentation/Parameter To** from the context menu, and select one of the available options in the sub menu.

Label

This edit field allows the User to enter a label that will be used to identify the axis. This label will appear in the corresponding trace area in the graph window.

Single Trace - To assign a label to a single axis, left click on the appropriate cell under the **Label** column and type a name in the edit field.

Multiple Traces - To assign a label to multiple axes, highlight multiple rows, right click within one of the highlighted rows, select **Set Label** from the context menu, and type in a label in the **Change Label** dialog.

Multiple Traces (Advanced) - To setup a single label for multiple axes, click on the **Advanced** button in the **Change Label** dialog. Select the **Step Through** check box, enter an alpha or numeric value in the **Starting With** edit field, and a numeric value in the **Stepping By** edit field.

Low

This edit field allows the User to enter a value that sets the low axis value.

Single Trace - To assign a low value to a single axis, left click on the appropriate cell under the **Low** column and type a value in the edit field.

Multiple Traces - To assign a low value to multiple axes, highlight multiple rows, right click within one of the highlighted rows, select **Set Low** from the context menu, and type in a value in the **Enter new value** edit field.

High

This edit field allows the User to enter a value that sets the high axis value.

Single Trace - To assign a high value to a single axis, left click on the appropriate cell under the **High** column and type a value in the edit field.

Multiple Traces - To assign a high value to multiple axes, highlight multiple rows, right click within one of the highlighted rows, select **Set high** from the context menu, and type in a value in the **Enter new value** edit field.

Color

This combo box column allows the User to specify the trace color displayed in the graph window.

Single Axis - To assign a trace color, left click on the appropriate cell under the **Color** column and select a color from the **Color** dialog.

Multiple Axes - To assign the same trace color to multiple axes, highlight multiple rows, right click within one of the highlighted rows, select **Set Color** from the context menu, and select a color from the **Color** dialog.

Remove Advanced Traces

This button allows the User to remove any additional traces enabled for the axis in the **Advanced View** (see Advanced View). This button will be grayed if no additional traces are currently enabled. Upon enabling additional traces (up to four), the button will become enabled.

To remove any additional traces setup for a selected axis, click on the **Remove Advanced Traces** button. **Note:** Executing this feature will only remove additional traces for the selected axis.

Advanced View

The following definitions are described for the **Advanced View** format (Primary and Trend graphs, only). If the User already configured axis information in **Simple View**, then this information will be filtered into the **Advanced View**.

Note: In order to toggle to the **Advanced View**, the Graph Page must first be enabled in the **Simple View** (See description for **Enable Page**).
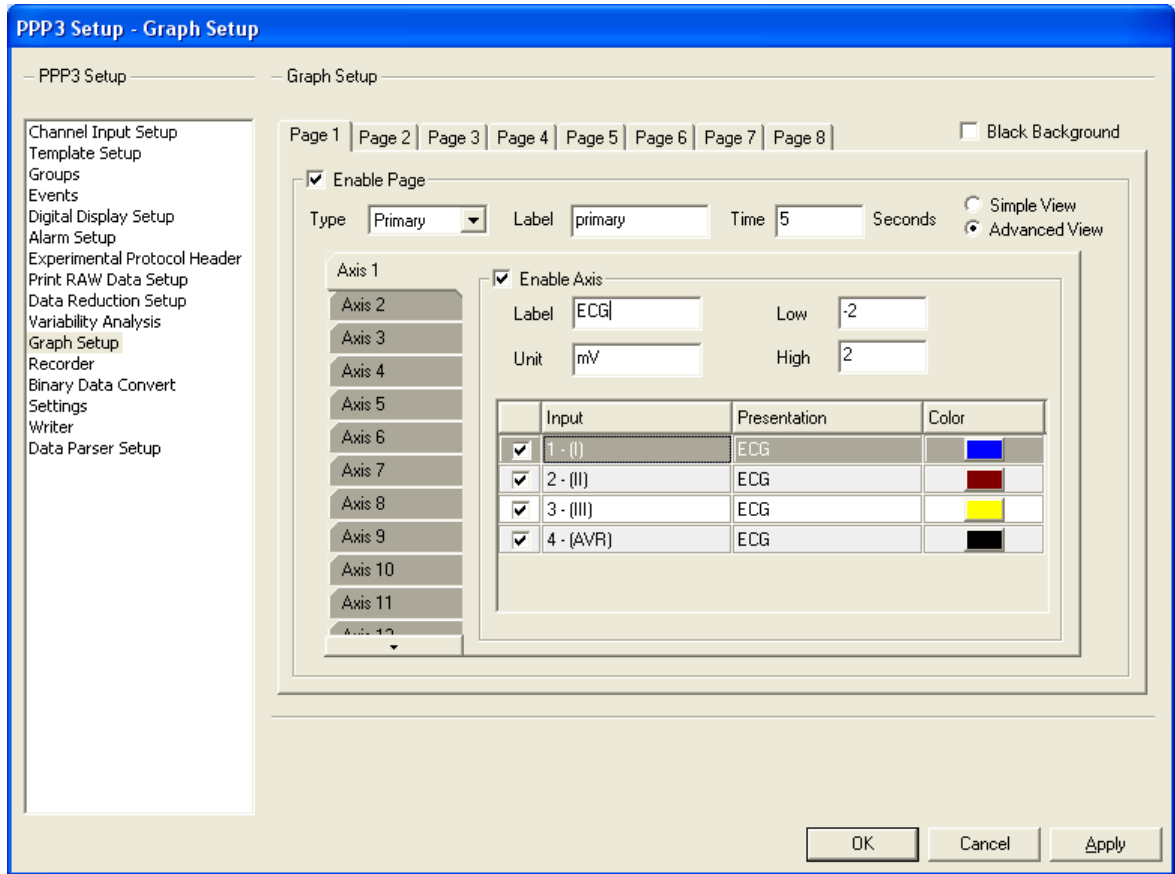
Graph Setup - Primary/Trend (Advanced View) Configuration
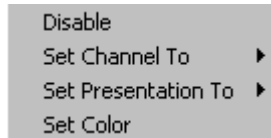
Graph Setup - Primary / Trend (Advanced View) Context Menu (right click menu)

Axis

This tab allows the User to specify which axis to configure.

To select an axis, click on the appropriate **Axis X** tab, where X = the axis number.

Enable Axis

This check box allows the User to enable the axis, and therefore, configure multiple traces for the axis. If the axis was already configured for one trace in **Simple View**, then this check box will already be selected upon switching to **Advanced View** with the first trace configured according to the User-defined settings set up in **Simple View**.

Label

This edit field allows the User to enter a label that will be used to identify the axis. This label will appear in the corresponding trace area in the graph window.

Single Trace - To assign a label to a single axis, click in the **Label** edit field and type in a label.

Low

This edit field allows the User to enter a value that sets the low axis value.

Single Trace - To assign a low value to a single axis, click in the **Low** edit field and type a value.

High

This edit field allows the User to enter a value that sets the high axis value.

Single Trace - To assign a low value to a single axis, click in the **High** edit field and type a value.

Enable / Disable

This check box allows the User to enable or disable an individual trace for the selected axis. Each row represents a different trace; up to 4 traces may be configured.

Input

This combo box allows the User to select a physical channel. The channels available will be dependent upon the **Inputs** enabled in the **Channel Input Setup** configuration.

Single Axis - To assign a channel, left click on the appropriate cell under the **Input** column and select one of the available options in the sub menu.

Multiple Axes - To assign the same channel to multiple axes, highlight multiple rows, right click within one of the highlighted rows, select **Set Channel To** from the context menu, and select one of the available options in the sub menu.

Presentation / Parameter

This combo box displays the available presentations or derived parameters that may be graphed. **Note:** Depending upon which type of graph was selected from **Type**, the **Graph Setup** configuration will display **Presentation** if "Primary" was selected and **Parameter** if "Trend" was selected.

Single Axis - To assign a presentation/parameter, left click on the appropriate cell under the **Presentation/Parameter** column and select one of the available options in the sub menu.

Multiple Axes - To assign the same presentation/parameter to multiple axes, highlight multiple rows, right click within one of the highlighted rows, select **Set Presentation/Parameter To** from the context menu, and select one of the available options in the sub menu.

Color

This combo box column allows the User to specify the trace color displayed in the graph window.

Single Trace - To assign a trace color, left click on the appropriate cell under the **Color** column and select a color from the **Color** dialog.

Multiple Traces - To assign the same trace color to multiple axes, highlight multiple rows, right click within one of the highlighted rows, select **Set Color** from the context menu and type and select a color from the **Color** dialog.

XY-LOOPS and Scatter Graphs (Setup)
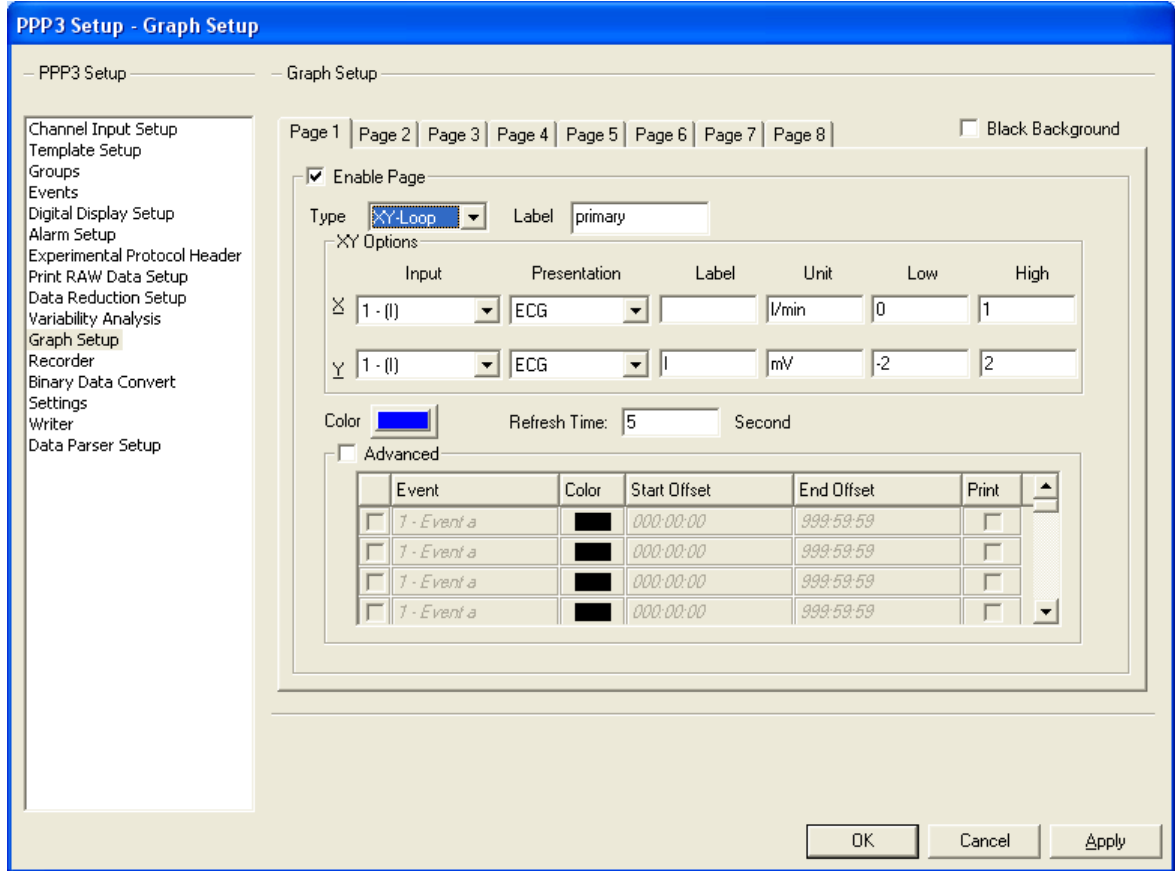
Graph Setup - XY-Loop/Scatter Configuration

Black Background

This check box allows the User to display the graph with a black background. If the check box is not selected, then the system will default to a white background. When using a black background, the analysis validation mark colors will change. The black mark becomes white and the white mark becomes black.

Page

This tab identifies the graph page number; each tab represents a different graph window that may be displayed during acquisition or replay modes. Eight tabs exist to allow the User to set up to eight different graphs.

To select the desired graph page, click on the appropriate **Page X** tab, where X = the page number.

Enable Page

This check box allows the User to enable the graph page. Enabling the graph page not only allows the User to configuration the information for the graph, but also enables the graph during acquisition or replay modes.

To enable the graph page, select the **Enable Page** check box.

Type

This combo box allows the User to select the display of the graph. The available choices are: *Primary, Trend, XY-Loops,* or *Scatter.*

To select the type of graph page, click on the **Type** combo box and select one of the available options: *Primary*, *Trend*, *XY-Loop*, or *Scatter*. **Note:** this combo box is available when setting up all types of graphs.

Label

This edit field allows the User to define a name (up to 11 characters) for the graph. The label will be placed in the title bar of the graph window.

Color

This combo box allows the User to specify a trace color.

To select the trace color, click on the **Color** combo box and select a color from the **Color** dialog.

Refresh Time

This box allows the user to specify a time in seconds that data in the graph page will refresh (removing all previous data).

Input

This combo box allows the User to select a physical channel for the X-axis and a physical channel for the Y-axis. The channels available will be dependent upon the **Inputs** enabled in the **Channel Input Setup** configuration.

Presentation / Parameter

This combo box displays the available presentations or derived parameters that may be graphed. **Note:** Depending upon which type of graph was selected from **Type**, the **Graph Setup** configuration will display **Presentation** if "XY-Loop" was selected and **Parameter** if "Scatter" was selected.

Label

This edit field allows the User to assign a name to the X-axis and a name to the Y-axis.

Unit

This edit field will list the units for each of the axes.

Low

This edit field allows the User to select a low value for each axis.

High

This edit field allows the User to select a high value for each axis.

Advanced

This section provides an advanced configuration for the colors that will be shown on the graphs based on events. The user can configure which events the color change will be triggered off of, the new color that will be used, the time offsets that the color will be used, and if those sections will be printed.

Binary Data Convert

Binary Data Convert allows the system to convert saved raw data from binary to ASCII format, depending on the selections made the **Binary Data Convert** configuration. The User can have the original signal converted or convert any derivation (specific to the analysis being performed on the signal). When data is converted, the original Raw data will remain in the .RAW file, and the converted data will appear in the **BinaryConvert** Excel sheet.

The **Binary Data Convert** configuration allows the User to select the primary signal type and any derivation made to the signal from the applied analysis. After setting up the information, the User can then use the **Binary Data Convert** function in the **Measure** utility to perform conversion (see **Measure**).

Binary Data Convert Configuration

Enable

This check box allows the User to enable each conversion. Up to sixteen different conversions can be set up.

Single Conversions - To enable/disable a single channel, left click on each appropriate check box to select/de-select the conversion.

Multiple Conversions - To enable/disable multiple channels, highlight multiple rows, right click within one of the highlighted rows, and select **Enable** or **Disable** from the context menu.

Input

This combo box column allows the User to select a physical channel (the channel must be enabled; see **Channel Input Setup** configuration) for which data will be converted.

Single Conversions - To set up a channel for a single conversion, left click on the appropriate cell and select one of the options from the list.

Multiple Conversions - To set up the same channel for multiple conversions, highlight multiple rows, right click within one of the highlighted rows, select **Set Channel To** from the context menu, and select one of the options from the list.

Presentation

This combo box allows the User to select either the raw analog signal or a derivative of the signal to be converted. The selections available are dependent upon the analysis assigned to the channel (see **Analysis** under Channel Input Setup).

Single Conversions - To set up a presentation for a single conversion, left click on the appropriate cell and select one of the options from the list.

Multiple Conversions - To set up the same presentation for multiple conversions, highlight multiple rows, right click within one of the highlighted rows, select **Set Presentation To** from the context menu, and select one of the options from the list.

Settings

The **Settings** configuration allows the set up of the following information to be applied to the protocol: **Acquisition Defaults**, **Replay Defaults**, **Data Separator**, **Time Formats**, and **Global Settings**. These User-defined settings are saved with the protocol and are applied during acquisition/replay modes.
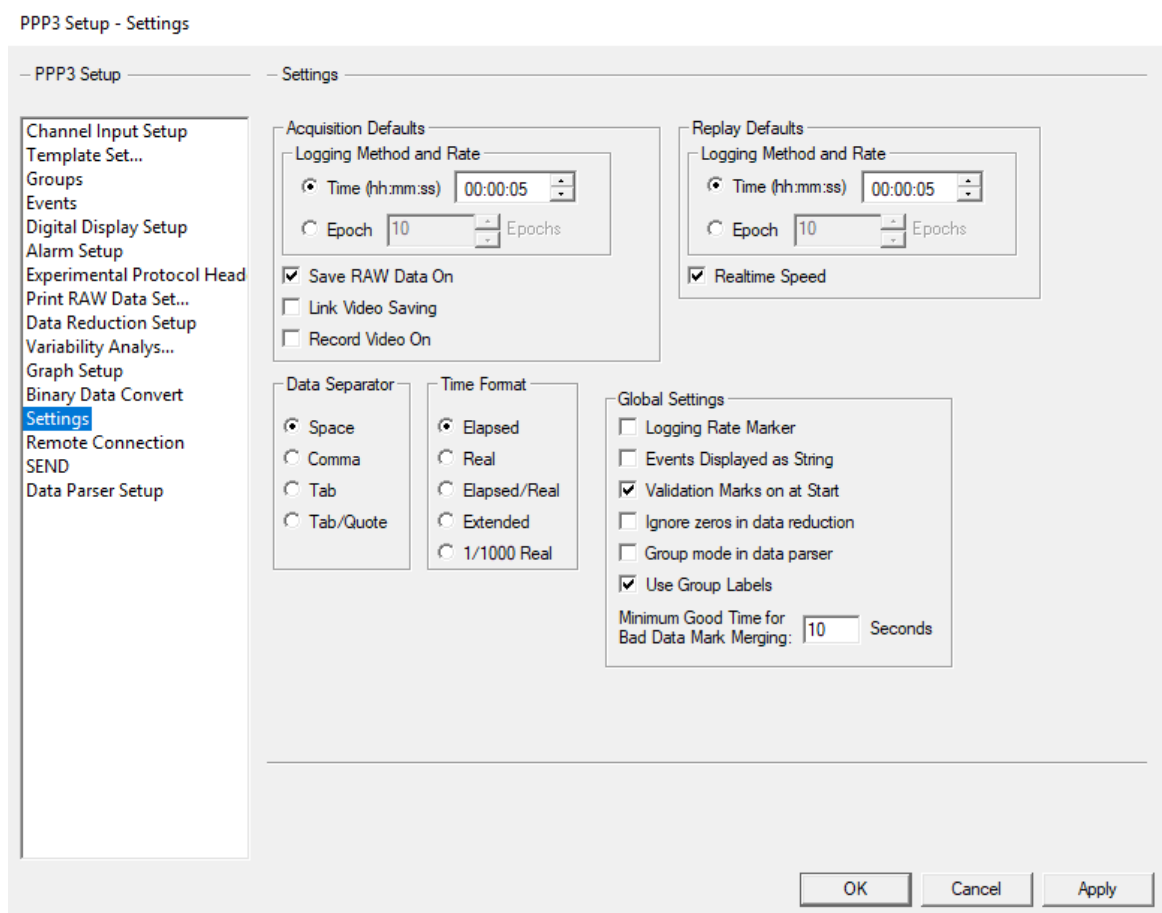
Settings Configuration

Acquisition Defaults

This section allows the defaults to be defined for when an acquisition is begun. The User is able to select when data will be logged into the derivation files and how often data will be plotted on the Trend and Scatter graphs.
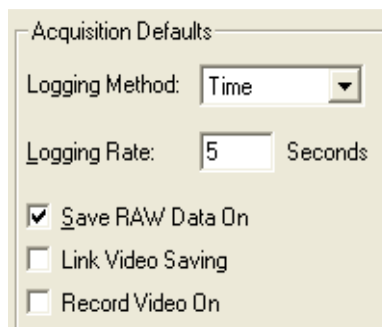
Acquisition Defaults

Logging Method

This combo box allows the User to select the logging method by selecting one of two options: Time or Epoch.

Time - this mode performs the logging period based on time (seconds).

Epoch - this mode performs the logging period based on the number of cycles (beat-to-beat) that occur.

Logging Rate

This edit field allows the User to enter a rate of how often data is plotted and logged into the files. The range is 1 - 99999.

Save RAW Data On

This check box allows the User to set up the system so that immediately upon entering acquisition mode, the .RAW data file is saved.

Select the **Save RAW Data On** check box to immediately save RAW data.

Link Video Saving

This check box allows the User to link the saving of video files with the saving of RAW data. When this option is selected, the **Record Video On** option is set and cannot be changed by the user. See the Ponemah Video Manual (MU00278) for details.

Record Video On

This check box allows the User to set up the system so that immediately upon entering acquisition mode, video data will be saved. See the PONEMAH Video Manual (MU00278) for details.

Replay Defaults

This section allows the defaults to be defined for when replay is begun. The User is able to select when data will be logged into the derivation files and how often data will be plotted on the Trend and Scatter graphs.
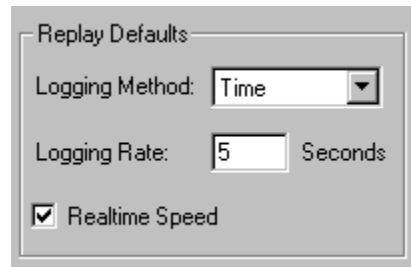
Replay Defaults

Logging Method

This combo box allows the User to select the logging method by selecting one of two options: Time or Epoch.

Time - this mode performs the logging period based on time (seconds).

Epoch - this mode performs the logging period based on the number of cycles (beat-to-beat) that occur.

Logging Rate

This edit field allows the User to enter a rate of how often data is plotted and logged into the files. The range is 1 - 99999.

Realtime Speed

This check box allows the User to replay a data set in real-time speed. If the check box is not enabled, then the system will replay the data as fast as the computer will allow.

To replay data in real-time speed, select the **Realtime Speed** check box.

Data Separator

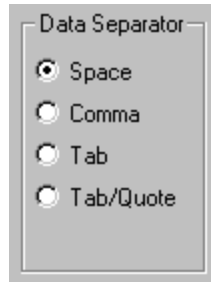This section allows the User to select a type of data separator, and therefore, customize how data is displayed in the derivation files. **Note:** The Data Separator has no effect on Excel output data.

The User may choose one of the following options:

Data Separator

Space

Selecting this radio button puts a space between data fields in the derivation files.

Comma

Selecting this radio button inserts a comma "," between data fields in the derivation files. This is useful for certain spreadsheet or statistical packages.

Tab

Selecting this radio button inserts an ASCII TAB characters between data fields in the derivation files. This is useful for certain spreadsheet or statistical packages.

Tab/Quote

Selecting this radio button inserts an ASCII TAB character between fields in the derivation files, except for the **Event ID** field. The **Event ID** field has quotation marks surrounding it. For example, if the **Event ID** field was to have a **c**, the system would display the character as "**c**".

Time Format

This section allows the User to specify which time formats to use in the derivation files. **Note:** The Time Format has no effect on the time that is used with Excel data.

The User may select one of the following options:
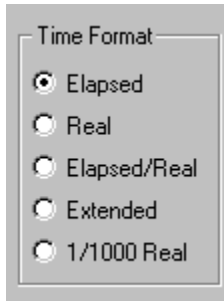
Time Format

Elapsed

Selecting this radio button will display the time in the following format:

hh:mm:ss

Upon entering acquisition mode, Elapsed Time will begin at 00:00:00. In replay mode, the time will be read from the .RAW file and reconstructed. The time will reset to 00:00:00 after twenty-four hours have elapsed.

Real

Selecting this radio button will display the time in the following format:

hh:mm:ss

Real Time is the clock time recorded from the computer's clock. Upon starting acquisition, the system reads the computer clock and then keeps track of Real Time from the A/D sample rate clock. In replay mode, the Real Time will be reconstructed from the .RAW file.

Elapsed/Real

Selecting this radio button will display the time in the following format:

hhhh:mm:ss hh:mm:ss mm/dd/yyyy

The Elapsed Time (see **Elapsed**) and the real time (see **Real**) are combined along with the current date. This format is recommended for long-term studies. **Note:** the elapsed time has four digits for hours (hhhh) and the year will be printed with four digits to be compliant with the year 2000.

Extended

Selecting this radio button will display the time in the following format:

hhhh:mm:ss

This format extends the hour of the Elapsed Time format to four digits. This is used for long-term studies.
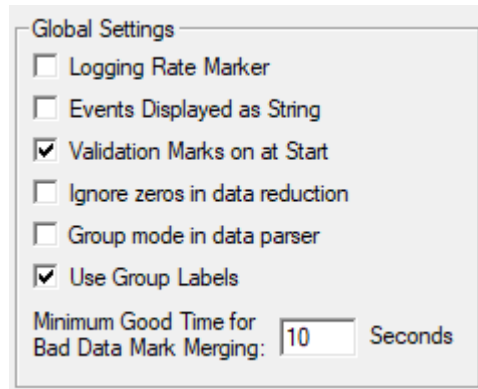
1/1000 Real

Selecting this radio button will display the time in the following format:

ssssssssssss.sss hh:hh:hh mm/dd/yyyy

This format combines the Elapsed Time (expressed in seconds with milli-second resolution), the Real Time, and current date. **Note:** The year will be printed with four digits to be compliant with the year 2000.

Global Settings

Global Settings

Logging Rate Marker

This check box allows a dashed line to be drawn on the **Primary** screen when a line of data is logged (available only if Logging Method is set to Time mode). This will aid in validating which cycles are in a particular logging period.

Events Displayed as String

This check box allows the system to display the complete Event message on the graph screen. If the check box is not checked, the system just displays a character on the graph screen.

Validation Marks on at Start

This check box allows the system to place validation marks on the Primary graph screens as soon as acquisition or replay starts.

Ignore zeros in data reduction

This check box allows data reduction to ignore zeros when running calculations. If this check box is enabled and data reduction is attempting to reduce all zeros, the result will be a zero. Control related calculations (Delta, %Delta, and %Chg) will report zeros if the reduced data are all zeros.

Group mode in data parser

This check box allows Data Parser to Group based. Rules may be established and applied to any or all groups. If this box is unchecked, Data Parser will apply the rules globally to all channels. This will affect how data is reported by Group in the Data Reduction output.

Use Group Labels

This check box allows the **Name** from the Groups setup uses these names in the title of each Derived Data and Data Reduction window instead of just being labeled by the group letter. This also applies to the Excel file that is created. Each group sheet in Excel will use the Name.

Minimum Good Time

The **Minimum Good Time for Bad Data Mark Merge** defines the upper limit of the time interval between bad data marks to determine if the bad data marks sections should be marked as a single section or marked separately. The default time is 10 seconds. This will affect how data is reported by Group in the Derived Data and Data Reduction outputs.

Remote Connection

The Remote Connection allows Ponemah and an external application to communicate in order to pass data from one program to the other. An example of this would be to allow beat data from Ponemah to be read into an external application for a feedback control mechanism.

Communication is through a TCP/IP socket and the default IP Address is localhost. Localhost indicates that both applications reside on the same PC. However, two networked PCs are also a valid configuration. Once the connection has been established, Ponemah will pass data to the external application and accept events into Ponemah from the external application.
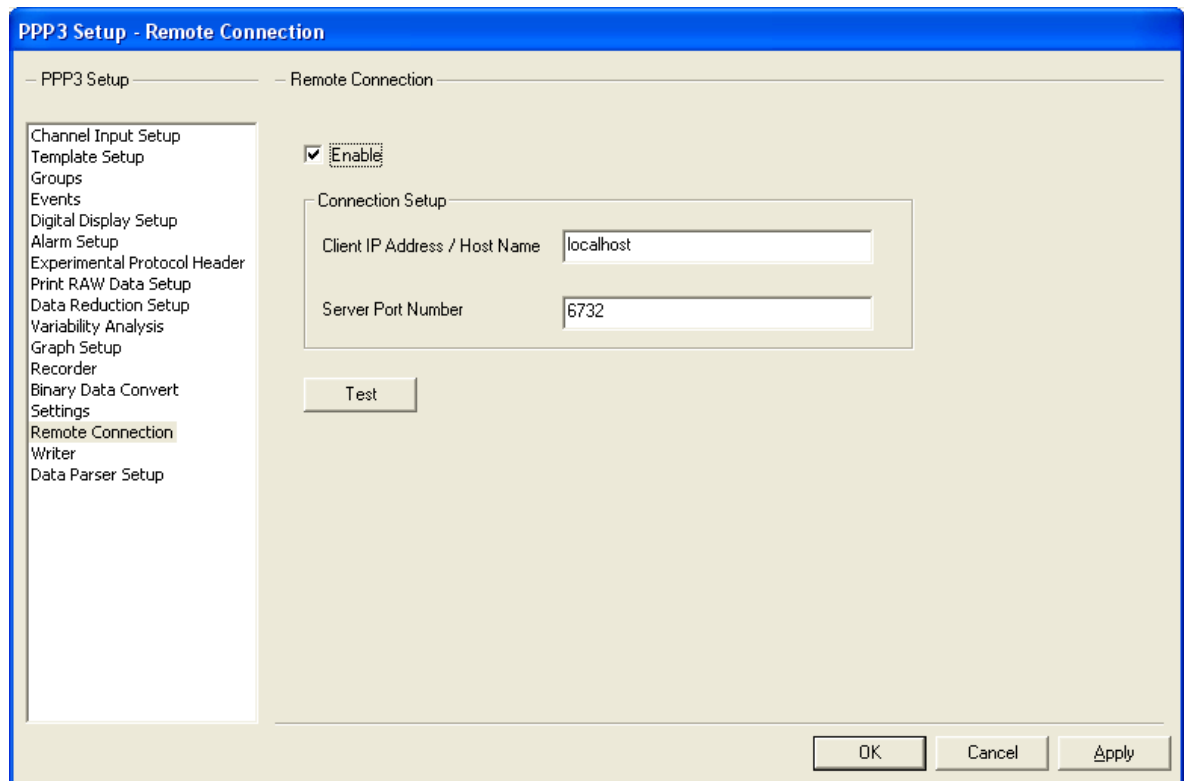
SEND

For information on SEND setup, refer to the SEND User Guide.

Data Parser Setup

For information on **Data Parser** setup, refer to the **Review Manual**.

Auto Configure Protocol

Auto Configure Protocol is used to quickly define the necessary protocol settings required to start an acquisition. When this menu option is selected, Ponemah will automatically define certain protocol settings based on User defined entries configured within the acquisition interfaces' Hardware configuration dialogs, eliminating the need to redefine settings manually.

Acquisition interfaces that support this feature:

- PhysioTel or PhysioTel Digital
- JET

NOTE:	**Auto Configure Protocol does not support hardwired signals collected through ACQ7700 and ACQ16 hardware interfaces. ACQ7700-MX2/CLC and ACQ16-MX2/CLC synch systems are also not supported.**
	Auto Configure Protocol provides limited support for Channel Mapping for the JET acquisition interface, only allowing users to disable channels. Reordering of channels is not supported by Auto Configure Protocol, nor is Channel Mapping with any other acquisition interface.

PhysioTel Digital

When PhysioTel Digital is selected as the acquisition interface, Auto Configure Protocol can be selected once implants have been selected for the acquisition within the Hardware – Select Implants dialog. The order implants are listed in the Selected Implants list will be the order the implants are listed in the Channel Input Setup and Groups.

PhysioTel Digital protocol settings automatically configured when selecting Auto Configure Protocol:

- **P3 Setup - Channel Input Setup**
    - o **Analysis Modules** are defined by the signal type defined in the PhysioTel Digital Configuration – Channel Details dialog.
    - o **Units** are defined by the units associated with the implant channel.
    - o **Labels** are defined by the signal type defined in the PhysioTel Digital Configuration – Channel Details dialog and incremented appropriately; i.e. Pressure1, Pressure2, etc.
    - o **Groups** are defined per implant serial number. All channels from the same implant will have the same group letter.
    - o **Ambient Pressure** from the E2S-1/APR-1 will be defined to the last channel of the Channel Input Setup and included as part of the last group. The analysis module will be enabled and correctly set to BARO for PhysioTel Digital acquisitions.
- **P3 Setup - Groups**

- o **Group Name** will be defined to the Implant Name entered in the PhysioTel Digital Configuration – Implant Details dialog.

- **P3 Setup - Graph Setup**

  - o **Primary Graph Pages** will be enabled and configured per group, up to 8 groups. If more than 8 groups exist (more than 8 implants are selected in the Select Implants dialog), the primary graph will be configured to display two groups per page.

  - o **Graph Title** will be defined to the group name; i.e. Group A. If more than 8 implants are selected in the Select Implants dialog, the title will list each group displayed in the graph; i.e. Group A and B.

  - o **Input Channel** will be enabled for ECG, BP, LVP, ACT, and Temp channels.

  - o **Labels** are defined to the Channel Input Setup Label.

  - o **Units** are defined to the Channel Input Setup Units.

  - o **High/Low spans** are defined to the Upper and Lower Ranges selected in the PhysioTel Digital configuration – Channel Details dialog.

- **Acquisition - A/D Sample Rates**

  - o **Primary Rates** are defined to 500 Hz.

  - o **Secondary Rates** are defined to 10 Hz

NOTE: **If L00 implants are the only implant in the system, the Primary sample rate will default to 10 Hz**

- **Analysis Modules – BP, LVP**

  - o **BP** – Barometric adjust checkbox is correctly unchecked for PhysioTel Digital pressure signals.

  - o **LVP** - Barometric adjust checkbox is correctly unchecked for PhysioTel Digital pressure signals.

MX2

When MX2 is selected as the acquisition interface, Auto Configure Protocol can be selected once sources have been selected for the acquisition within the Hardware – Select DSI Sources dialog. The order implants are listed in the Select DSI Sources – Selected Sources list will be the order the sources are listed in the Channel Input Setup and Groups.

- **P3 Setup - Channel Input Setup**

  - o **Analysis Modules** are defined by the signal type defined in the MX2 Configuration – Signal Properties dialog.

  - o **Units** are defined by the units associated with the signal type.

- o **Labels** are defined by the signal type selected in the MX2 Configuration – Channel Settings dialog and are incremented appropriately; i.e. Pressure1, Pressure2, etc.

  - o **Groups** are defined per transmitter serial number. All channels from the same transmitter will have the same group letter.

  - o **Ambient Pressure** from the APR-1 will be defined to the last channel of the Channel Input Setup and included as part of the last group. The analysis module will be enabled and correctly set to BARO for MX2 acquisitions.

- **P3 Setup - Groups**

  - o **Group Name** will be defined to the Animal ID entered in the MX2 Configuration.

- **P3 Setup - Graph Setup**

  - o **Primary Graph Pages** will be enabled and configured per group, up to 8 groups. If more than 8 groups exist (more than 8 transmitters are selected in the Select DSI Sources dialog), the primary graph will be configured to display two groups per page.

  - o **Graph Title** will be defined to the group name; i.e. Group A. If more than 8 transmitters are selected in the Select DSI Sources dialog, the title will list each group displayed in the graph; i.e. Group A and B.

  - o **Input Channel** will be enabled for ECG, EMG, BP, BPR, LVP, PVO, ACT, and Temp channels.

  - o **Labels** are defined to the Channel Input Setup Label.

  - o **Units** are defined to the Channel Input Setup Units.

  - o **High/Low spans** are defined to the Upper and Lower Ranges selected in the telemtery configuration.

- **Acquisition - A/D Sample Rates**

  - o **Primary Rates** are defined to 1000 Hz.

  - o **Secondary Rates** are defined to 10 Hz

- **Analysis Modules – BP, LVP**

  - o **BP** – Barometric adjust checkbox is correctly unchecked for telemetry pressure signals.

  - o **LVP** - Barometric adjust checkbox is correctly unchecked for telemetry pressure signals.

JET

When JET is selected as the acquisition interface, Auto Configure Protocol can be selected once sources have been selected for the acquisition within the Hardware – JET Device Configuration dialog. The order devices are listed in the Active JET Devices list will be the order the devices are listed in the Channel Input Setup and Groups.

JET protocol settings automatically configured when selecting Auto Configure Protocol:

- **P3 Setup - Channel Input Setup**
  - **Analysis Modules** are defined by the signal type associated with the Device Type and its connected lead set; i.e. 3ETA-ECG-BP
  - **Units** are defined by the units associated with the signal type.
  - **Labels** are defined as the last two digits of the Device ID and the signal type associated with the Device Type and its connected lead set.
  - **Groups** are defined per Device ID. All channels from the same device will have the same group letter.
  - **Ambient Pressure** from the E2S-1/APR-1 will be defined to the last channel of the Channel Input Setup and included as part of the last group. The analysis module will be enabled and correctly set to BARO for JET acquisitions.
- **P3 Setup - Graph Setup**
  - **Primary Graph Pages** will be enabled and configured per group, up to 8 groups. If more than 8 groups exist (more than 8 transmitters are active in the JET Device Configuration dialog), the primary graph will be configured to display two groups per page.
  - **Graph Title** will be defined to the group name; i.e. Group A. If more than 8 devices are active in the JET Device Configuration dialog, the title will list each group displayed in the graph; i.e. Group A-B.
  - **Input Channel** will be enabled for ECG/Lead-II, BP, PAF, ACT, and Temp channels.
  - **Labels** are defined to the Channel Input Setup Label.
  - **Units** are defined to the Channel Input Setup Units.
  - **High/Low spans** are defined to the Upper and Lower Ranges from the JET configuration.
- **Acquisition - A/D Sample Rates**
  - **Primary Rates** are defined to 500 Hz.
  - **Secondary Rates** are defined to 50 Hz
- **Analysis Modules – BP, PAF**
  - **BP** – Barometric adjust checkbox is correctly checked for JET pressure signals.
  - **PAF** - Chest Channel
    - Primary Signal is set to Vol-Rip-chest
    - Calculated Flow Units is set to L/min
    - Abdomen Channel Index is set to PAF Abdomen Channel
  - **PAF** – Abdomen Channel
    - Primary Signal is set to Volume
    - Calculated Flow Units is set to L/min

Data Storage Scheduler

Data Storage Scheduler is used to automate the control of saving RAW and derived data during an acquisition. The scheduled times will be based off of real clock time, which the time can be set in normal clock time or by an offset from the starting point. Data Storage Scheduler is beneficial for automating the acquisition process over extended periods of time.

The **Data Storage Scheduler** dialog contains two tab controls that allow the User to choose how the date/time format will be viewed. The **Actual Times** will display the dates and times as real Calendar dates and times. The **Offset Times** will display the dates and times as the number of days plus a time offset from the Experiment Start date and time. The User can switch between **Offset Time** and **Actual Time** as desired. When the User enters an Experiment Start date and time, in either tab, the Offset and the Actual Time values are preserved.

Actual Times

This tab allows the User to set the acquisition cycle times within an experiment according to real (absolute) calendar dates and clock times.

Setup Scheduler - Actual Times Dialog

Offset Times

This tab allows the User to set the acquisition cycle times within an experiment using offset times. The Experiment Start date (first cycle) will be defined as "0". Additional cycles will be displayed as an offset from the Experiment Start date.
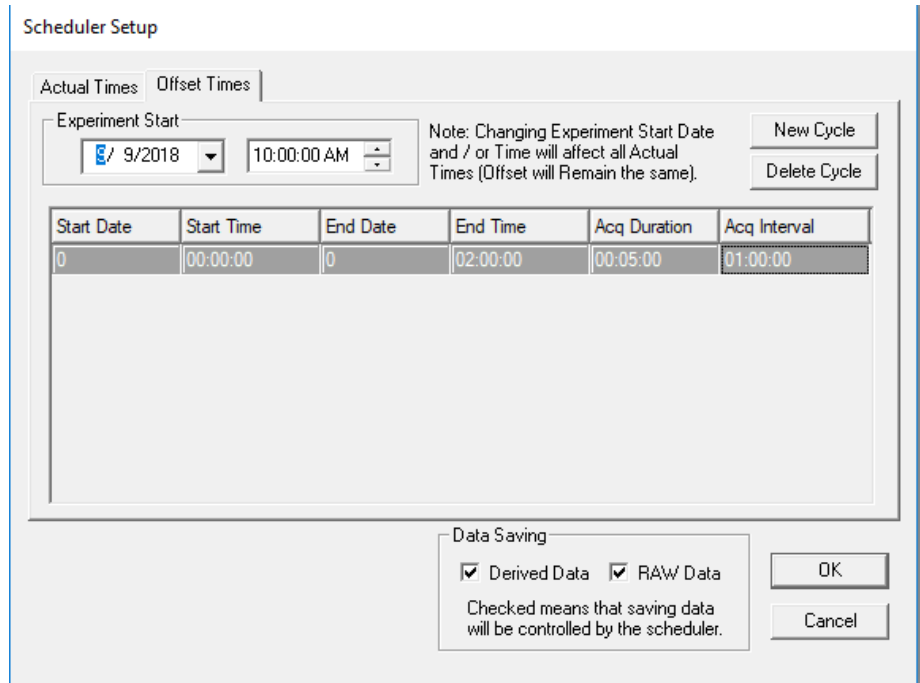
Data Storage Scheduler - Offset Times Dialog

Experiment Start

This section allows the User to specify the starting point of the experiment and when Data Storage Scheduler will begin. The User is able to specify the Calendar date (mm/dd/yyyy) and the time (real time, expressed as hh:mm:ss) from which the experiment will begin.
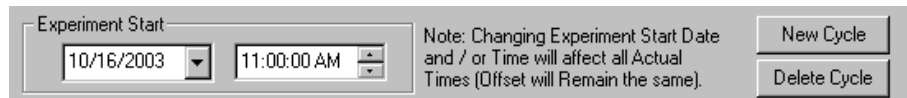
Experiment Start

New Cycle

This button allows the User to add a new Scheduler Cycle to the Cycle Grid. After adding a new cycle, the User may click on the appropriate cell in the cycle to edit cycle information.

To add a cycle, click on the **New Cycle** button. The Cycle Grid will automatically update with a new Scheduler Cycle.

Delete Cycle

This button allows the User to delete a Scheduler Cycle from the Cycle Grid.

To delete a cycle, click on the appropriate row to highlight the cycle to be deleted in the Cycle Grid and click the **Delete Cycle** button.

Cycle Grid

Start Date	Start Time	End Date	End Time	Acq Duration	Acq Interval
10/16/03	11:00:00 AM	10/16/03	12:00:00 PM	00:05:00	01:00:00
10/17/03	12:00:00 PM	10/16/03	01:00:00 PM	00:05:00	01:00:00

Cycle Grid Entries

The Cycle Grid lists all of the currently defined Scheduler Cycles; the cycles listed will be run when the Data Scheduler is started. Within the grid, the User is able to further define the Events of the Scheduler Cycle by clicking on the cell to be modified. The User may define the **Start Date/Start Day(s)**, **Start Time**, **End Date/End Day(s)**, **End Time**, **Acquisition Duration**, and **Acquisition Interval**.

> **Note:** Times are entered in the following format: hh:mm:ss.

> **Note:** The User can only modify **Start Date** and **Start Time** for subsequent cycles defined after the Experiment Start in the Cycle Grid(i.e. **Start Date** and **Start Time** cannot be modified for the first cycle entered).

Start Date/Start Day(s) - This column allows the User to define the beginning date of the cycle. If setting up in the **Actual Times** tab, then the "Start Date" will be displayed as a real calendar date. If setting up in the **Offset Times** tab, then the "Start Day(s)" will be an integer representing the offset days from the Experiment Start date.

Start Time - This column allows the User to define the beginning time of the cycle. If setting up in the **Actual Times** tab, the "Start Time" will be displayed as the real time (hh:mm:ss). If setting up in the **Offset Times** tab, this will be a time representing the offset time from the Experiment Start date and time.

End Date/End Day(s) - This column allows the User to define the ending date of the cycle. If setting up in **Actual Times** tab, the "End Date" will be displayed as a real calendar date. If setting up in the **Offset Times** tab, the "End Day(s)" will be an integer representing the offset days from the Experiment Start date.

End Time - This column allows the User to define the ending time of the cycle. If setting up in the **Actual Times** tab, the "End Time" will be displayed as the real time (hh:mm:ss). If setting up in the **Offset Times** tab, this will be a time representing the offset time from the Experiment start date and time.

Acq Duration - This column allows the User to define the segment of time in which the system will save data. **Note:** This time must be less than the **Acquisition Interval**.

Acq Interval - This column allows the User to define how often the cycle will be repeated. **Note:** The interval between acquisitions must be longer than the duration of each acquisition.

Data Saving

This section allows the User to specify which data (RAW and/or derived) will be saved during the Acquisition Duration periods of the Scheduler Cycle(s). If these options are not enabled, the User can control the saving of the RAW data using the **Save RAW Data** toggle button available while on-line (refer to **Save RAW Data**

under On-Line Screen and Functions section of this manual). The derived data will always be saved if this check box is not enabled.
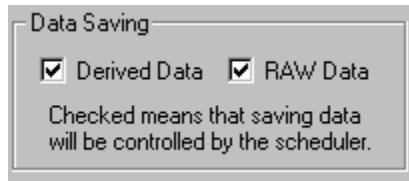
Data Saving

Derived Data

When this check box is enabled, the derived data will be saved in the .Excel file during the Acquisition Duration portions defined in the Scheduler Cycle. However, the on-line DRx list views will display all logging periods and update the Trend and Scatter graphs. All derived data will be saved if this check box is not enabled.

RAW Data

When this check box is enabled, the RAW Data will be saved in the .RAW file only during the Acquisition Duration portions defined in the Scheduler Cycle. If this check box is not enabled, then Data Storage Scheduler does not control the saving of RAW data.

Guidelines for Setting Up Data Storage Scheduler

Experiment Start

The **Experiment Start** is the point at which Data Storage Scheduler will begin executing its first cycle during a continuous acquisition. This may be the first cycle of a multi-cycle Scheduler program or the only cycle defined in the Scheduler program.

1) To define the Experiment Start date, click on the date combo box (in the **Experiment Start** section) and select the appropriate date from the **Calendar** dialog.

2) To select the Experiment Start time, use the arrow keys on the time combo box to define the desired time.

3) Upon defining the Experiment Start date and time, click on the **New Cycle** button to enter the cycle into the Cycle Grid.

4) Click on the **New Cycle** button to add additional cycles to the Cycle Grid (if desired).

5) Click on the field in the Cycle Grid to be entered/modified. (**Start Day(s)/Start Date**, **Start Time**, **End Day(s)/End Date**, **End Time**, **Acq Duration**, and **Acq Interval**) and make the appropriate modifications to the field to set up a User-defined Scheduler program.

   Note: The **Start Day(s)/Start Date** and **Start Time** for the first cycle are always the same as the Experiment Start date and time and cannot be modified from the Cycle Grid; modifications must be done in the **Experiment Start** section.

Defining a Scheduler Program

After entering the first cycle, (Experiment Start), the User has the option to add additional cycles to the Scheduler program. Additional cycles would allow the User to vary the **Acquisition Duration** and **Acquisition Intervals** over extended periods of acquiring data. For example (see Cycle Grid below), the User can set up the first cycle to save RAW and derived data for 10 minutes (Acquisition Duration) every 1 hour (Acquisition Interval) between the times of 12:00am (Experiment Start time) and 3:00pm (End Time). Later that day, the User may decide that it is not necessary to save the RAW and derived data as often, so the User sets up a second cycle to vary the **Acquisition Duration** and **Acquisition Interval** periods. The second cycle is set up so that between the times of 3:00pm and 11:00pm data is saved for 5 minutes (Acquisition Duration) every 2 hours (Acquisition Interval).

Cycle Grid (example)

For more information on starting an acquisition, refer to **Start Acquisition** in the Menu section of the manual. For information regarding the status of a Scheduler program during acquisition, refer to **Scheduler Status** in the On-Line Screen and Functions section of this manual.

Review Print Setup

For information regarding Review Setup, refer to the **Data Review Option Manual**.

Study

For information on the **Study** setup, refer to the **Study Options Manual**.

Hardware

The **Hardware** menu allows the user to access the specific acquisition hardware based dialogs, including the channel configuration and video configuration. For specific acquisition interface hardware menu options, refer to the separate acquisition interface manuals for details.

When a calibration is performed, the system takes the electronic signal that is the raw analog input signal from the input channel and assigns it a value. This is how the computer knows how to interpret the electronic signals from the input channel (voltage) to whatever the User's experiment is measuring (such as mmHg for blood pressure). For example, if the system receives a 1V signal from a channel measuring blood pressure, the calibration would have given the system enough information to know that this is 100mmHg for this experiment (on another experiment 1V could indicate 150mmHg).

Perform a calibration before performing an acquisition. If the User changes any settings, perform a calibration again.

Note: **Depending on the attached hardware, this menu will contain different menu items and dialogs, or the menu may not exist. Please refer to the specific hardware manual for complete information.**

Warning: **If calibrations are not performed, Gain and Offset errors will occur.**

The calibration information will be placed at the beginning of the .RAW file and in the protocol file. All calibrations are calculated to the highest precision internally, and the output is rounded to the precision level set in the calibration fields.
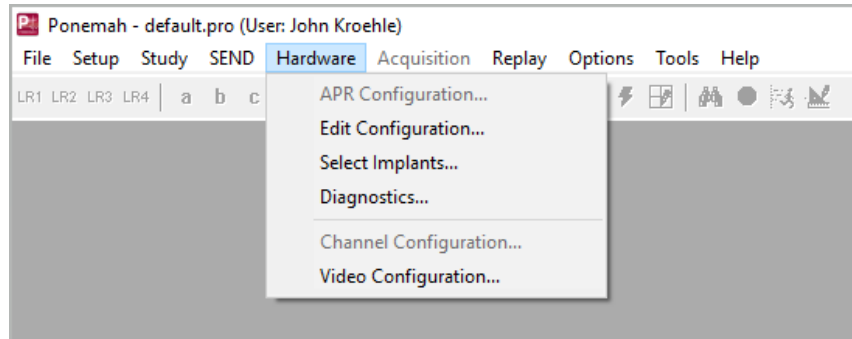
Hardware Menu

Channel Configuration

The Channel Configuration allows the user to change the order of channels. This is useful when a data synchronization between telemetry and a USB acquisition device (Data Sync) hardware option is selected. The user will be able to remap channels so that all data acquired from the same animal from both acquisition devices will be next to each other. By default the 7700 based amplifiers will be listed prior to any sources that have been configured. It is recommended to configure all sources prior to making any modifications to using this feature.
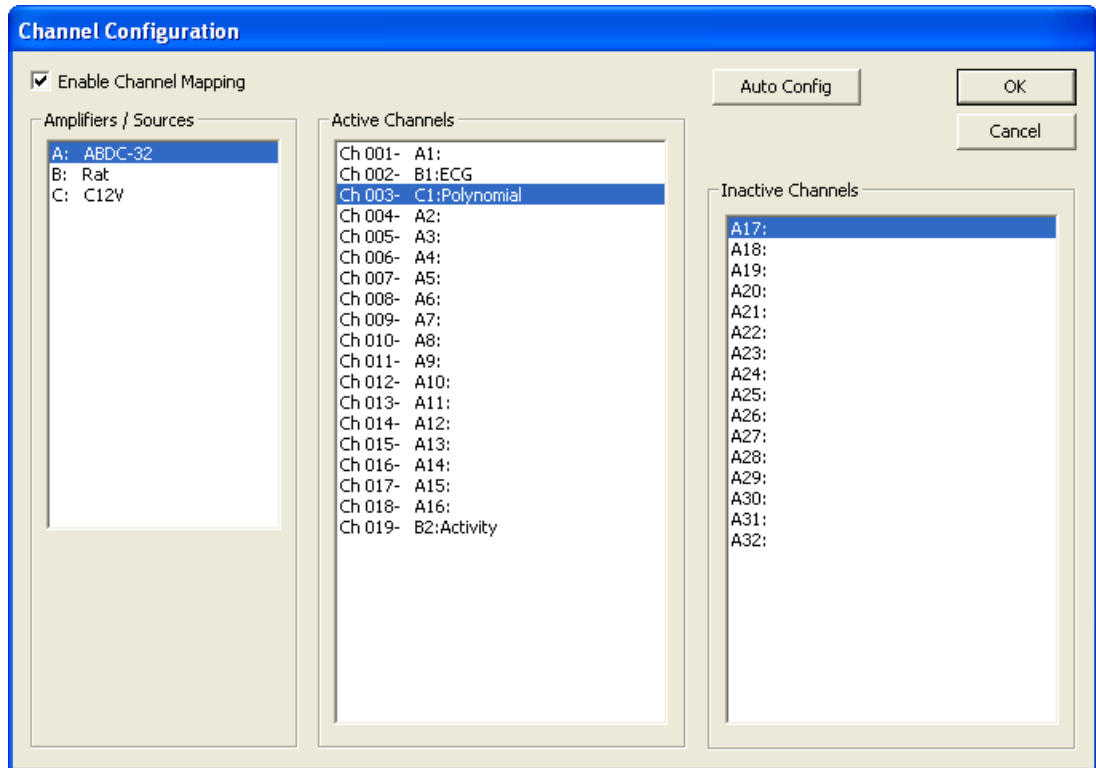
The configuration that is set up in the **Active Channels** list will be used throughout Ponemah. The user must still enable the channels to be acquired in the **PPP3 Setup** dialog under the **Channel Input Setup** configuration.

Note: **Changing the channel configuration is just like changing the hardware. If this information is modified the user will need to reconfigure other settings like graphs and sample rates.**

Enable Channel Mapping

The **Enable Channel Mapping** check box enables/disables the use of the channel mapping feature.

Amplifiers/Sources

The **Amplifiers/Sources** section lists all of the available amplifiers and sources that are currently found. When a Data Sync option is selected, it will be the 7700 based amplifiers and sources configured through MX2, for example. Other configurations exist based on sync hardware selected.

Active Channels

The **Active Channels** list shows the channels that Ponemah will be acquiring. The user can move the active channels around within the list. The channels can also be moved over to the **Inactive Channels** if there is no need to have them acquired. A multi-select option is available so the user can drag and drop multiple channels.

Inactive Channels

The **Inactive Channels** list shows the channels that Ponemah will not be acquiring. The order of the channels is not important. The user can drag and drop any inactive channel to the **Active Channels** list to acquire those channels.

Auto Config

The **Auto Config** button allows the user to auto configure the channels. This will reorder the channels in their original hardware configuration in the **Active Channels** list. All channels in the **Inactive Channels** list will move to the **Active Channels** list.

Video Configuration

See the Video Manual (MU00278) for details.

Acquisition

The Acquisition menu allows the User to start the acquisition and analysis of data. How the system will acquire and analyze the data is defined through the **Setup** menu and saved in the protocol file.

Once the acquisition starts, the User can use any of the On-Line Screens and Functions to control the Acquisition process.

Warning: **When running an acquisition, the User should not have the system standby timer set; otherwise, when the system goes into standby mode, acquisition will be stopped.**
Note: Standby mode does not affect replaying of data.

```
A/D Sample Rate...
Data Set Name...
Start Acquisition
Start Acquisition Scheduler
```
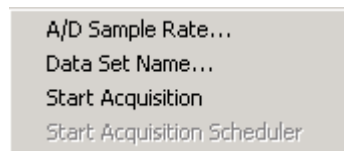
Acquisition menu

In the bar at the bottom of the screen are ET, DT, DS, Data Set, Save ON/Save OFF, Acquisition Status Flag, and the RAW file name. These are all active during Acquisition mode. Some are active in Replay mode.

- **ET** is the Elapsed Time (hours, minutes, seconds). The elapsed time starts at 0 when the system starts acquiring data. When replaying data, the elapsed time will be the elapsed time of the raw data.

- **DT** is the Disk Time (days, hours or hours, minutes). This is the estimated amount of time before the disk becomes full and automatic shut down occurs. This is an approximate value because of the different configurations of the derived data files and the different logging rates that can be selected while analyzing data.

- **DS** is the Disk Space remaining (GB or MB). It displays the amount of free disk space remaining on the hard drive. This is useful in determining if the experiment is going to be able to be saved on the system. If there is 160 Mbytes

or less of free disk space, the acquisition will not start. If after acquisition starts, the free disk space falls below 160 Mbytes, the acquisition will stop, and an entry will be made in the .LOG file.

- **Data Set** is the filename (not the extension) of all files used or created during acquisition or replay (except the protocol file).

- **Save ON/Save OFF** shows whether or not the raw data is being saved. (Derived data is always saved unless the Scheduler is controlling the saving of derived data). This is not shown in Replay mode.

- **RAW file name** shows the name of the file that the User are acquiring.

A/D Sample Rate

The A/D Sample Rate dialog allows the User to set the sampling rate for each analog input channel. This is the rate that data will be entered into the .RAW data file.

The .RAW file only saves data from enabled channels. This reduces the amount of disk storage space an experiment requires. For example, if there are eight input channels on the User's system, but the analysis only requires four input channels, the amount of data storage that is available will be doubled if the User disables the four unnecessary channels.

The storage space can also be increased by using different sample rates for different channels. For example, a temperature channel may not need to be sampled at the same rate as an ECG channel.

If the User disables a channel, the channel will not be sampled, and the raw analog format of the signal will not be saved to the file.

Warning: If one channel relies on another channel's input they must be sampled at the same rate. For example, the pulmonary compliance resistance and the pulmonary pressure channels must be sampled at the same rate for compliance and resistance calculations.

The system has different sampling rate dialogs depending on the type of A/D input to the system. The one listed below is for the, , ACQ16 USB, ACQ7700 USB, JET, ACQ16 USB-MX2/CLC, and ACQ7700 USB-MX2/CLC hardware interfaces.
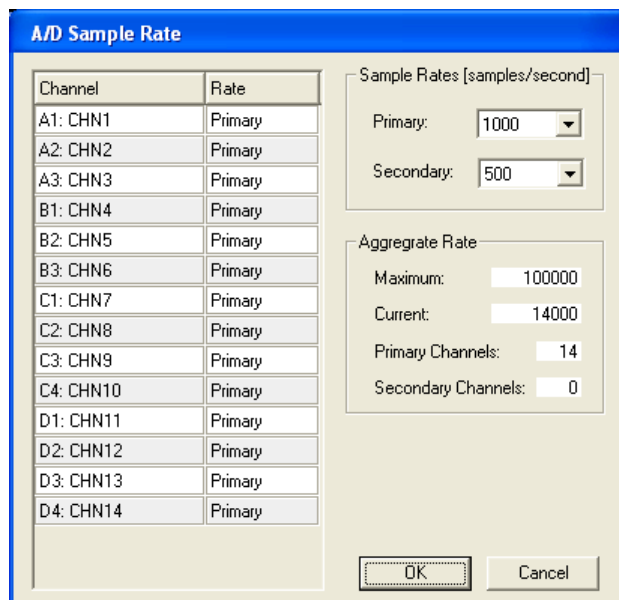
A/D Sample Rate dialog

Select the Primary Sample Rate from the drop-down list. The fastest rate is 10000Hz. The other channels can be set to this primary rate or the secondary rate.

To have an Input assigned to one of the specific rates, select it from the drop down list box next to the channel.

Also listed is an Aggregate Rate section which lists the maximum available aggregate rate, the current aggregate based on the selections, and how many primary and secondary channels are configured.

Data Set Name

This window sets the filename, but not the extension, of all files (except protocol files) used and/or created during acquisition. Some files, such as derivation files, are created each time an acquisition or replay is done. To prevent old files from being overwritten, use a different Data Set Name.
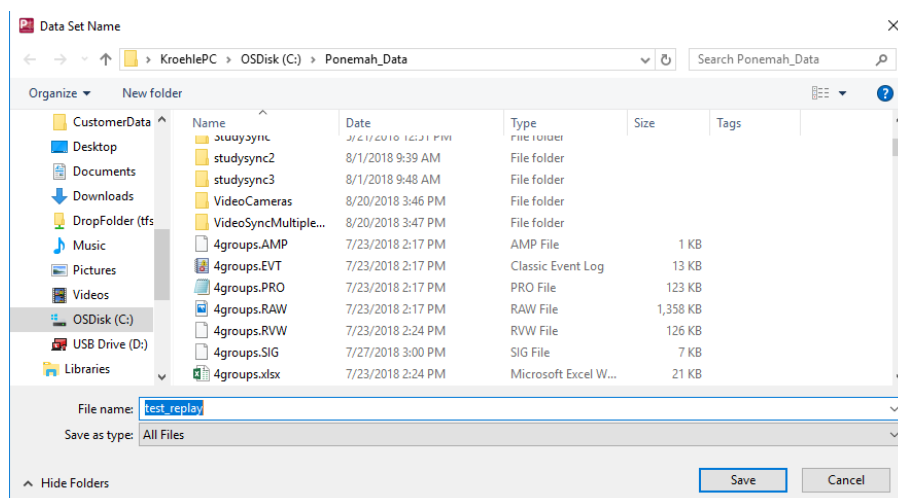

Data Set Name dialog

NOTE: **The Data Set Name will be entered automatically in a Study system by selecting an entry from the Animal Select dialog.**

Start Acquisition

Start Acquisition begins the Acquisition process. See the **On-Line Screens and Functions** section for detailed information on keystrokes and functions that can be performed while collecting and analyzing data.

If a data set already exists, the following warning message will appear:
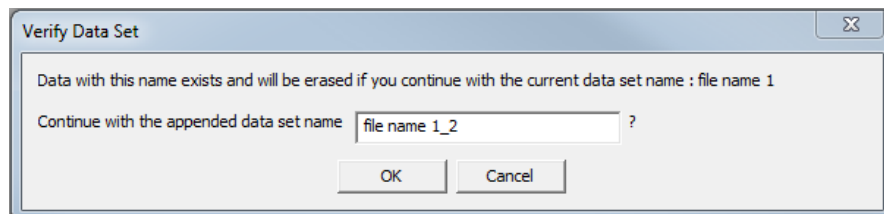
Warning Message

- **No** returns the User to the main window.

- **Yes** causes the existing data files with that filename to be overwritten, and new files with this filename to be created during acquisition.

Start Acquisition Scheduler

Start Acquisition Scheduler begins the Acquisition process with a schedule for unattended data collection and analysis. The data saved to the disk depends on the scheduler setup. Data Storage Scheduler must be configured before the Start Acquisition Scheduler menu selection will become enabled.

See the **On-Line Screens and Functions** section for detailed information on keystrokes and functions that can be performed while collecting and analyzing data.

If a data set already exists, a warning message will appear as shown above in **Start Acquisition**.

When entering the **Start Acquisition Scheduler**, the system will display a dialog box that displays the current number of seconds in the real time clock. This allows the system to synchronize the elapsed time clock and the real time clock so that the seconds in the both times start at 0.

Replay

Replay allows the User to replay saved raw data or re-create derived data. When replaying data, the User can select different derived parameters than originally selected during acquisition and re-calculate data.
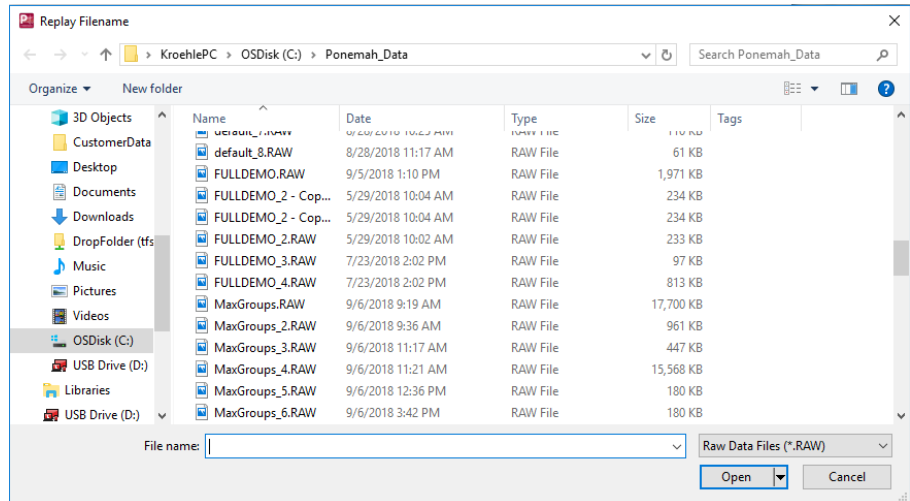
Old derived data files will be overwritten if the same Data Set Name is used.
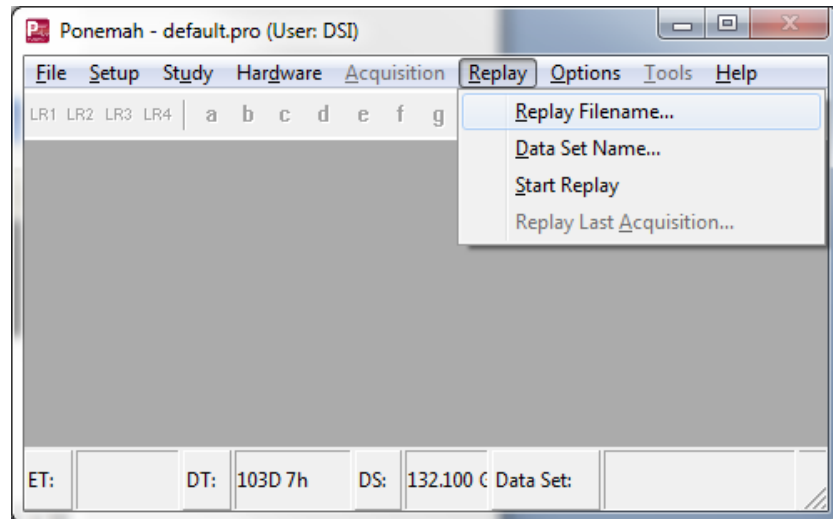

Replay Menu

Replay Filename

To replay data, select the protocol that has the desired settings. Next choose the .RAW file from the **Replay Filename** dialog.

Replay Filename Dialog

If an Event file (.EVT) does not exist for this data set, the following warning message will be displayed. Replay mode can be entered if the .EVT file does not exist. The User will still be able to use the function **Jump** to jump by time but not by Event.
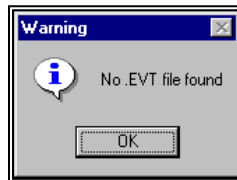
Event File Warning

Data Set Name

This window sets the file name, but not the extension, of all files created during replay (except the protocol file).
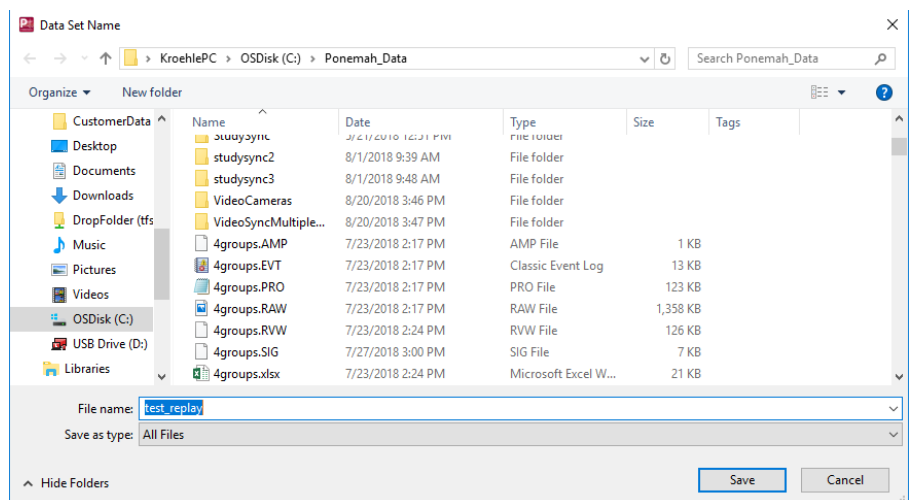
ata Set Name Dialog

As a default, **test_replay** will be used for the derived Data Set Name.

Start Replay

**Start Replay** starts the replay process. Once this mode is entered, the system will start replaying and analyzing the data from the selected **.RAW** file.

If the same **Data Set Name** already exists (either Replay or Acquisition), the system will prompt the User with a dialog that automatically increments the file name to avoid accidentally overwriting files. The User may modify the name in the dialog and overwrite the existing file if desired or specify a completely new name.

The file will be appended with "_x" where x is the next numerical value. This will keep appending until 9999.
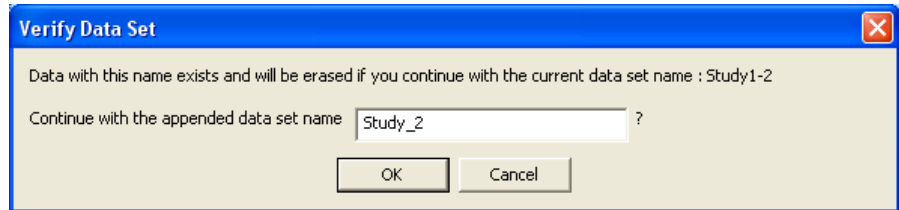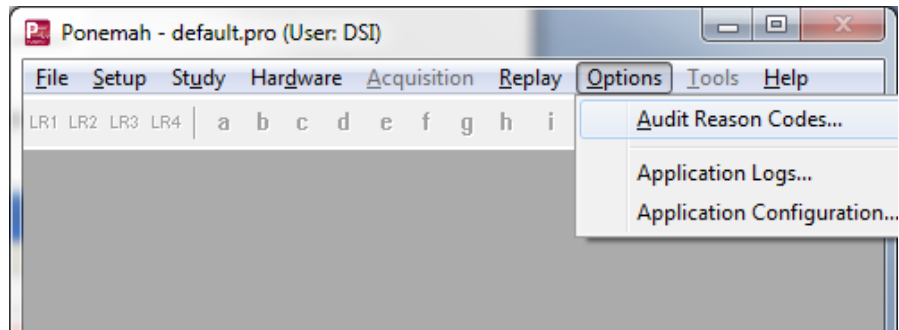

Overwrite File Warning

Replay Last Acquisition

If an acquisition has been performed, the system can replay the last acquired data without selecting the file by using this menu entry.

Options

Selecting the **Options** menu will display a dialog that allows the User to configure Audit Reason Codes, view Application Logs, and change the Application Configuration.

Options Menu

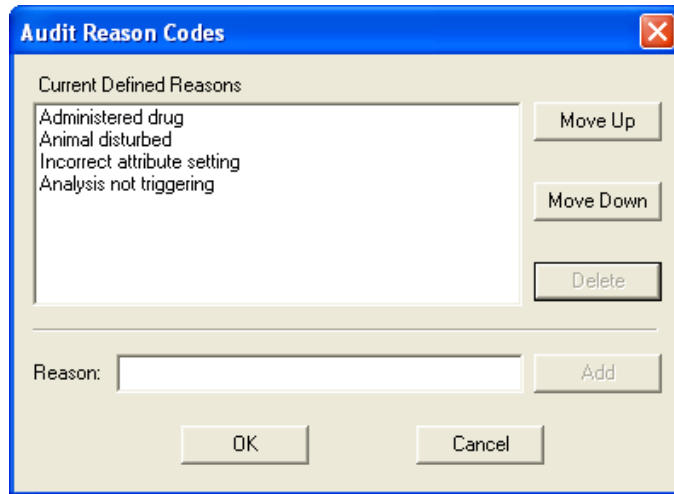## Audit Reason Codes

The User has the ability to pre-define audit reason codes that may later be used during acquisition or replay modes to indicate reasons for making a change to the data. When an Audit Reason Code is executed, then the system will log this information in the LOG sheet for the experiment.

To define an audit reason code, enter text into the dialog and click on the **Add** button.

The User can also move the defined reasons up and down if needed by using the **Move Up** and **Move Down** buttons.

Audit Reason Codes Dialog

*Audit Reason Codes are available for Users who must comply with FDA's Good Laboratory Practices (GLP) and 21 CFR Part 11 requirements.

Application Logs
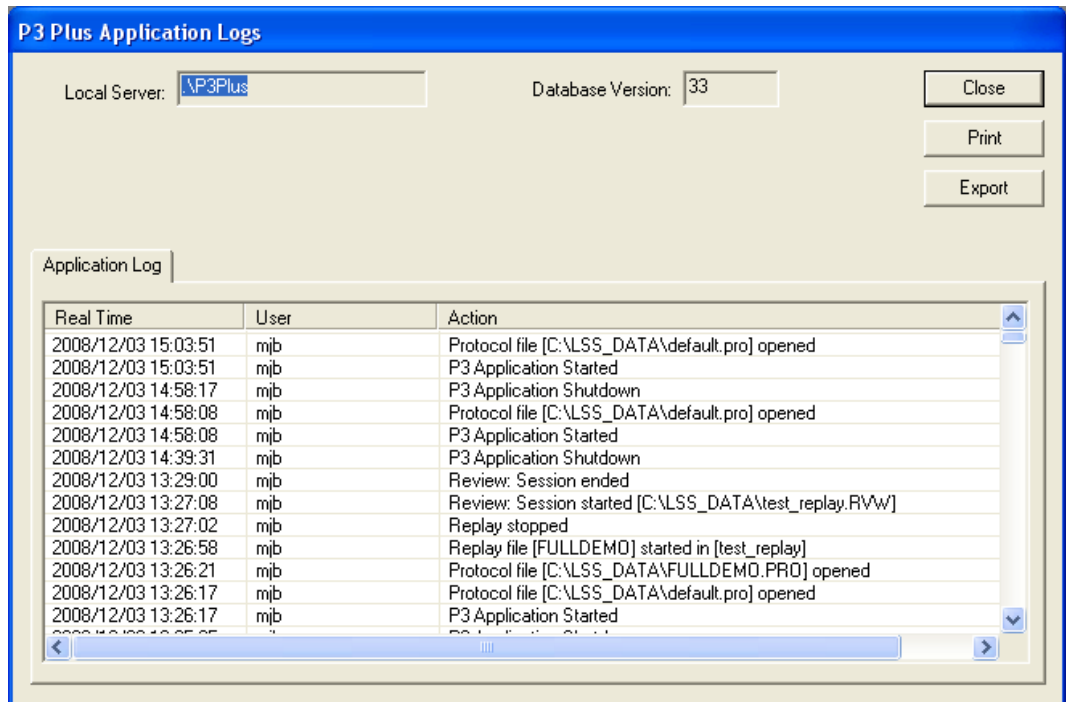
Ponemah Application Logs Dialog

The application logs dialog lists the local server being used, the database version, and the application log information. This information shows all of the functions that have been performed.

The user can also click on the **Print** button to print the current application log information.

The user may also export a record to Excel based on a user defined date range.

Export - Select Data Range

Application Configuration

The application configuration dialog allows the modification of the acquisition interface, data paths, miscellaneous information, review information, Animal ID and advanced settings.
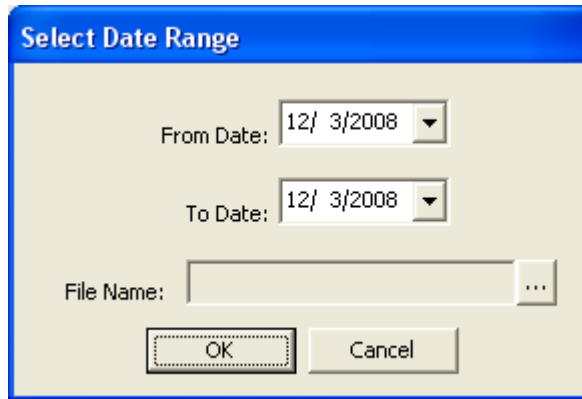
Acquisition Interface
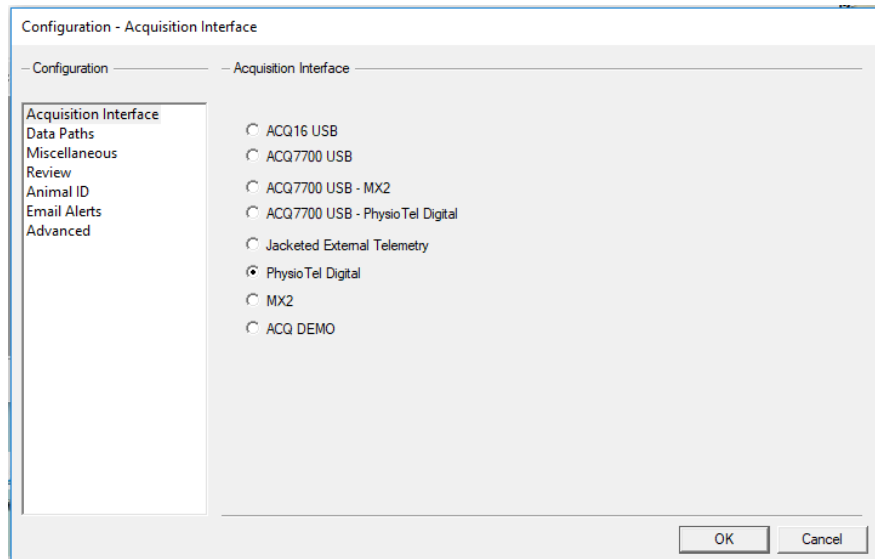
Acquisition Interface Configuration

The **Acquisition Interface** configuration allows the setup of the type of hardware that is connected to the computer. The available selections are **ACQ16 USB, ACQ7700 USB, PhysioTel Digital, Jacketed External Telemetry,   ACQ16 USB-MX2/PhysioTel Digital, ACQ7700 USB-MX2/PhysioTewl Digial and ACQ-Demo**

.

The selections **ACQ16 USB-MX2/PhysioTel Digital** and **ACQ7700 USB-MX2/PhysioTel Digital** allow the user to acquire from both the DSI telemetry and either of the USB devices simultaneously. This requires both sets of hardware, a Measurement Computing card , and synchronization cable. This will allow the user to acquire from both sets of hardware to within 10 milliseconds.

If any settings are changed on this tab, a restart of Ponemah will be needed.

Data Paths
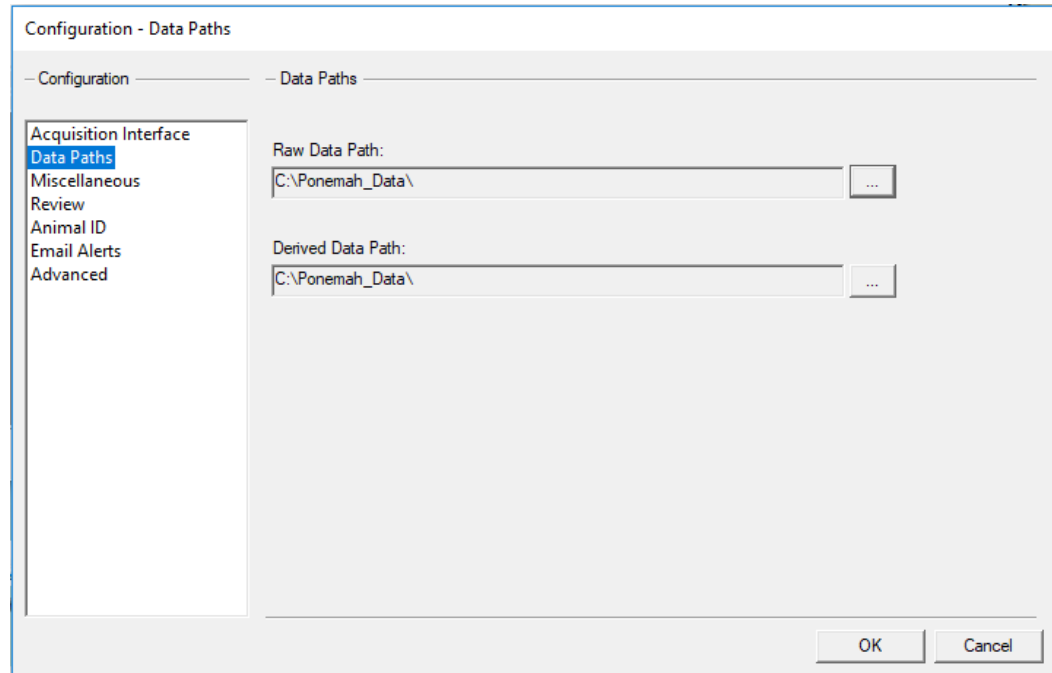
Data Paths Configuration

The **Data Paths** configuration allows the modification of the location of where the raw and derived files will be saved. Clicking on the button next to each path will bring up a dialog asking for the new location.

Miscellaneous

Miscellaneous Configuration

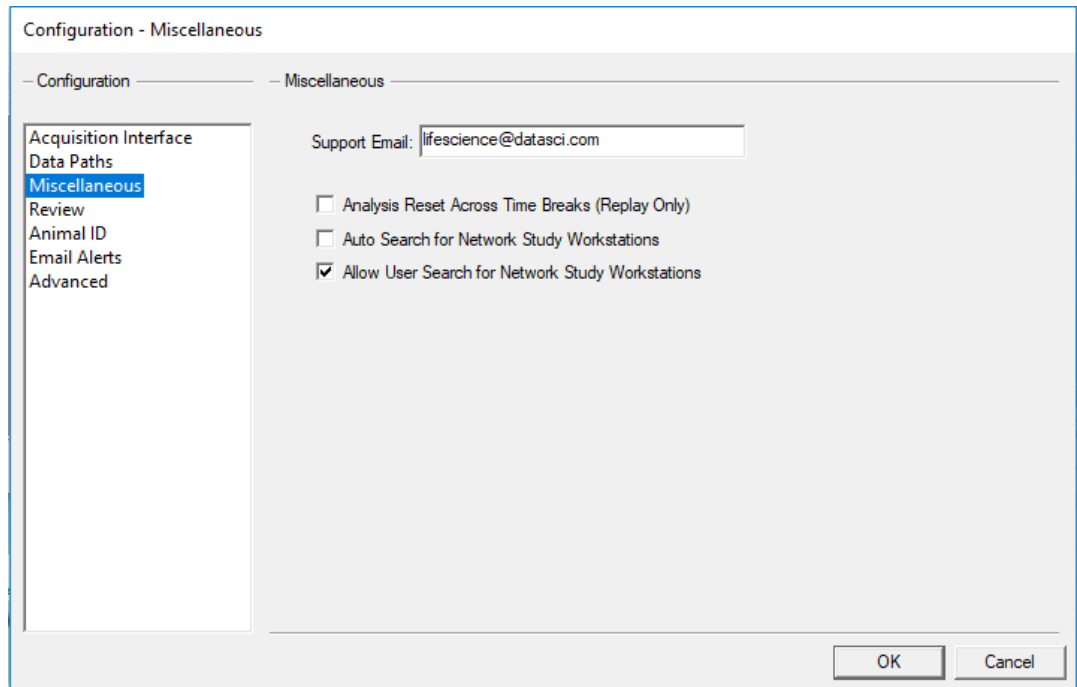The **Miscellaneous** configuration allows the modification of miscellaneous items. The available items are **Support Email** and **Analysis Reset Across Time Breaks (Replay Only)**. The **Support Email** text box lists the email address that will be used if **Email Report** button is pressed that is located on the **Version Information** dialog. The **Analysis Reset Across Time Breaks (Replay Only)** check box allows the analysis to reset if a time break has been reached if the check box is enabled. If the check box is disabled, analysis will not reset when a time break has been reached.

Additionally, the modification of Network Options is also configurable. This allows the user to configure how network searches will be performed and accessed for the Study Protocol Option. **Auto Search for Network Study Workstations** will automatically begin searching the network for study workstations upon opening the Ponemah program (default setting for Ponemah version 4.70). The option, **Allow User Search for Network Study Workstations,** permits the user to manually search for network study workstations using the Find Workstation or Workstation Search buttons located in the Study Setup menu during study configuration. Additionally, this will allow access when searching for workstations using the Edit Primary Workstation List function (this is the default setting upon loading the Ponemah software). If both of the above options are not checked, the auto search capability will be disabled and the user will not have access to search for networked workstations.

Review
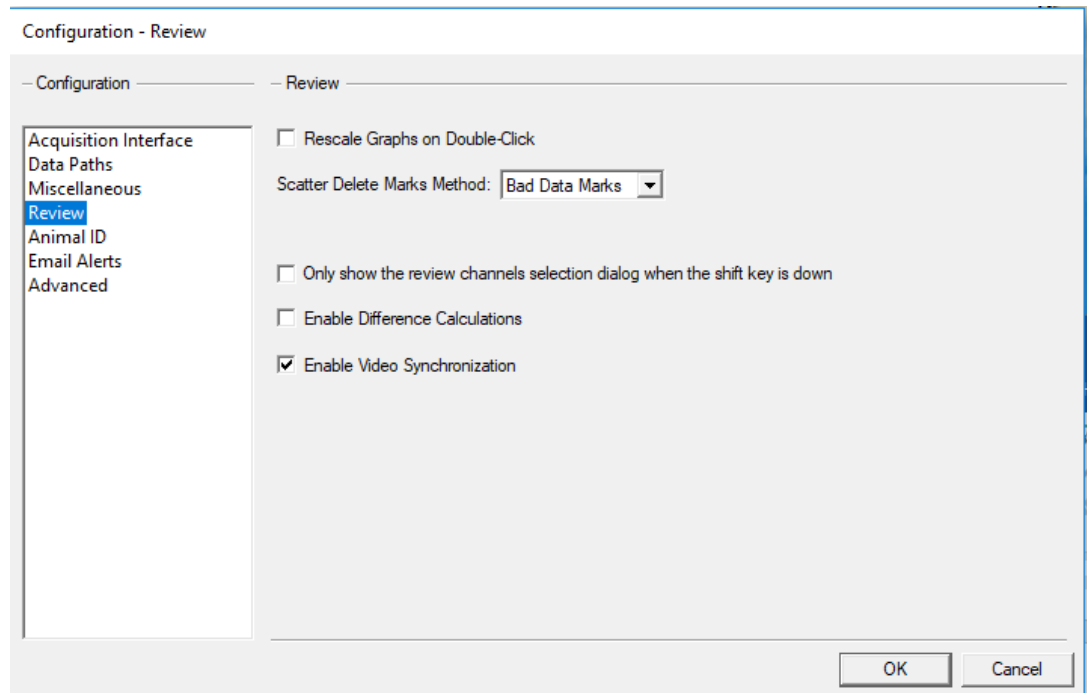
Review Configuration

The **Review** configuration allows the setup of various review based options. Below is a basic description of the options. View the Review manual for a more complete description.

The **Rescale Graphs on Double-Click** check box allows the user to enable or disable rescaling of the graphical data when double-clicking on the Derived list views or the Data Reduction list views in Review mode.

The **Scatter Delete Marks Method** drop down list box has the options **Bad Data Marks** and **Delete Cycles**. The **Bad Data Marks** option inserts bad data marks in the locations that were lassoed and the **Delete Cycles** option deletes the cycles that were lassoed.

The **Only show the review channels selection dialog when the shift key is down** check box allows the user to set how review files are opened. When this check box is checked, the dialog that asks which channels to open in review will not appear. By default all channels in the review file will be opened. When this check box is not checked, the dialog that asks which channels to open in review will appear. This will allow the user to select channels to be opened for that review file.

Enable Difference Calculations provides performance improvements when reviewing large datasets by not committing memory allocations for cycle and mark information for the Reference section. With this feature disabled, no mark differences will be calculated and viewable on the graph page which improves system performance. Although differences will not be displayed, individual mark movement is still logged in the experimental log file.

This feature may be changed during review. Any difference marks that exist will be removed when this option is disabled. Open reference section will be disabled along with the Toggle Mark Differences, Search Previous/Next Change and Undo Move features. Additionally, any changes to the derived data will not be displayed (cells grayed) when this feature is disabled and N/A will be displayed for the reference name on the main Ponemah window.

If this feature is enabled after being disabled, previous mark changes will be displayed and features that were disabled as a result of the setting will again be enabled.

Enable Video Synchronization

This is only active during acquisition mode and is grayed during replay mode. This option allows the user to link the saving of video data with the saving of RAW data.

Animal ID
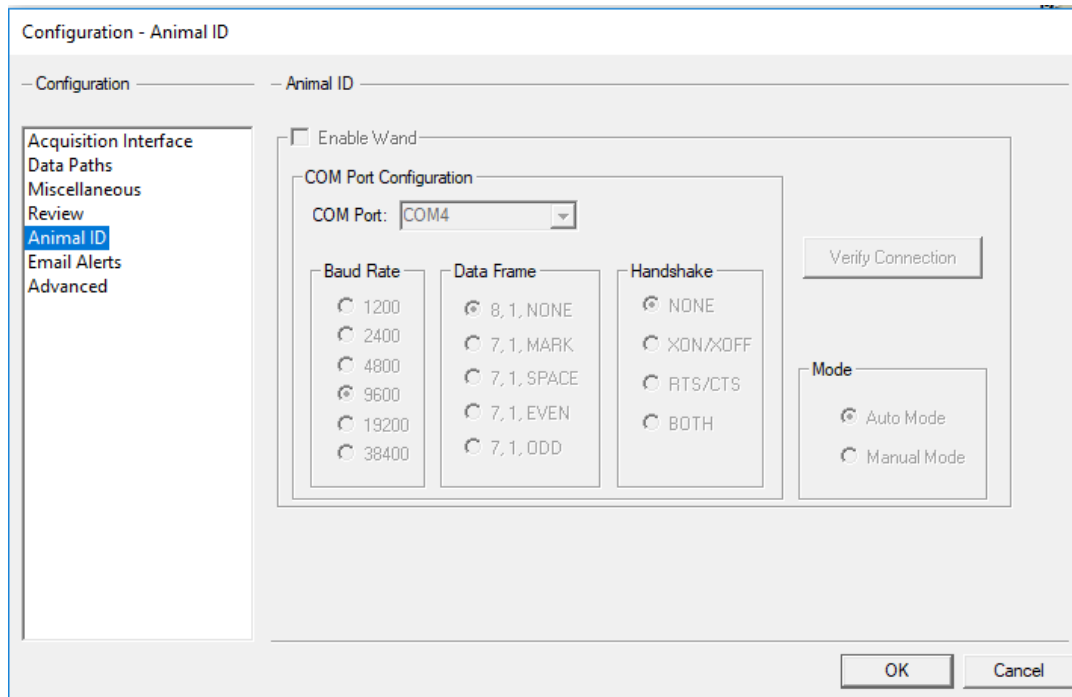
The **Animal ID** configuration allows the user to set up the BMDS wand hardware. See the BMDS Wand Manual (MU00264) for more details.

Email Alerts

The Ponemah application supports the sending of an informational Email Alert for two types of conditions by using Simple Mail Transfer Protocol (SMTP).

One of the email alerts is for parameters that go into an alarm condition during acquisition. The alarm thresholds can be set by the user and are updated for every logging period. The user has the ability to set a time, in minutes, that set the frequency of the alerts.

This will help prevent sending many email alerts for an alarm if the logging period is set for a short duration but the user would only want to be notified of the alarm condition every 30 minutes. With the delay of sending emails this helps prevent a non-physiological event from sending multiple alarms with a short duration logging period.

The second type of email alert is for an application failure. The application failure would be for Data Buffer Overflows.

Data Buffer Overflows occur when an application uses many of the resources of the system and starves the Ponemah application from processing incoming data, such as

when a virus checker starts scanning. The processing of this data gets too far behind and causes the failure which then sends out an email alert allowing the issue to be addressed.

As email alerts are sent out, these actions are also logged in the Ponemah Application log.
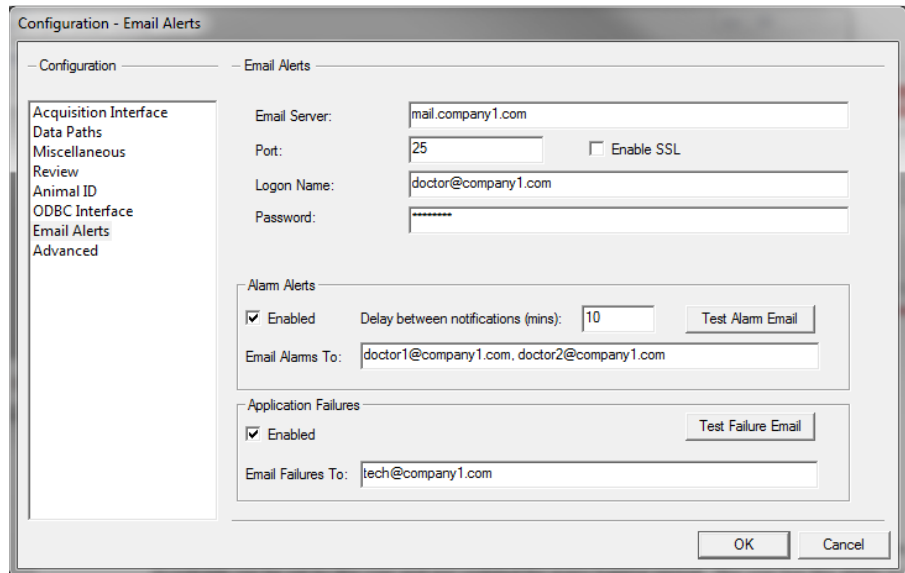
Email Alert Configuration

To setup the Email Alert notifications, the first step is to setup the Email server that will be used to allow sending the emails, the recipient addresses to which the alerts will be sent and setting up the desired alarm conditions to trigger the alerts.

To access the Email Alert settings, choose Application Configuration | Email Alerts as displayed in Figure 1.

Notes:

- If using the Data Security option, the Email Alert setting must be in the users Access Level Available Features otherwise the menu will not be accessible.

- If you are using an account that requires a password change, be sure to update the password used in this configuration

Email Server Configuration

Depending on the email server that will be used to send the email alerts, the configuration can be accomplished by setting the appropriate fields to match the server configuration. In certain cases, such as for Exchange Server, specific configuration settings may be needed to allow access. If you are unsure of settings, please contact your IT systems administrator. See Appendix 1 for typical Exchange Server configuration.

- Email Server: This field should have the name of the email server that will be used for sending the emails. In the above example mail.company1.com would be email server that would be authenticated against with the provided logon credentials to send the email.

- Port: This is the SMTP host port that is used and defaults are listed below. If the email server uses a different port, that specific port number should be entered in this field.

    - Exchange Server: 25

    - Microsoft Live: 587

    - Gmail: 587

- Enable SSL: Enable Secure Socket Layer allows the connection to use an encrypted connection.

- Logon Name and Password: These fields contain the email address and password of the user that will authenticate the email communication connection.

    - NOTE: this email address will be the one used in the From field of the sent email.

Alarm Alerts

The user can choose to have the alarms generated from out of limit derived parameters to send a detailed email of the alarm condition. This only works when the application has alarms defined in the protocol.

- Enabled: This allows the user to enable or disable the sending the email alerts when using alarms.

- Delay between notifications (min): The system has the ability to set a time-delay, in minutes, between consecutive alerts triggering an email notification to be sent out. For example, if the time-delay is set to 1 minute and Ponemah is logging data every 10 seconds, then when a parameter is in an alarmed condition for 3 consecutive logging periods, 30 seconds, Ponemah will only send out one email notification instead of three notifications.

- Email Alarms To: This field contains the recipients email addresses that will receive the alarm email alert. Multiple names can be entered separated by a comma or semicolon.

- Test Alarm Email: Click this button to test the configured mail server and send a test email to the recipients listed. The email subject will be Test Email along with the body of the email containing Ponemah workstation serial number.

    - This will save the current configuration even if Cancel is used to exit Application Configuration.

- For failures see Failures Section below.

Note: Invalid email addresses will be ignored and no warning is posted.

Application Failures

The user can choose to have an email notification sent to them for alarms generated from certain application failures.

- Enabled: This allows the user to enable or disable the sending the email failures.

- Email Failure To: This field contains the recipients email addresses that will receive the failure email alert. Multiple names can be entered separated by a comma or semicolon.

- Test Failure Email: Click this button to test the configured mail server and send a test email to the recipients listed. The email subject will be Test Email along with the body of the email containing Ponemah workstation serial number.

  - This will save the current configuration even if cancel is used to exit Application Configuration.

  - For failures see Failures Section below.

Note: Invalid email addresses will be ignored and no warning is posted.

Typical Email Alarm

The figure below displays a typical email that is received for an alarm condition.
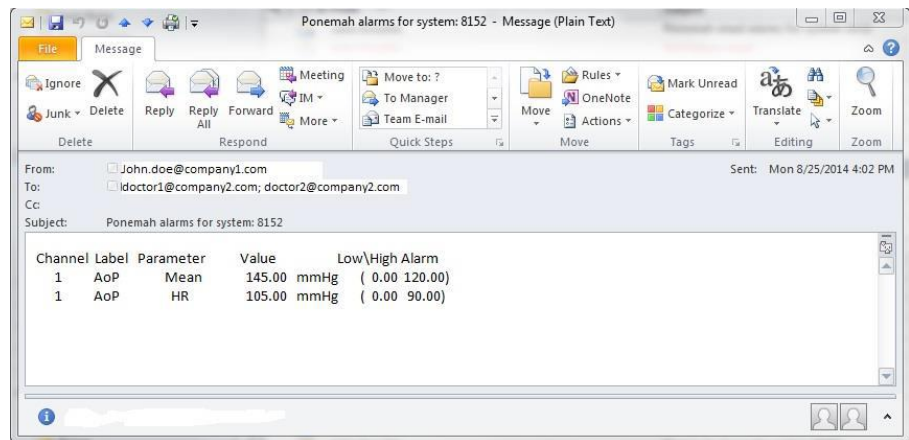
Typical Exchange Server Settings

The following is a list of items to check in Exchange Server in order to use the Email Alert feature in Ponemah.

- E-Mail Server - The value entered in 'Email Server' is typically the same URL used to access email from a web browser. When you connect to email from a browser, please note if the URL starts with HTTP or HTTPS. If you see HTTPS you will need to check the box 'Enable SSL', this will ensure the proper authentication is used.

  - Port - Port 25, is the most common port used for email.

  - Logon name - Can be entered one of two ways, Domain\Username or emailaddress@domain.com

    - e.g. Company1\Doctor or doctor@company1.com

- Password - This is the network password for the account you entered in the 'Logon name' field. **Be sure to update this password when you change you network password**, as your alerts will stop working and can result in locking that network account from accessing any other network resources (files, folders, email, intranet, etc.).

- If you are unable to successfully send a Test Alarm email, please contact your IT Administrator to confirm your settings, and that this machine is allowed to relay messages.

Email to Text

To send the email notification as a text message, add the message recipients' 10 digit mobile phone number followed by their cell phone carrier's domain to the Email Alarms/Failures To field.

- AT&T – phonenumber@txt.att.net

- Verizon – phonenumber@vtext.com

- T-Mobile – phonenumber@tmomail.net

- Sprint PCS – phonenumber@messaging.sprintpcs.com

- Virgin Mobile – phonenumber@vmobl.com

- US Cellular – phonenumber@email.uscc.net

- Nextel – phonenumber@messaging.nextel.com

- Boost – phonenumber@myboostmobile.com

- Alltel – phonenumber@message.alltel.com

- Metro PCS – phonenumber@mymetropcs.com

- SunCom – phonenumber@tms.suncom.com

Please contact your specific carrier if not listed. It is recommended to send a Test Email to the phone to confirm messages will be received prior to starting a study.

Troubleshooting

EMAIL SERVER NAME NOT FOUND

This occurs when the email server that is being used to cannot be located in the network. Possible causes are:

- Server name is not valid.

- No network connection to the server.

- Route to the server cannot be found.
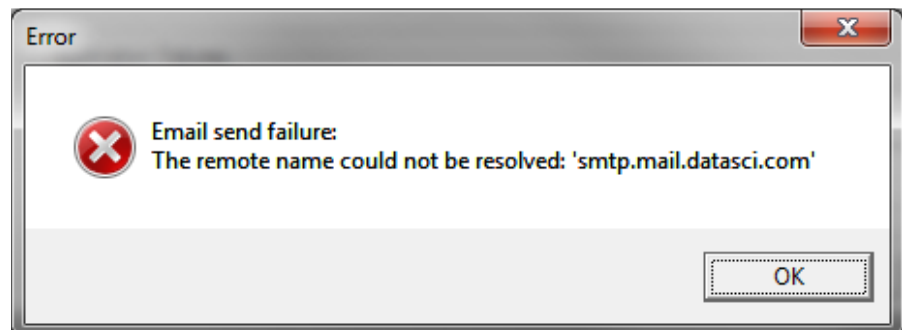
Recommendation:

- Ensure you have a network connection.

- Confirm the Email Server with your IT Administrator.

EMAIL SEND FAILURE

This type of error may occur for the following reasons:

- Bad or invalid email address entered into the Email To field(s).

- The outgoing Email server is not allowing an email message to be relayed to another server.

Error

Email send failure:
Mailbox unavailable. The server response was: 5.7.1 Unable to relay

OK
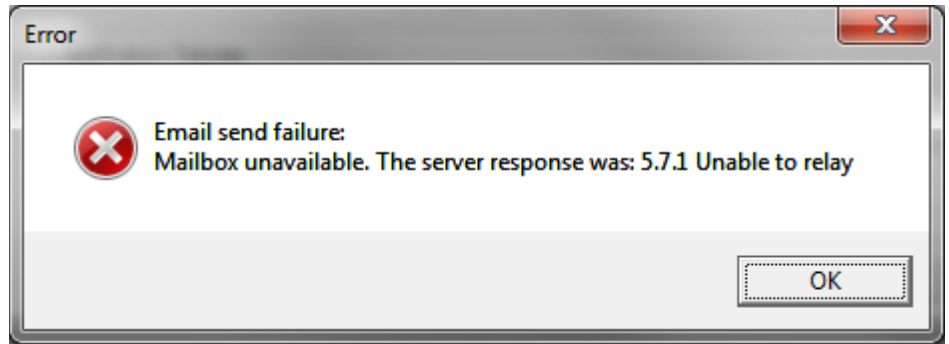
Recommendation:

- Ensure all email addresses entered in the Email To field(s) are accurate.

- Confirm that you have the correct value entered for Figure 1. Email Server.

- Check with your local IT Administrator to ensure the computer configured to send alerts is allowed to relay emails and that the Email Server being entered is correct.

Excel Output Format

Ponemah supports Excel 2007 or better, Excel file format of .XLSX for its data output as descried below.

Limitations for Excel file is:

- Excel 2007 or better
    - Maximum columns 16,384
    - Maximum rows 1,048,576

After the creation of the initial file, worksheets for Excel will be created for the different types of derived data. The different worksheets and tables are described below:

- **Group*n*** - for each group enabled, a table or worksheet will be generated with the information assigned to that group. Columns for the worksheet and table are:
    - COLID (entry number)
    - Label
    - Description
    - Field1
    - Field2
    - Field3

- **Derivations*n*** - for each group enabled, a worksheet or table will be generated for the derived data. Columns for the worksheet and table are:
    - **ElapsedTime** - is the experimental time accurate to the sample rate clock in hhhh:mm:sssss format. This starts at time 0 when an

acquisition starts. For replay, it will be the time read from the .RAW file.

- o **RealTime** - is the day and time of the data in mm/dd/yyyy hh:mm:ss format.

- o **Event** - is the Event character entered along with the Event description if it exists. For example if Event **a** is assigned to **dose**, this column will have **(a) dose** as the Event.

- o **Alarm** - is the alarm character assigned in the Alarm Setup Section when an alarm condition exists in the logged line of data.

- o **Parm1** - is the start of the enabled derived parameters. The format of the heading is the Input channel followed by the derived parameter label. For example if Input 3 had RR-I as the derived parameter, the column header would be **I3RR-I**.

- o **Parm*n*** - this is repeated for all enabled derived parameters up to a total of 255 columns, including the previous columns.

- **Datareduction*n*** - for each Data Reduction group enabled, a worksheet or table will be generated for the derived data. Columns for the worksheet and table are:

- o **Label** - is the label entered in the Data Reduction setup.

- o **DRFunction** - is the function for that line from Data Reduction. For example, **Line** or **SDev Est** are examples of Data Reduction functions.

- o **EventTime** - is the time associated with the Event in the same format as **ElaspedTime**.

- o **Parm1** - is the start of the enabled derived parameters.

- o **Parm*n*** - this is repeated for all enabled derived parameters up to a total of 255 columns, including the previous columns.

Note: **The T0 line associated with Data Reduction does not get saved to the Datareductionn worksheet. Instead, T0 information is found in the Event worksheet.**

- **Events** - lists the entered Events during acquisition or replay. Columns for the worksheet and table are:

- o **ElapsedTime** - is the experimental time accurate to the sample rate clock in hhhh:mm:ss.n format. This starts at time 0 when an acquisition starts. For replay, it will be the time read from the .RAW file.

- o **RealTime** - is the day and time of the data in mm/dd/yyyy hh:mm:ss format.

- o **EventCharacter** - is the Event character associated with the Event and is from **a** to **j**.

- o **EventGroup** - is the group associated with the Event and is from **A** to **AF**.

- o **EventCount** - is the occurrence of the Event.

- o **Description** - is the label associated with the Event.

- **LOG** - will have the initial setup values and Experimental Log information.

- **Message** - will have the Online messages that are entered in the system.
    - **ElapsedTime** - is the experimental time accurate to the sample rate clock in hhh:mm:ss.n format. This starts at time 0 when an acquisition starts. For replay, it will be the time read from the .RAW file.
    - **RealTime** - is the day and time of the data in mm/dd/yyyy hh:mm:ss format.
    - **UserName** - is the name of the person logged into the application.
    - **Message** - is the online message that was entered.
- **Derivations** – this sheet will have the derived data in an Excel Pivot compatible table.
- **DataReduction** – this sheet will have the Data Reduction data in an Excel Pivot compatible table.
- **BinaryConvert** - this will have the binary RAW data convert information (only created upon performing a Binary Data Convert using the Measure utility).
    - **Conversion** - this column will list to which conversion the data relates. For example, if the User performs multiple conversions during a replay session of the .RAW file, then each conversion will be identified in numeric order.
    - **Elapsed Time** - this column will list the elapsed time that correlates to the data point.
    - Subsequent columns will list the converted data values. Each column will reference the Input # and the Presentation (i.e. I1:Heart Rate) for which the conversion is being conducted. These columns correlate to the User's setup in **Binary Data Convert** configuration.
- **TimeAmp** - this will have the Time/Amplitude values according to the User's cursor positions (only created upon performing a Time/Amplitude measurement using the Measure utility).
    - **Elapsed Time** - this column displays the elapsed time (cursor time) in seconds that correlates to the data values.
    - **Delta Time** - this column displays time from the previous left mouse click in seconds accurate to milliseconds.
    - **TR01MX** - this column lists the first trace's maximum value at the cursor.
    - **TR01MN** - this column lists the first trace's minimum value at the cursor.
    - **TR0nMX** - repeated for each trace on the graph.
    - **TR0nMX** - repeated for each trace on the graph.
- **Slopes** - will list the slope calculations (only created upon performing a Slope measurement using the Measure utility).
    - **Input** - this column references the Input for which the slope was calculated.
    - **Slope** - this column will list the slope value.
- **Areas** - will list the Area and Mean values between two User-defined cursor positions (only created upon performing a Area measurement using the Measure utility).

- o **Input** - this column references the Input for which the Area measurement was being performed.
- o **Start Time** - this column lists start time that correlates to the starting point of the measurement (first anchored cursor position).
- o **End Time** - this column lists the end time that correlates to the end point of the measurement (second anchored cursor position).
- o **Mean** - this column lists the mean values; the average of the vertical difference between the signal and the baseline (horizontal baseline positioned at y=0).
- o **Area** - this column lists the area values; the area between the signal and the baseline (horizontal baseline positioned at y=0).
- o **Mean2** - this column lists the mean values; the average of the vertical difference between the signal and the baseline (horizontal baseline positioned at the Y axis value of the first selected point).
- o **Area2** - this column lists the area values; the area between the signal and the baseline (horizontal baseline positioned at the Y axis value of the first selected point).
- o **Mean3** - this column lists the mean values; the average of the vertical difference between the signal and the baseline (baseline connects the two selected points).
- o **Area3** - this column lists the area values; the area between the signal and the baseline (horizontal baseline positioned at the Y axis value of the first selected point).
- **SEND Compatible Sheets** – if the system has the SEND license enabled, tables will be created for the supported SEND domains. The domains will be dependent on the analysis that is enabled. Refer to the SEND User guide for detailed information on these sheets.

Advanced
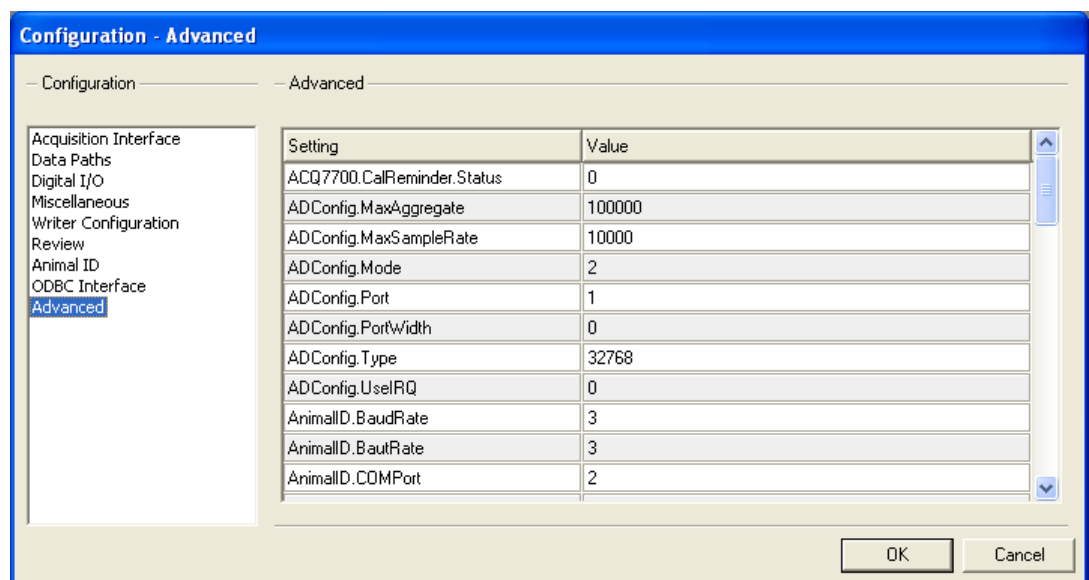
The **Advanced** configuration shows a list of the other tabs using an advanced configuration. These options should not be changed by the typical user with several exceptions.

BadDataMarks.Percentages will output the percentage of Bad Data Marks across channels in Review. The default setting is 1 which enables this feature. The setting is disabled when changed to 0. When enabled, a new menu item under Functions called BDM Percentage will display a dialog with Bad Data Mark information. This information can be copied to clipboard and pasted into other documents.

Warning: **Changing these selections may make Ponemah not respond.**
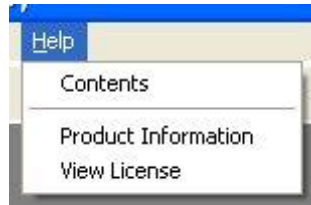
Tools

Selecting the **Tools** menu accesses the Data security menu and dialogs. This will be grayed out unless the Data Security option has been installed.

Refer to the **Data Security Option Manual** for complete details.

Help

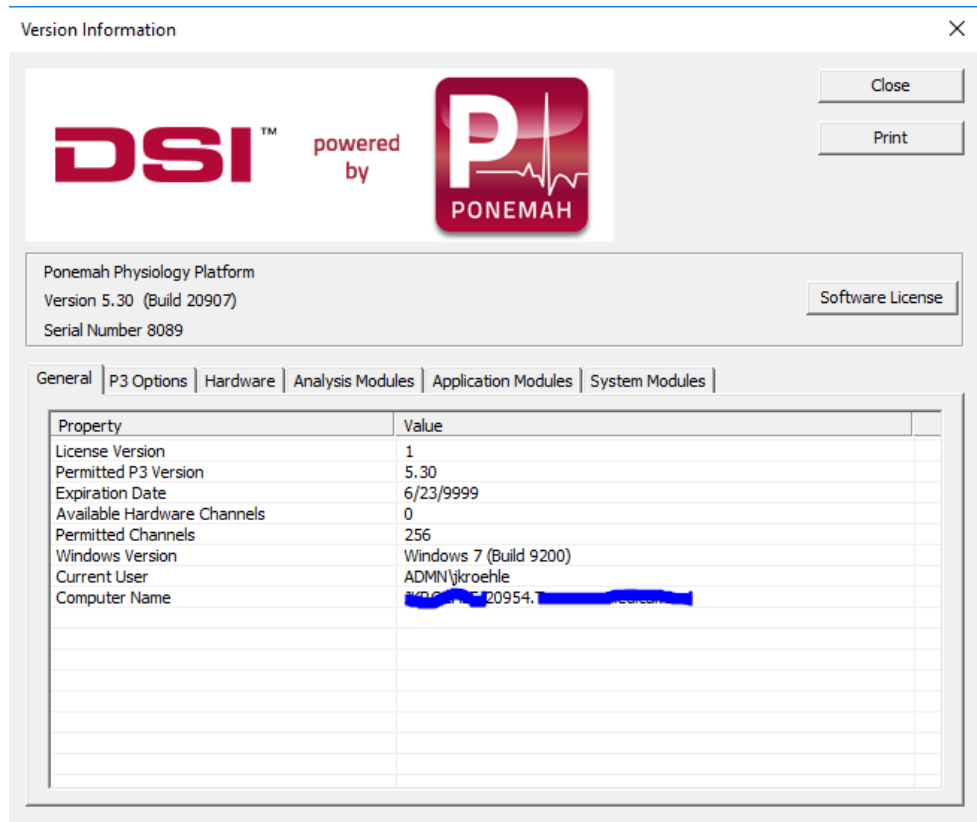When **Help** is selected, the **Help** menu will be displayed.

Help Menu

Contents

This will display the Table of Contents for the Ponemah Help file in the Windows Help system.

Product Information

The Product Information dialog provides information about the User's **Ponemah** Physiology Platform system.

Product Information Dialog

The following static fields are displayed:

- Ponemah Physiology Platform

- Version of Ponemah

- Serial number of system

General Tab

License Version - Revision level of the software license.

Permitted Ponemah Version - The Ponemah version permitted by the license file.

Expiration Date - The expiration date of the license file (the time-frame permitted to upgrade to a new version).

NOTE: **The Permitted Ponemah Version and Expiration Date pertain to the restrictions defined by the license file for upgrading to newer versions of Ponemah software. The User is limited by either the version or expiration date. The User may upgrade to a newer version of Ponemah as long as the date has not expired (the permitted version level is ignored at this point). If the expiration date for the license file has been reached, but the version that the User wants to upgrade to does not exceed the permitted version, then the User may upgrade.**

NOTE: **If installing software without an updated license file (the software version being installed and the current date (the date that the User is performing the install) exceeds the permitted version or expiration date, then the system will not run.**

Available Hardware Channels - Displays the number of channels currently connected.

Permitted Channels - Displays the total number of channels that the license file allows.

DSI Version - Displays the currently loaded version of the DSI OpenART software, if installed.

Windows Version - Displays the currently loaded version of the Windows operating system.

Current User - The currently logged on windows user.

P3 Options Tab

This tab lists all currently enabled options in the system's license file.

7700 Modules Tab

This tab will only appear if an ACQ-7700 style acquisition device is connected. It will display the available modules/devices currently connected.

If a JET configuration has been set up, each device and every WRAP Access Server will be listed.

Analysis Modules Tab

This tab lists all currently loaded analysis modules in the runtime directory.

Application Modules Tab

This tab lists all the .DLLs and .EXEs in the runtime directory.

System Modules Tab

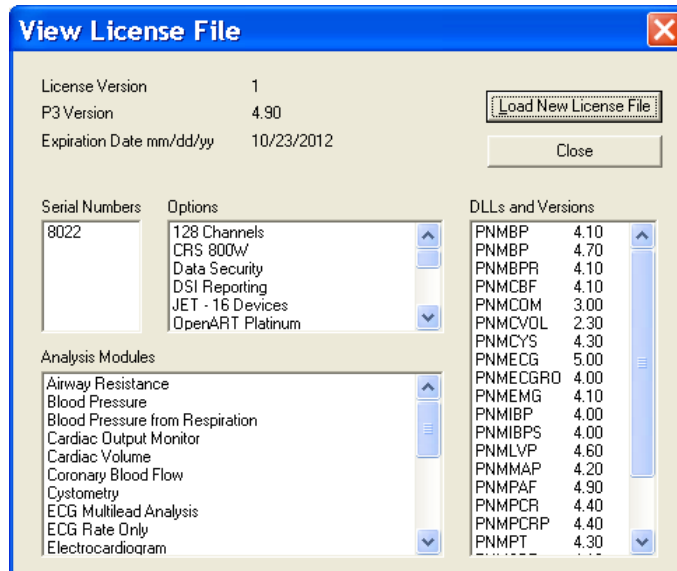This tab lists certain drivers, ActiveX controls, and operating system version numbers.

Print

This button allows the User to print a hardcopy of the information displayed in the **Product Information** dialog.

View License

This dialog displays the currently loaded options. It also allows the loading of a new license file.

View License File Dialog

License Version - Revision level of the software license.

P3 Version - The Ponemah version permitted by the license file.

Expiration Date mm/dd/yy - The expiration date of the license file (the time-frame the User is permitted to use the system if using a subscription license or permitted to upgrade to a new version if using a perpetual license).

Serial Numbers - The software license file number installed on the system.

Options - The Ponemah options that are enabled in the license file.

Analysis Modules - Lists the Analysis Modules that are installed on the system. Note: In order to use the installed Analysis Modules, the Analysis Modules must be enabled in the license file.

DLLs and Versions - Lists the .DLL (Analysis Modules) installed on the system and the permitted version level allowed to be installed.

Load New License File

This allows the User to load a new license file that will enable Ponemah options.
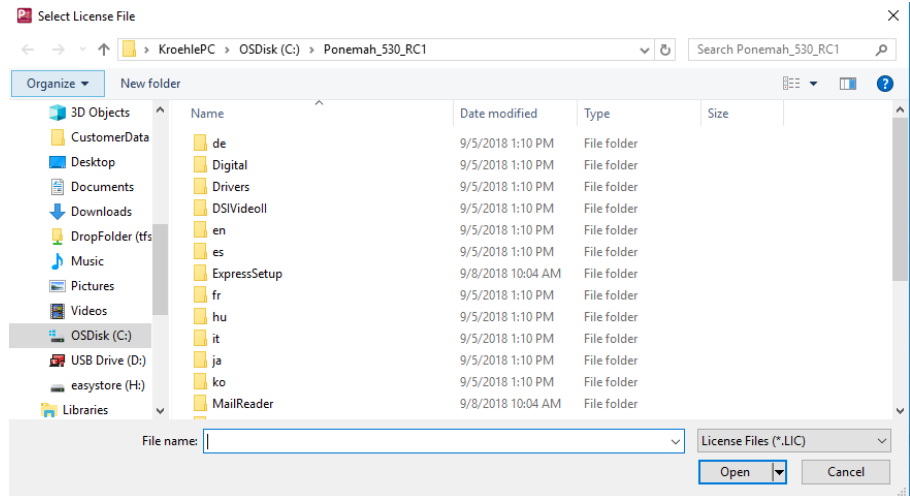
Select License File Dialog

From the above dialog, change to the directory or floppy where the license file is located and select it.

NOTE: **Once selected, the Ponemah application must be exited and then re-started in order for the new license file to take effect.**

On-Line Screen and Functions

Introduction

There are many types and formats of data to view while the system is analyzing the data. The User determines which data will be displayed when they select which derived parameters to analyze, which types of graphs to display, etc. Some data, such as the Derivation, Status, and the Event list views, are always displayed.

The system can display the graphs and text on one or two monitors. If using two monitors, the graphic screens can be displayed on the second monitor.

NOTE: The system maintains the position and size of the list views in the protocol file. When exiting the system, save the protocol to save the last list views' positions. When Replay or Acquisition is entered, the list views will go back to those positions.

Main Window

This window contains the commands available during Acquisition and Replay mode. It also contains the data that is being logged into the individual derivation tables in Excel and a display of the current Events.

NOTE: **If the main window is maximized, the graphic windows will disappear behind the main window when the main window has focus. It is recommended that the main window cover only a portion of the desktop, leaving space for graphic windows and digital displays.**
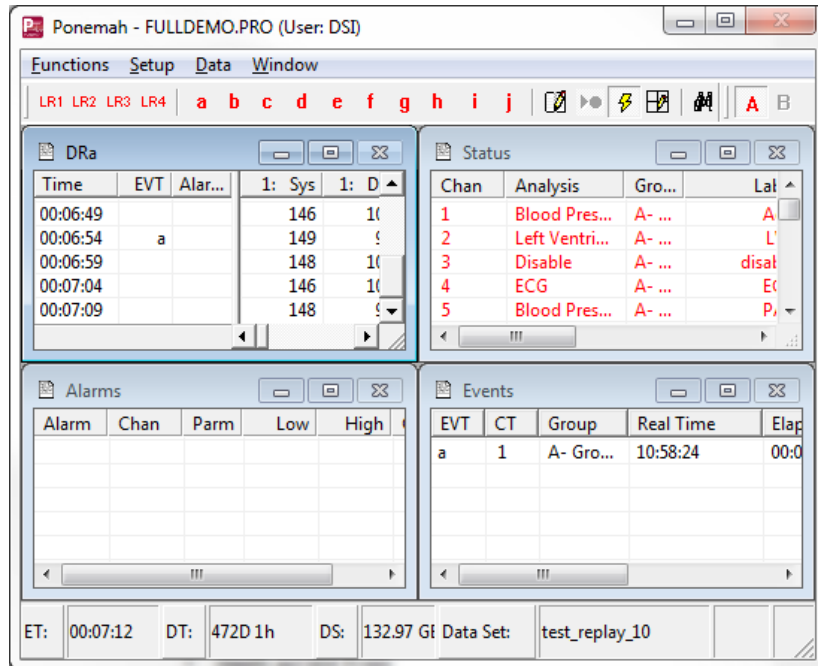
Main Ponemah Window - On-Line

From this window, the User can access the following menus:

- **Functions** allows the User to:
  * Change the logging rate
  * Identify and label Events
  * Toggle validation marks
  * Toggle logging marks
  * Jump to a time/Event in Replay
  * Halt the Replay process
  * Change speed of Replay
  * Enable measure mode in Replay
  * Enable page mode in Replay
  * Save raw data in Acquisition
  * Link Video Saving
  * Record Video
  * Stop Data Scheduler in Acquisition
  * Print RAW data to the printer
  * Exit Replay/Acquisition mode

- **Setup** allows the User to:
  * Access PPP3 Setup configurations
  * Setup or change Windows default printer

- **Data** allows the User to:
  * Copy data from one of the list views
  * Add comments to the .LOG file

- **Window** allows the User to:
  * Horizontally tile windows
  * Vertically tile windows
  * Cascade windows
  * Arrange icons

∗   Select one of the available list views and bring its focus to the front

Tool Bar

The tool bar allows easy access to common functions in the system.

Logging Rate Tool bar Buttons

The first four buttons, LR1 through LR4 are four predefined logging rates. The logging rates and methods are assigned in the PPP3.INI file.

Event Tool bar Buttons

The buttons labeled "**a**" through "**j**" are to indicate an Event. Clicking one of these buttons will insert the Event into the .EVT file and the Events list view. An Event can be executed to a specific Group or multiple Groups (A - P), if Groups were defined in Channel Input Setup enabled (see Group under Channel Input Setup).

To execute an Event, enable the appropriate **Group** buttons (see Group tool bar buttons) and click on the appropriate **Event** button.

Events can be pre-defined under Groups and Events (see Groups and Events under PPP3 Setup). If the Events were pre-defined, then the labels will appear in the Primary graph screen, .EVT file, and Events list view along with the alpha character (a - j) represented by the Event.

Online Message Tool bar Button

This button brings up the Online message box.

RAW Data Save On/Off Button

This button toggles the saving of the .RAW data file and is only active during the acquisition mode.

Validation Tool bar Button

This button toggles the validation marks on and off.

Logging Rate Mark Tool bar Button

This button toggles the logging rate marker that appears on the Primary screens every time a logging period has been completed.

Jump Tool bar Button

This button is only available in Replay mode, and it displays the **Jump** dialog shown later.

Halt Tool bar Button

This button, only available in Replay mode, halts the system from processing data from the data file. Clicking on this button again restarts the processing of data.

Speed Tool bar Button

This button, only available in Replay mode, toggles the replay speed from replaying the data back in real time speed, to as fast as the system can process the data. Speed is determined by the computer's performance.

Measure Tool bar Button

This button, only available in Replay mode, toggles the **Measure** functions.

Status Bar

The status bar contains information on the status of the system. A typical status bar is displayed below:
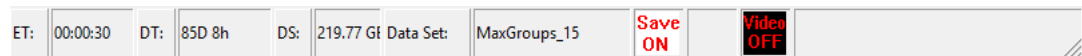
Status Bar

- **ET** is the elapsed time from the start of acquisition, or in replay, it is the elapsed time from the raw data file.

- **DT** is the approximate time of disk space available on the hard disk for the .RAW data file. This value cannot be an exact value since items such as logging rates have an impact on the storage space.

- **DS** is the amount of free disk space available on the hard disk in Megabytes or Gigabytes.

- **Data Set** is the current name of the data set being created.

- **Save On/Save Off** is the .RAW data saving indicator. This is only valid for acquisition mode.
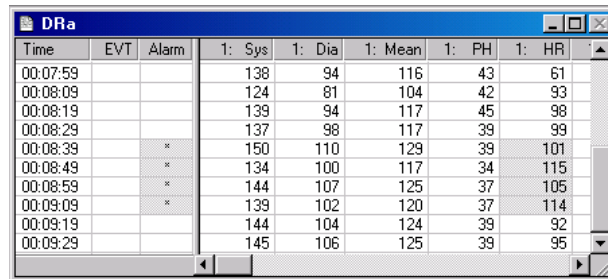
- **MX2/CLC Status** icon area will display an Error icon, when a hardware or other critical fault occurs with PhysioTel or PhysioTel Digital system. To get details on the issue view the message in the **Message** window in Ponemah. To clear the icon right click on the icon.

- **RAW file name** indicates the name of the file that is being replayed.

Derivation List View

The data on each line in the .DR*n* list view is the data from the beginning of the analysis to that point. It is not information about a single point in time and is updated at every Logging Period, which is determined by the value in the **Logging Rate** dialog.

There will be one derived data list view and file for each **Group** defined in the **Channel Input Setup** configuration.

Derived Data List View with an Alarm Condition (HR over 100)

The columns to the left of the separator will always be visible, allowing the data on the right side to be scrolled while keeping the time, Events, and alarms visible.

If an alarm condition is set, the alarm column will appear. Otherwise, it will not be visible. If an alarm condition is met, the cell containing the alarm character and the cell representing the time and parameter of the condition will be shaded to draw attention to the alarm.

- **Time** is the current time from the selected time format in the **Time/Data** dialog. When using the elapsed time, the time starts at 0 when the system starts acquiring data.

- **EVT** contains a symbol if an Event was recorded at this time. The symbol is a letter **a** through **j** if the Event was given a predefined name, or it contains an **x** (for external). External refers to a hand-entered Event through the **Events** dialog. If multiple buttons are pressed, only the last one will display in the Event column, but all Events are entered into the Event list view. Voice Events are represented with the symbol "z".

- The other columns are the derived parameters that are selected in the **Channel Input Setup** configuration. The columns depend on which derived parameters are enabled for the type of analysis assigned to a channel.
  Each header in the derived data list view has the associated channel number along with the derived parameter label.

When the system changes from the time based logging method to the epoch based logging method, the derived data files are only updated when the trigger channel in the defined **Group** has met the logging rate. For example, if channels one, two, and

three are in **Group A** and channels four, five, and six are in **Group B**, the Excel derivation sheet for Group A is only updated when the trigger channel in **Group A** has met the logging rate. Likewise, **Group B** only updates the derived data files when the trigger channel in **Group B** meets the logging rate.

This method allows multiple animals to be analyzed at the same time in the epoch mode. This is most useful when doing breath-to-breath analysis for respiratory studies.

If the data is too large to fit into the cell, i.e. the value is greater than 999999 or less than -99999, then an 'x' will be placed into the cell. The output to Excel depends on the setting in the **Application Configuration Advance table, ODBCInterface.Overflow. If this filed is 1** the 'x' will be translated into the maximum float (3.4028E+38), if the value is 1 or NULL if that filed is 0.

Event List View

The Events list view contains all the Events the User has executed.

EVT	CT	Group	Real Time	Elapsed Time	Comment
a	1	A- DOG123	10:57:57	00:06:24	Inject Drug
b	1	A- DOG123	10:58:15	00:06:42	Start Occul.
c	1	A- DOG123	10:58:19	00:06:46	End Occul.

Events List View

- **EVT** is an identification mark. It is a letter between **a** through **j** if the User gave the Event a predefined name, or it contains an **x** (for external). External refers to a hand-entered Event through the **Events** dialog. Voice Events are indicated by the letter "z".

- **CT** counts the number of Events with the same Event name.

- **Group** references the Group letter and name assigned to the input channel or group of input channels (see **Group** under **Channel Input Setup** and **Name** under **Groups and Events** (**PPP3 Setup** dialog).

- **Real Time** is the actual time the Event happened.

- **Elapsed Time** is how much time passed from the beginning of the experiment to the Event.

- **Comment** is the name the User gave the Event in the **Groups and Events** configuration.

Status List View

The Status list view displays the status of each input channel. The status list view also allows access to the channel attributes with a double click on the channel row.

Chan	Analysis	Group	Label	Units	Rate
1	Blood Pressure (Respiration)	A- DOG123	AoP	mmHg	250
2	Left Ventricular Pressure	A- DOG123	LVP	mmHg	250
3	Disable	A- DOG123	disable	mV	0
4	ECG	A- DOG123	ECG	mV	250

- **Chan** is the physical input channel number.

- **Analysis** is the assigned analysis on the input.

- **Group** references the Group letter and name assigned to the input channel or group of input channels (see **Group** under **Channel Input Setup** and **Name** under **Groups and Events** (**PPP3 Setup** dialog).

- **Label** is the User label assigned in the **Channel Input Setup** dialog.

- **Units** is the units label assigned in the **Channel Input Setup** dialog.

- **Rate** is the sample rate for the **Input**.

- **Source** is the physical channel being used.

NOTE: **To access the channel analysis attributes, place the cursor on the row that is to be modified. The first mouse click will highlight the row and the second mouse click will display the Attributes dialog.**

The information displayed below is an **Attributes** dialog opened during acquisition or replay. The following is the RAW Electrical Mean Attributes dialog.
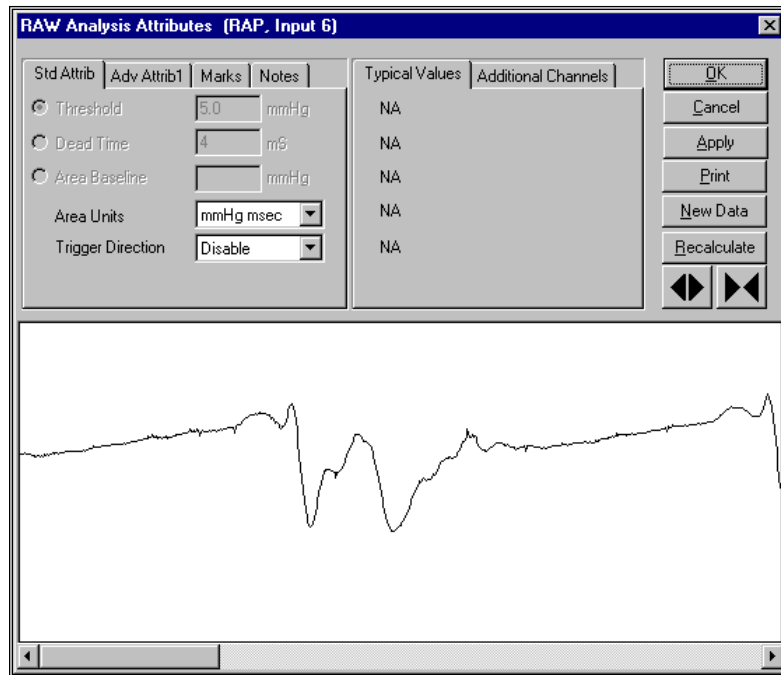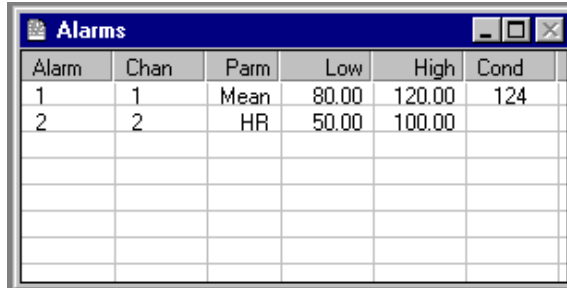

Attributes Dialog (Example of Raw Electrical Mean)

Refer to the appendix for the specifics of the RAW Electrical Mean attributes. The graph section in the attributes section is only displayed during acquisition or replay.

Alarms

Displayed below is a typical Alarm Status list view.
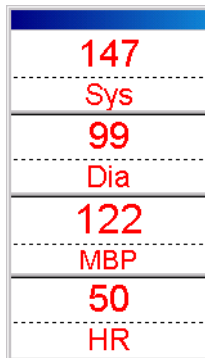

Alarm Status List View

- **Alarm** is the number of the alarm.

- **Chan** is the channel that is assigned to the alarm.

- **Parm** is the derived parameter that is assigned to the alarm.

- **Low** is the low alarm value.

- **High** is the high alarm value.

- **Cond** is the condition of the alarm. If the field is blank then no alarm condition exists for that parameter. If a value is in the field, that value is the alarm value.

Digital Displays

The number of windows depends on the **Digital Display** setup. These windows can be sized, moved, and separated.

When acquisition or replay has been exited, the last position is retained and saved.

See **Digital Display Setup** for details on Digital Displays.

Digital Display Window

The Digital Display windows can be moved or sized by using the mouse as with any other window on the system.

If the Digital Display window is double-clicked with the left mouse button, the title bar will appear or disappear accordingly. If the title bar is visible, the entire window of displays can be moved as a group by dragging the title bar.

The User can also break apart each Digital Display by placing the mouse cursor in the upper half of the window and dragging each Digital Display window to a new location.

To connect these windows back together, drag the top left-hand corner of the window into any area of the window that it is going to be attached to. The cursor will change to an up arrow, indicating that the display may be attached. Release the mouse button, and the windows will be connected. Groups of displays can also be attached to other groups of displays by utilizing the title bar.

The derived parameter and label can be sized by placing the mouse over the dotted line separating the two sections. The mouse will change to the resize cursor, which is a two-sided arrow, and when clicked and held, can drag the Parameter/Label to a new size.

Right clicking on a Digital Display will bring up a menu with various choices. The options displayed depend on the current state of the Digital Display window. A list of possible choices is shown here.

Show All Displays - This will show all Digital Displays that may have been hidden by other windows.

Attach - This option is available only if there are two or more Display groups. The cursor will change to an Up Arrow and, if the User left clicks on another display, will attach the first display to the second. If the User does not click on a display or clicks upon the same display, the cursor changes back to normal and no action is taken.

Detach - This option is available only if there are two or more displays in the selected group. If so, the display that was clicked upon is detached from the group.

Reset Timer - This option is available only if the Display is a Timer. The timer will be reset.

Pause/Unpause Timer - This option is available only if the Display is a Timer. The timer is either paused or unpaused, depending upon the current state.

Make Display Horizontal/Vertical - This option allows the User to change the orientation of the selected display group.

Show/Hide Buttons - This option is available only if the Display is a Timer. This option allows customized use of the button bar located at the bottom of the individual display. If the bar is hidden, the display appears as every other display does. If it is visible, a small bar appears at the bottom of the display containing two buttons, one to reset the timer and another to pause\start the timer.
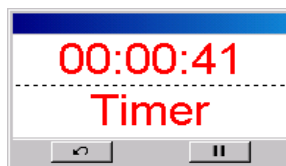
Timer Display (with buttons)

Data Reduction

After the first Event that triggers the data reduction for a specific group, the system will display a Data Reduction Data screen.

Data Reduction Screen

The same information appears in the data reduction sheets in Excel.

Scheduler Progress

This dialog is displayed during the operation of the Data Storage Scheduler. This status dialog will only be displayed during acquisition if the Data Storage Scheduler has been set up. The User has the option of viewing the time formats in **Actual Times** or **Offset Times** by toggling between the tabs.

Scheduler Status Dialog

The Cycle grid is displayed and the current cycle is highlighted. The Save ON/Save OFF icon will display whether the system is saving data or paused (not saving data), respectively.

Quit Scheduler - This button allows the User to abort Data Storage Scheduler. The system will continue to acquire data; however, the scheduled cycles for saving .RAW and derived data will be terminated.

Event Groups

This window allows the user to select multiple Groups (Subjects) that will be assigned an event from the toolbar.
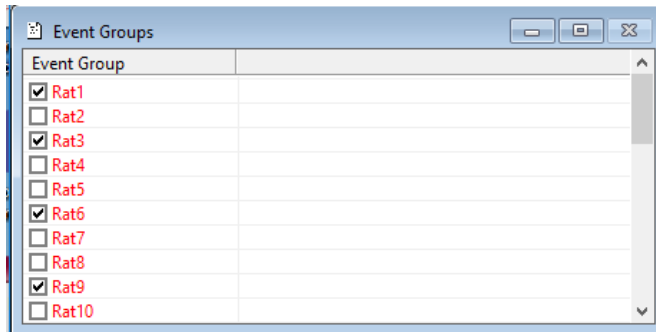
Message Window

This window will display the history of certain critical hardware failures that are generated by either PhysioTel or PhysioTel Digital telemetry.

Functions

When **Functions** is selected, the **Function** menu is displayed.

Functions Menu

- **Logging Rate** changes the current logging rate.

- **Events** causes a point in time to be labeled with a predefined Event.

- **Validate** verifies that the analysis is triggering properly by displaying validation tick marks on the Primary graph where the input channel is being displayed.

- **Toggle Logging Mark** causes a blue dashed line to appear on **Primary** graph screens at the termination of each logging period. The logging mark is only displayed if the **Logging Method** is set to "Time" mode.

- **Jump** moves the graph to a different point in time (Replay Only).

- **Halt** causes all activity on the windows to stop (Replay Only).

- **Speed** is a toggle option for replaying data either at the speed at which it was collected or as quickly as the system can replay it (Replay Only).

- **Enable Measure** enables the Measure functions (Replay Only).

- **Page Mode** allows a screen full of data to be updated on a **Primary** screen and then automatically **Halts** the system until the **Halt** function is toggled (Replay Only).

- **Save Raw Data** allows raw data to be saved (available during Acquisition Only).

- **Link Video Saving** allows the user to link the saving of video with the saving of RAW data.

- **Record Video** allows the user to save video files.

- **Quit Scheduler** allows the **Data Scheduler** to be terminated (available during Acquisition Only).

- **Print RAW Data** performs the printing of the data according to the setup defined in **Print RAW Data Setup** dialog (see **Print RAW Data Setup** under PPP3 Setup).

- **Stop Replay/Stop Acquisition** allows the system to return to the set up mode.

- **Voice Record** toggles the voice recording on and off during acquisition. Each time the Voice Record is activated, the application will create a new Windows .WAV file in the form of *datasetname.nnn.wav*, where *nnn* is incremented each time the voice record is toggled on. When a voice record has been requested, the application will also enter an Event in the Event log. This event will be assigned the letter **z** and will have as the event name **Voice Record**. This will also update the status bar indicator to On or Off.

Logging Rate - F8

This dialog allows the User to change the logging rate listed in Derivation windows, Excel tables, and graphs as the data is being acquired or replayed.
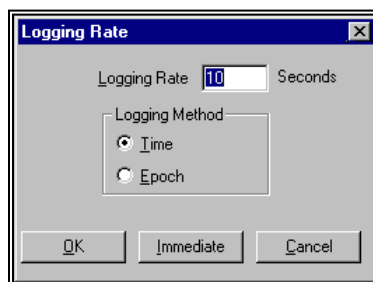
Logging Rate Dialog

- **Logging Rate** (seconds or epochs) determines how often data is plotted on Trend and Scatter graphs and logged into the Excel sheets.

- Logging Method

  - **Time** sets the Logging Rate to seconds

  - **Epoch** sets the Logging Rate to cycles (beats, breaths, contractions, etc.)

- **Immediate** causes the system to begin using the new logging rate immediately and not to wait for the current logging period to finish. The line of data associated with this logging period will be based on fewer values averaged in the logged line of data.

- **OK** causes the system to wait until the last logging rate has expired before beginning the new logging rate. For example, if the last logging rate was 30 seconds, but only 20 seconds has elapsed, choosing **OK** causes the system to wait 10 more seconds, log the current data, then begin using the new logging rate.

A message is inserted into Log sheet in the Excel file to notify that a change occurred at that point in time. The message will be surrounded by asterisks, (**), allowing the message to be parsed out if needed.

Events - F9

This dialog allows the User to label Events. This can be done during acquisition or replay modes.

Enter Event Dialog
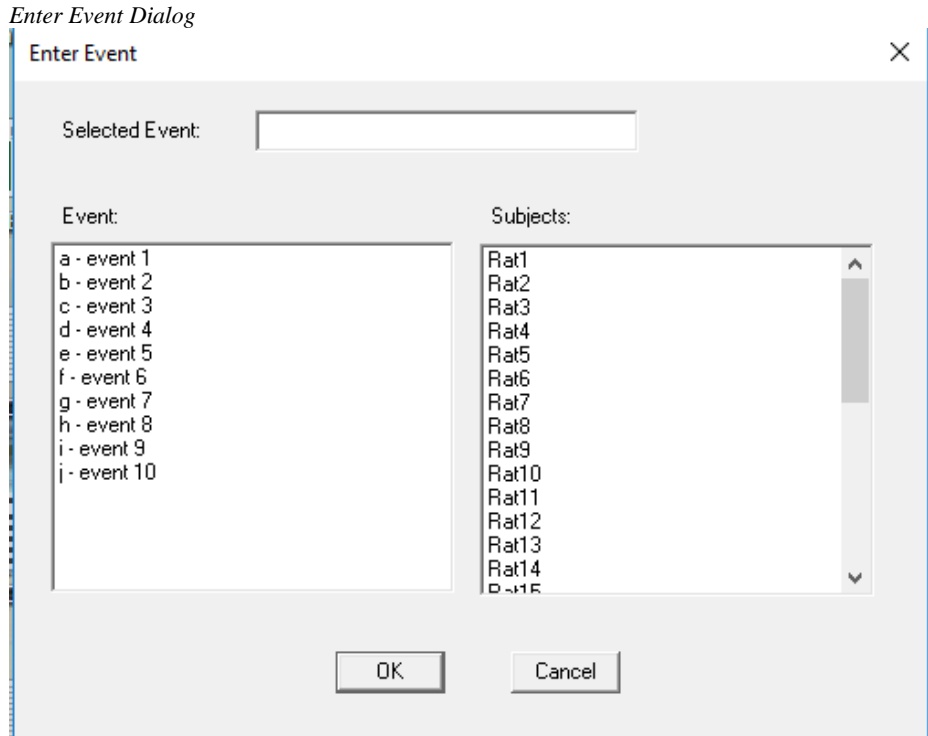
Event allows the User to name (label) the Event by selecting a predefined Event from the drop-down list or by typing a name. Predefined Events are defined in the Groups and Events configuration.

- **Subjects** allows the User to select which group of channels to which the Event will be assigned. Multiple Subjects can be selected by holding down the <Ctrl> key and selecting the Subjects.

When an Event is entered:

- The Events list view will be updated with the new Event.

- The graphs will show the name of the Event next to the selected point in time only if it is displayed as a string.

- The Events file (.EVT) and the Events sheet in Excel will be updated with the new Event.

- The Derivations sheet will be updated with the Event. Events have their own column in .Derivation sheet.

Validate - F10

This option validates that the analysis is triggering correctly. Refer to the **Ponemah Analysis Module Manual** for more information.

When Validate is selected, a checkmark appears to the left of the Validate option. Select it again to turn off the Validate option. Below is a Primary graph with validation marks displayed.
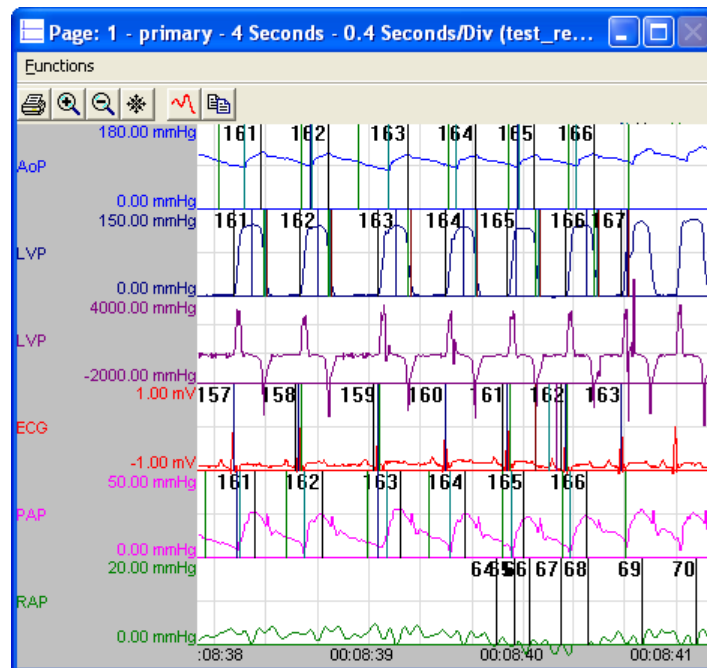
Primary Graph (with Validation Marks)

Toggle Logging Mark

This option allows the toggling of a blue dashed line to be displayed on Primary graph windows. This is useful to view what cycles are in the logging period. Displayed below is a Primary graph screen with a set of logging marks displayed.
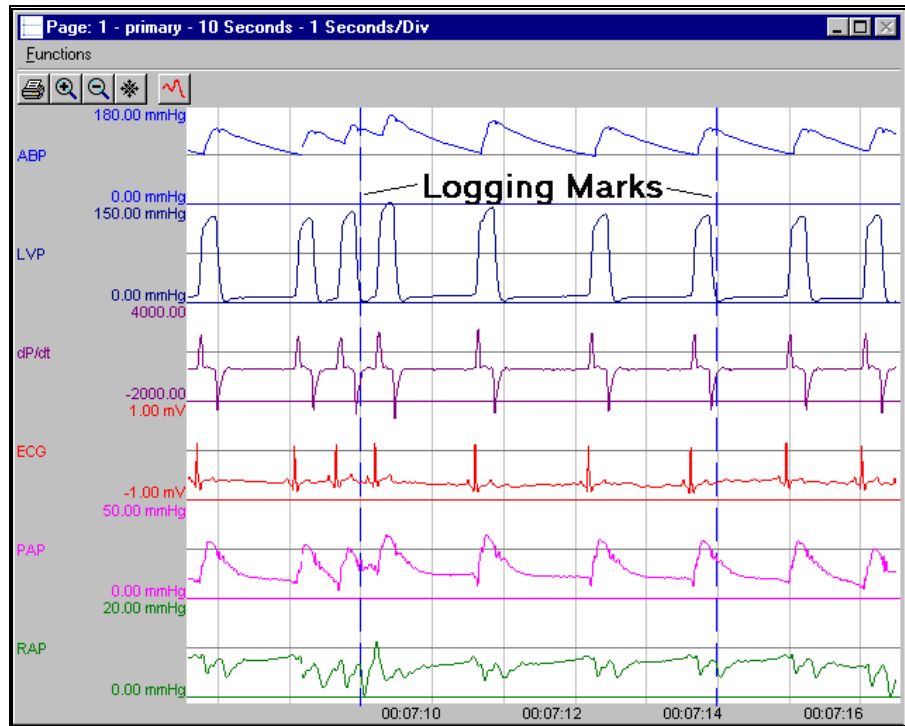
Primary Graph (with Logging Marks)

Jump

This option is only available in replay mode. It allows the User to jump to a different point in time in the raw data file. The User can choose to either specify exactly which Event to jump to, an amount of time before that Event occurred, or any time point in the raw data file.
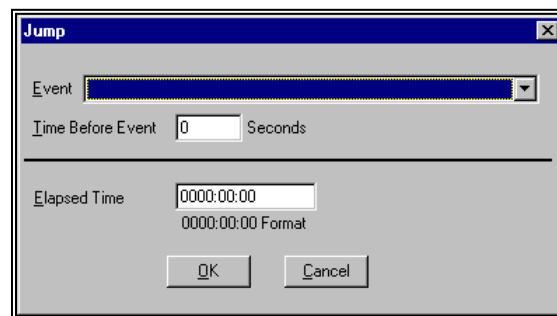
Jump dialog

- **Event** allows the User to select an Event from the drop down bar.

- **Time Before Event** is the exact time in seconds before an Event occurred to jump to.

- **Elapsed Time** is the exact time (hours:minutes:seconds) in the experiment to jump to. For example, to see what occurred after the experiment had run 30 minutes, enter 0000:30:00.

Once the specified point in time is located in the file, the system will start replaying data, noted by a red dashed line.

Halt - F7

This option is only available in replay mode. Selecting **Halt** causes all activity to stop. This allows the User to jump to a new time point or print different screens.

When **Halt** is selected, a checkmark appears to the left of the **Halt** option in the **Functions** menu. Select it again to turn off the option.

Speed

This option is only available in replay mode. It allows the User to either view the graphs and derived files at the same speed they were recorded during acquisition mode or at a faster rate. The faster rate is dependent on the User computer's performance level.

Enable Measure - F5

This option is only available in replay mode. It allows the User to measure the analog signals for amplitude, time, and area of a signal. It also allows the User to convert sections of raw binary data to ASCII values that can be imported into other graphics or statistic programs for further analysis and select a segment of data for Data Review.

Refer to **Measure** for detailed information.

For more information on Data Review, refer to the **Ponemah Data Review Manual**.

Page Mode - F3

This option is only available in Replay mode. It allows a **Primary** graph screen to automatically stop once a full screen worth of data has been scrolled into the display area. Using the **Halt** function will display the next full screen of data.

NOTE: **One of the graph screens must have focus before this feature will function.**

Save Raw Data - Ctrl + F6

This is only active during acquisition mode and is grayed during replay mode. It causes raw data to be saved in the .RAW file. This can be toggled on and off throughout the experiment. The Save field in the status bar at the bottom of the Main Window shows if raw data is currently being saved.

| ET: | 00:00:08 | DT: | 85D 7h | DS: | 219.67 Gb | Data Set: | MaxGroups_17 | Save ON | Video OFF | |
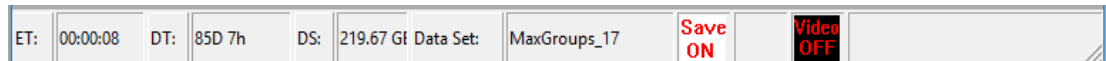
Status Bar - Save On/Off

When toggling the RAW data saving off, the User will be prompted to acknowledge that saving is to be turned off.

Link Video Saving

This is only active during acquisition mode and is grayed during replay mode. This option allows the user to link the saving of video data with the saving of RAW data.

Record Video

This is only active during acquisition mode and is grayed during replay mode. This option toggles the video saving on and off. The Video field in the status bar at the bottom of the Main Window shows if video is currently being saved.

Quit Scheduler

This option will stop the current Scheduler program from controlling the system. **Quit Scheduler** is only active only during acquisition mode when the **Data Storage Scheduler** has been set up and the acquisition started through the **Start Scheduler** menu item.

Print RAW Data

This option starts the printing of the RAW data to the printer. The configuration must be defined in the **Print RAW Data Setup** dialog.

Stop Replay or Stop Acquisition

Exits acquisition or replay mode, and returns to the application to the setup mode.

When **Stop Acquisition** or **Stop Replay** is selected, all analysis and data collection/replay stops.

Setup

When **Setup** is selected, the following menu appears:
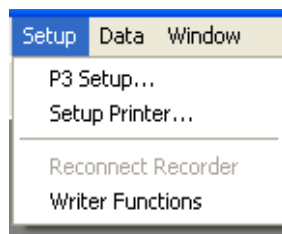
Setup Menu

P3 Setup

Allows access to the **PPP3 Setup** Dialog, and therefore, allows the User to view or change protocol information (not all protocol information can be changed once on-line). For more information, see **P3 Setup**.

Data

When **Data** is selected, the following menu appears:
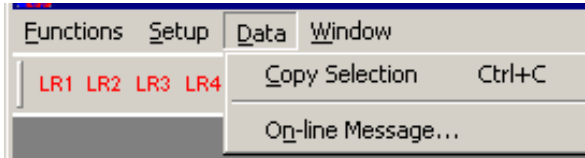
Data Menu

Copy Selection - Ctrl + C

Copy Selection allows the User to select (highlight) items in one of the status list views (Event, Derived, Data Reduction, and Status list views), and then copy the selected information to the Windows Clipboard so the data can be pasted into any Windows application that supports pasting.

When attempting to use **Copy Selection** in any of the list views, the complete row of the data that is highlighted is copied to the clipboard. Header information from the list view is not copied.

On-line Message

The On-line message allows the User to enter text that will be placed in the time-stamped XLSX file. A maximum of 254 characters is permitted.
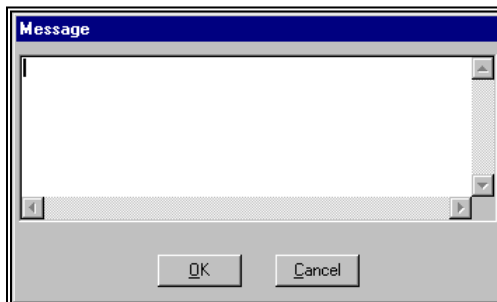
Message Dialog

Window

Selecting **Window** from the menu bar causes the **Window** Menu to be displayed.
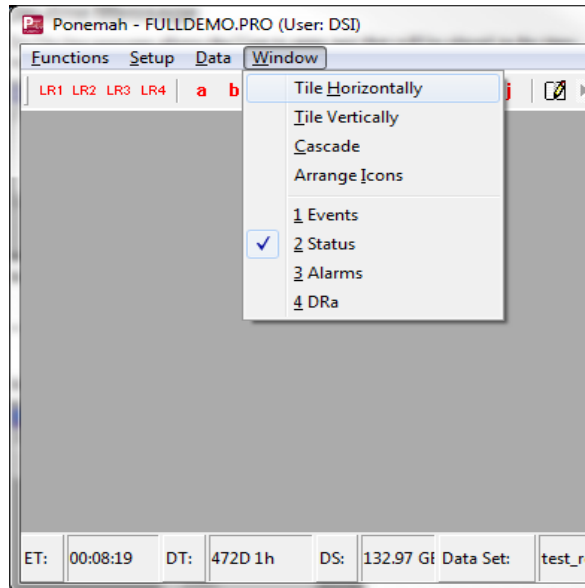
Windows Menu

Tile Horizontally

Selecting **Tile Horizontally** sets the display page to be tiled from top to bottom across the full display area. All defined derivation list views will be displayed in the Ponemah main window. Although only one derivation list view can be the active page, all derivation list views in this mode are viewable simultaneously.

Tile Vertically

Selecting **Tile Vertically** sets the derivation list views to be tiled from left to right over the full vertical height of the window. Similar to **Tile Horizontally**, all defined derivation list views are viewable simultaneously.

Cascade

Cascade sets the display pages in a cascaded presentation from top left to bottom right. Clicking on the title bar of any of the derivation list view causes that list view to move to the front and become the current list view. Only one list view is viewable at a time and the active list view occupies the majority of the display area.

Arrange Icons

When derivation list views have been minimized, their associated icon will be displayed along the bottom of the Ponemah main window. If the main window is resized and the icons no longer appear, clicking the Arrange Icons will bring the list views back into view.

Graph Windows

Graph Windows

Up to eight graphic windows may be created using four different types of displays: *Primary*, *Trend*, *XY-Loop*, or *Scatter*. Depending on which display the User selects, the graphic windows will display raw (primary) analog input signals or derived parameters. The graph configurations can be changed during acquisition or replay modes by selecting **Graph Setup** in the **PPP3 Setup** Dialog (from **Setup** menu).

Primary Graphs - A Primary graph displays the raw (physical) analog format of the signal over a specified period of time. The Primary graph is similar to an oscillographic recorder output in that it displays the analog signal over a specified period of time. Sixteen traces can be set up with up to four signals per trace area. Each trace area has its own scaling information.
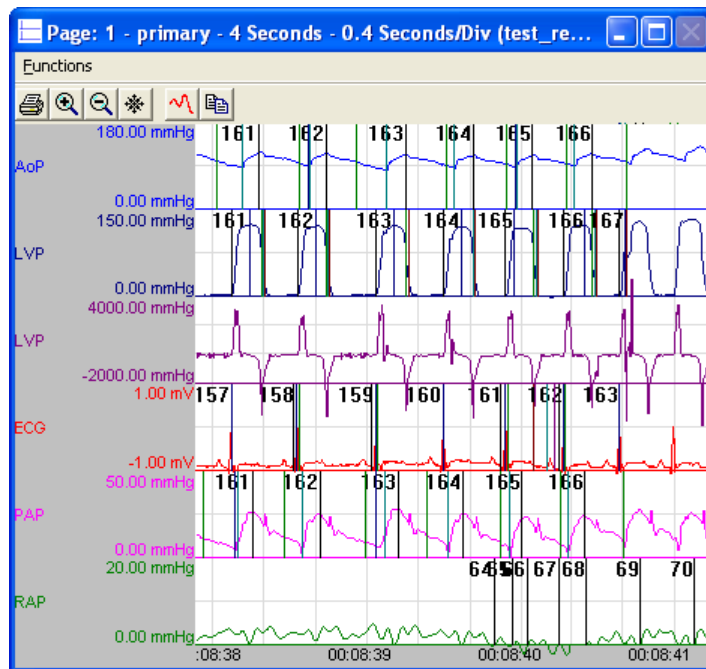
Primary Graph Window

Trend Graphs - A Trend graph shows all derived data (such as heart rate, mean blood pressure, or dP/dt$_{MAX}$) from the output of the analyzed input signals; it is similar to a dose response curve. Sixteen trends can be graphed with up to four derived parameters for each trend.
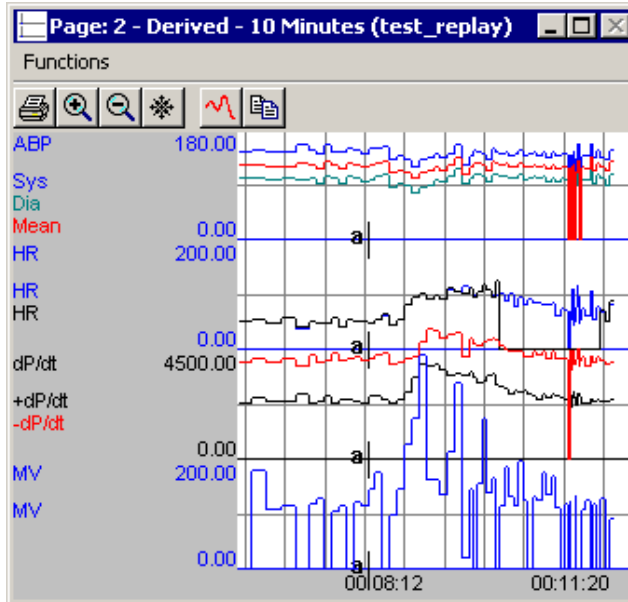
Trend Graph Window

XY-Loop Graphs - An XY-Loop graph allows one analog signal to be plotted against another analog signal. For example, to display pressure volume loops, the User would set up the graph to plot pressure versus volume.
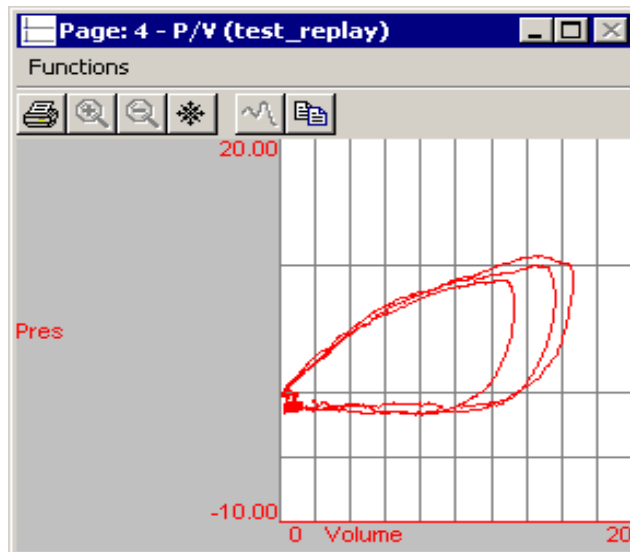
XY-Loop Graph Window

Scatter Graphs - A Scatter Graph allows two derived parameters to be plotted against each other. At the point of intersection, a "+" is draw to indicate where the values for the two derived parameters intersect.
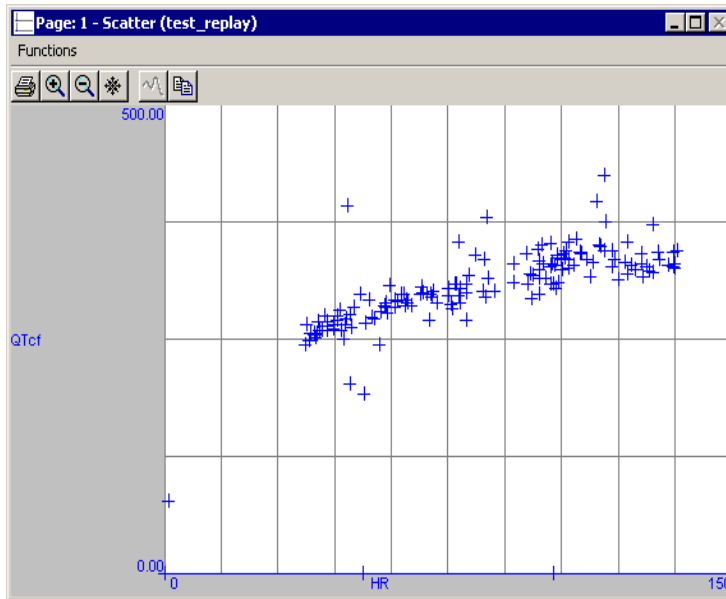
Scatter Graph Window

NOTE: **If a window overlays the right hand edge of the screen, Windows will scroll blank data into the window. To correct this, remove the overlay window from the edge.**

Tool Bar

The tool bar allows quick access to the following functions:

Print Tool bar Button

The Printer icon allows the printing of the image in the window.

Increase Magnification Tool bar Button

The Magnifier icon allows the window time base to be decreased by a factor of two. This is a quick way to divide the current axis time by two.

Decrease Magnification Tool bar Button

The Decrease Magnification icon allows the window time base to be increased by a factor of two. This is a quick way to multiply the current axis time by two.

Freeze Window Tool Bar Button

The Freeze Toggle icon allows the window contents to be frozen or unfrozen.

Autoscale Tool bar Button

The Autoscale icon allows the system to autoscale all the axes on the graphic screen. Before the autoscale is performed the User will be prompted to complete the autoscale function as shown below:
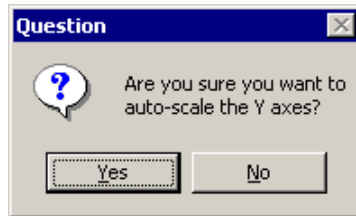
Copy Image Tool bar Button

The Copy Image icon allows the User to copy the graphic image to the clipboard, and therefore, allow pasting of the image into other applications, such as Microsoft Word. The tool bar or frame will not be part of the image.

Change Traces

Double click the left mouse button anywhere in any of the graph windows, and the **Change Trace** dialog will be displayed for that selected trace. Through this dialog, the User is able to change the boundaries of both the X and Y-axis or autoscale the axis.
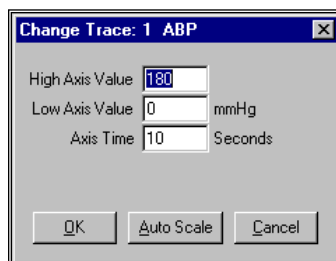
Change Traces dialog

- **High Axis Value** allows the User to change the upper limit of the Y-axis of the selected trace.

- **Low Axis Value** allows the User to change the lower limit of the Y-axis of the selected trace.

- **Axis Time** allows the User to change the range of the X-axis displayed on the graph.

- **Auto Scale** will automatically set the **High Axis Value** and **Low Axis Value**.

The selected axes will change immediately after **OK** is pressed.

Functions

The **Functions** menu is available on all graphs.
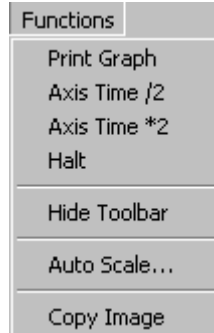
Functions Menu

Print Graph

Print graph prints the selected graph page to the currently selected Windows printer.

Axis Time /2

Axis Time /2 divides the current axis by 2.

Axis Time *2

Axis Time *2 multiplies the current axis time by 2.

Halt

Halt is active in both Acquisition and Replay modes. Selecting Halt stops the graphics screens from updating. Only the information that was on the screen when the User selected **Halt** will display until the User deselects **Halt**. Functions such as acquiring raw analog data and analyzing the data continue, but the screens will not display this new data until **Halt** is released.

Hide Tool Bar

Hide Tool bar toggles the hiding of the tool bar. This is useful to make the full area of the window available to the graphing of data. The system will remember the status of the tool bar when exiting Replay or Acquisition mode and use the same configuration the next time the mode is entered.

Auto Scale

Auto Scale will perform an auto scale on all axes by setting the low and high axis value for each trace. This function is not available for the XY-Loops or Scatter graphs.

## Copy Image

Copy Image allows the User to copy the graphic image to the clipboard, and therefore, allow pasting of the image into other applications, such as Microsoft Word. The tool bar or frame will not be part of the image.

On-Line Keys

Introduction

The following is a list of all function keys active during Acquisition and Replay modes.

Enable Measure - F5

Allows the Measure functions to be used during replay. See the Measure section of the manual for details on using measure.

Save Raw Data - Ctrl + F6

This function key is only active in Acquisition mode.

Pressing <Ctrl><F6> causes the raw input data to be saved in the .RAW file. This can be toggled on and off throughout the experiment. The Save field in the bar at the bottom of the Main window shows if raw data is currently being saved.

Halt - F7

This option is only available in Replay mode. Selecting **Halt** causes all activity to stop. This allows the User to jump to a new time point or print different screens.

Logging Rate - F8

Pressing this key causes the **Logging Rate** dialog to be displayed.

This dialog allows the User to change the logging rate of derivation files and graphs as the data is being acquired or replayed.
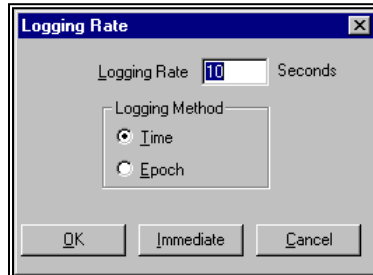
Logging Rate Dialog

- **Logging Rate** (seconds or cycles) determines how often data is plotted on the graphs and logged into the files.

- Logging Method

    - **Time** sets the Logging Rate to seconds.

    - **Epoch** sets the Logging Rate to cycles (beats, breaths, contractions, etc.).

- **Immediate** causes the system to begin using the new logging rate immediately.

- **OK** causes the system to wait until the last logging rate has expired before beginning the new logging rate. For example, if the last logging rate was 30 seconds, but only 20 seconds has elapsed, choosing **OK** causes the system to wait 10 seconds, perform a log function, then begin using the new logging rate.

A message is inserted into the .DER file to notify that a change occurred at that point in time. The message will be surrounded by asterisks, (**), allowing the message to be parsed out if needed.

Events - F9

Pressing this function key causes the **Enter Event** dialog to be displayed.

Validate - F10

This option validates that the analysis is triggering correctly. See the **Ponemah Analysis Modules Manual** for more information.

Page Mode - F3

This option is available only in Replay mode. It allows the system to automatically be halted after a primary screen has filled will data. To view the next full screen worth of data, use the **Halt** function.

Files

Introduction

Note: The figures shown in this section are only examples and may not be comprehensive, showing all necessary information.

.PRO Protocol File

This ASCII file contains all the information for a particular setup in the system. Some of the information it contains are:

Which input channels are enabled.

The analysis to be run on each channel and its attributes.

The derived parameters to be calculated for each analysis.

The calibration setup information.

When **Save** or **Save As** is selected on the main menu, the Protocol file is updated with the latest protocol information.

Archive this file with the .RAW and .EVT files to be able to recreate the exact experiment at a later time, if needed.
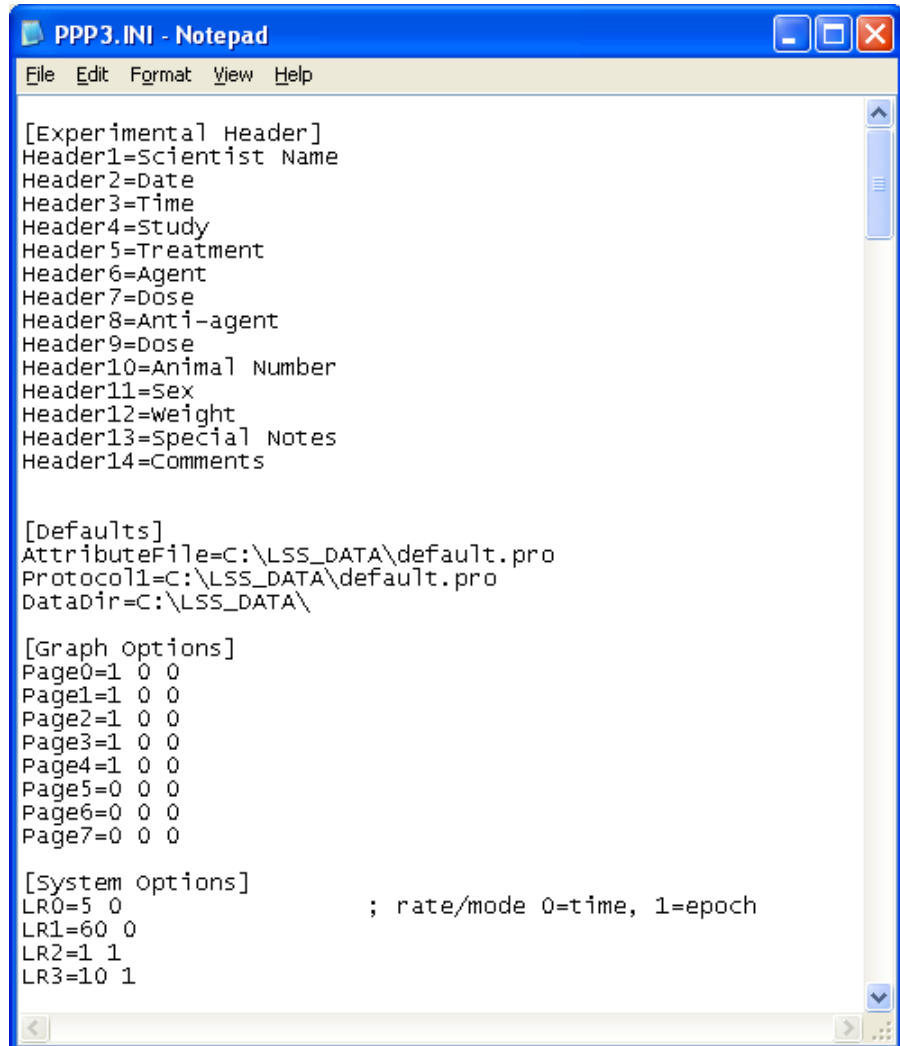
PPP3.INI - Configuration File

The .INI configuration file contains information that the program references for the startup procedure. The file is an ASCII file that can be edited by a normal ASCII editor and is located in the runtime directory with the runtime files for the system.

It is very important not to eliminate lines in this file. Information such as the default attribute file or graph options are in this file, and if the wrong information is entered into this file, data could be lost.

Before editing this file, a backup copy should be created.

The following is an example of an .INI file.

```
[Experimental Header]
Header1=Scientist Name
Header2=Date
Header3=Time
Header4=Study
Header5=Treatment
Header6=Agent
Header7=Dose
Header8=Anti-agent
Header9=Dose
Header10=Animal Number
Header11=Sex
Header12=Weight
Header13=Special Notes
Header14=Comments


[Defaults]
AttributeFile=C:\LSS_DATA\default.pro
Protocol1=C:\LSS_DATA\default.pro
DataDir=C:\LSS_DATA\

[Graph Options]
Page0=1 0 0
Page1=1 0 0
Page2=1 0 0
Page3=1 0 0
Page4=1 0 0
Page5=0 0 0
Page6=0 0 0
Page7=0 0 0

[System Options]
LR0=5 0                    ; rate/mode 0=time, 1=epoch
LR1=60 0
LR2=1 1
LR3=10 1
```

The User can edit this file, but each line must not be longer than 20 characters.

In this file, the **[Experimental Header]** section contains the Experimental Protocol Header.

The **[Defaults]** section has the default protocol file that is loaded at program startup. **AttributeFile=**, change this key to the desired protocol file.

The **[Defaults]** section also contains the last four used protocols.

Warning: **Change these values only with assistance from technical support!**

The **[Graph Options]** section is for certain graph page settings. There is an entry for each graph page, starting with **Page0=**.

The first value is whether or not the graph page tool bar is displayed, 0=hidden and 1=displayed.

The other two values are not used.

For the analysis module sections, refer to the specific analysis module in the **Analysis Manual**.

The **[System Options]** section allows the definition of the first four tool bar buttons, LR1 through LR4. The first value is the Logging Rate, and the second value is the Logging Method. A method of 0 is for time and a method of 1 is for epochs.

LR1 through **LR4** are the four logging rate tool bar buttons on the main window while in acquisition or replay. The first value is the number of seconds or epochs assigned to the logging rate button and the second value is logging mode. 0 is for time mode and 1 is for epoch mode.

Files Created During Acquisition or Replay

.RAW - Raw Data File

The .RAW data file is a binary file containing all the waveform data, scaling information, and actual channel setup of the system for data tracking. This file cannot be used by any other program. This file must be archived if the experiment is to be recreated.

.MEA - Measure Result File

The .MEA file contains data from the measure feature during replay. The contents of the file will vary with the type of measurement being performed (see **Measure**).

.JMP - Jump Index File for .RAW

The .JMP file is only used with older systems (prior to version 3.33). The .JMP file is used as an index file to jump quickly to a position in the .RAW file. .RAW files created on systems 3.33 or greater, the Jump information is appended within the .RAW file at the end of the acquisition.

.AMP - Signal Conditioner File

The .AMP file is a binary file that contains the configuration parameters for the 7700 signal conditioners. It is loaded and saved in concert with the like named .PRO [protocol] file and in general is always associated with the like named .PRO file. The .AMP file is created when a protocol file is created.

.TPL - Template File

The .TPL file is a file that contains information about specific ECG complexes used in the ECGPro Option. This file can be ported and saved to other studies.

. MP4/.XML - Movie File

Video files created using the Ponemah video option using Noldus Media Recorder. Data is collected from cameras and stored in these files.

. XLSX - Excel Output Files

Excel file will be created with all information from each subject in separate table/sheets.

There are 3 sheets, one for Data Reduction, one for Derivations that contain all subject data and a Group sheet that contains the subject specific information for the data contained in the other 2 sheets.

.SIG - Signature File

The .SIG file is created when using the Data Security Option (DSO). This signature denotes that the file integrity is intact and has not been modified from its original state.

.RVW - Review File

The .RVW file is created every time a Replay or Acquisition is performed. It is the recommended format for post processing data. This file contains a copy of the protocol file, marks section information and a pointer to the RAW file.
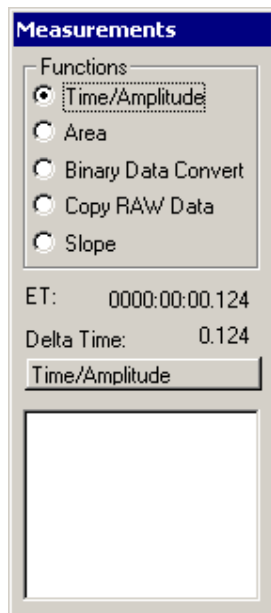
Measure

Introduction

The following section describes the use of the measure mode. It should be noted that measure mode is only available during the replay process.

In the measure mode, the system can measure, display, and update files for time/amplitude measurements, area measurements, convert sections of the binary .RAW data file to ASCII, copy a segment of the .RAW data file to a new file, calculate the slope of selected points, and data review (if Review channels are enabled; see the Data Review Manual for details).

To enable measure mode, the graph page that is going to be measured must be selected and the replay process must be halted. The next step is to Enable Measure either through the drop down menu or via the hot key (F5).

When Measure is running, the system will display the following selection dialog:

Measurement Dialog

From this the following functions are available:

- **Time/Amplitude** displays the maximum/minimum data point and time at the cursor locations.

- **Area** calculates the area between two cursors.

- **Binary Data Convert** converts a segment of the binary .RAW data to ASCII as set up with the **Binary Convert** dialog.

- **Copy RAW Data** allows a segment of the binary .RAW data file to be copied to a different file.

- **Slope** allows a slope value to be calculated from points measured along a waveform.

- **ET** is the elapsed time at the point of the cursor.

- **Delta Time** is the difference of time from the previously anchored cursor position to the current cursor position.

- **Message area** is the status for the current type of measurement being performed.
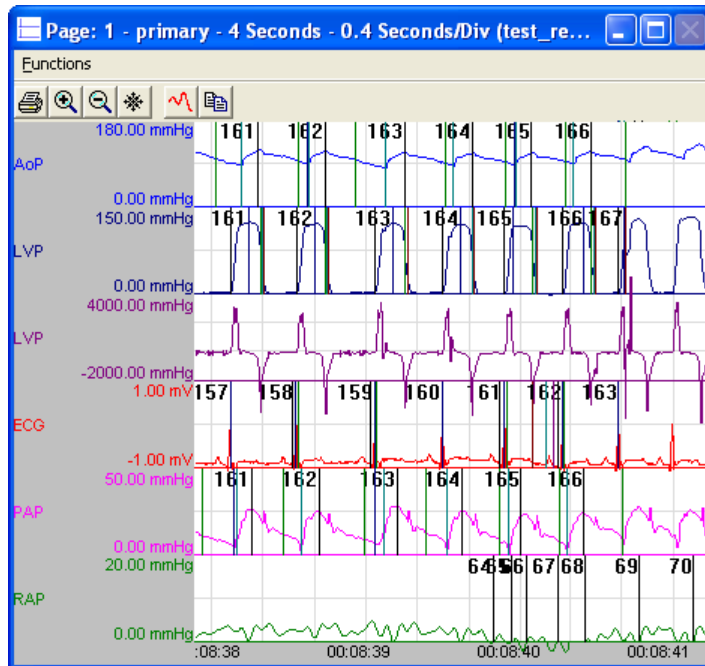
Cursor Measurements

The system allows the cursor to be moved pixel by pixel by using the left and right arrow keys. Pressing and holding the Shift key and the pressing the left and right arrow keys allows the cursor to move by ten pixels at a time. The cursor can also be moved by placing the mouse cursor on a waveform and then clicking the left mouse button.

When the left mouse button is clicked, the system takes a temporary data point for any of the measure functions. Depressing the right mouse button anchors the cursor into place.

Time/Amplitude

The Time/Amplitude measurements are available on the Primary, Trend, and Scatter graphic screens. A maximum and minimum data value is reported at the current cursor position along with the absolute (ET) and delta time at the cursor position. To update the .MEA file with the maximum and minimum values, press the Enter key.

When the right mouse button is clicked, the system will also reset the delta time to zero. Displayed below is a typical graph when the Measure utility is enabled for performing Time/Amplitude measurements.

Measure Screen

In the above graphic, each trace has the maximum value followed by the minimum value on the lower axis area.

In the **Measurements** dialog, the elapsed time of the cursor will be displayed as shown below.
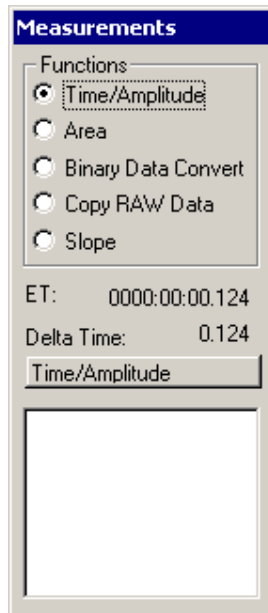
Measurement Dialog

Area

The Area measurement calculates the mean value and area under the curve for the selected trace. The system will use every sample point from the raw data file for this calculation.

To perform the area calculation, two cursor locations must be locked down. This is done by clicking the left mouse button followed by a right mouse button click. The system will draw a red vertical line at the first point.

The cursor then needs to be placed on the second point of interest, and then a left mouse button click followed by a right mouse button click. The system will then display a second green vertical line and display the Mean and Area values, along with writing the values into the .MEA file.

Binary Data Convert

The Binary Data Convert feature allows segments of the .RAW data file to be converted from binary to ASCII. The number of channels converted and the type of data converted is setup in the **Binary Raw Data Convert** configuration of the **PPP3 Setup** dialog. The system can convert the primary signal along with any derived signals, such as tidal volume, depending on the selections made in the **Binary Raw Data Convert** configuration.

To perform the binary to ASCII conversion, two cursor locations must be locked down. This is done by clicking the left mouse button followed by a right mouse button click. The system will draw a red vertical line at the first point.

The cursor then needs to be placed on the second point of interest, and then a left mouse button click followed by a right mouse button click. The system will then display a second green vertical line and then display a progress dialog box with a **Cancel** button.

No data values will be presented on the screen, only the progress of the conversion. The data values will be placed in the XLSX file with the time value in row column format.

Copy RAW Data

The Copy RAW Data function allows segments of the .RAW data file to be copied into a secondary file. This is useful to extract segments of the raw data into different files.

To perform the Copy RAW Data function, two cursor locations must be locked down. This is done by clicking the left mouse button followed by a right mouse button click. The system will draw a red vertical line at the first point.

The cursor then needs to be placed on the second point of interest, and then a left mouse button click followed by a right mouse button click. The system will then display a second green vertical line and then prompt for a new filename and then display a progress dialog box with a **Cancel** button.

NOTE: *The selected data must exceed a 32 KB block for this feature to operate properly.*

Slope

The slope calculation will calculate a slope value from multiple cursor samples. To make a slope calculation, the User would do multiple left mouse button clicks followed by right mouse button clicks on a waveform, and then clicking the right mouse button a second time on the final data point to perform the slope calculation. The Measure function will draw a dashed green line from the first slope data point to the last slope data point.

The slope value will be displayed in the **Measurements** dialog along with the channel of the slope.
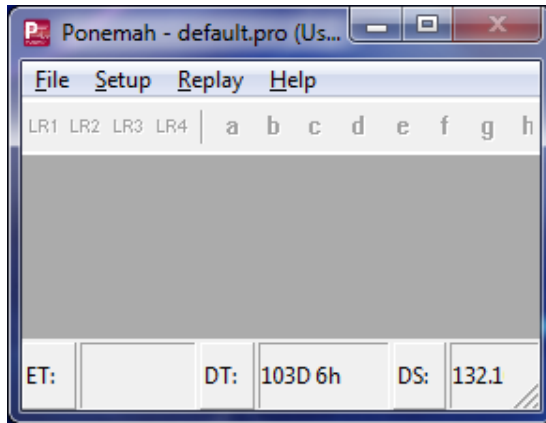
Ponemah Viewer

Introduction

The Ponemah Viewer is a stand-alone utility that allows a User to view, from a remote system, a Ponemah experiment that is currently acquiring data on a system in the laboratory. On the remote system, the User is able to replay data up to the most current point of the acquisition process.

Utilizing Ponemah Viewer does not require a software key and license file, nor does it require the remote system to be secured if the acquisition system is secured (per the Data Security Option for Ponemah). Since the User is not able to save changes made to an experiment or create an experiment, then having the system secured is not necessary. However, if the remote system is secured, the User will be prompted for an authorized access in order to gain access to the system.

When Ponemah Viewer is used on a remote system, it is necessary to permit access to the data folder to which the acquisition is being saved. This can be done by sharing the folder over the network and enabling the appropriate security preferences (see the Data Security Option Manual [MU00169] for the appropriate security preferences).

Ponemah Viewer will be accessed through the Ponemah menu. The Ponemah Viewer utility is similar to the Ponemah application; however, all features of Ponemah that are involved in acquiring or saving data will be absent in Ponemah Viewer, and the User will not be able to create files through Ponemah Viewer. The options that are selectable by the User have the same functionality described for the Ponemah application. The User will be able to make changes within the application (i.e. change attributes or protocol settings), however, these changes are local to the system being used to view the data, and therefore, will not affect the acquisition process. The changes are made only to replayed data on the viewing system.

Ponemah Viewer Window (Setup mode)

To use Ponemah Viewer on a remote system via a network, it is necessary to share the folder to which data is being acquired. The following steps may be taken to share a folder:

Appendix A

Setup Dialogs

Menu Grid Control

The following **PPP3 Setup** configurations use a menu grid control to allow easy, fast setup of protocol information:

- Channel Input Setup
- Groups and Events
- Digital Display Setup
- Alarm Setup
- Experimental Protocol Header
- Print RAW Data Setup
- Data Reduction Setup
- Graph Setup
- Binary Data Convert
- Data Parser Setup

This menu grid control display allows the User to make single modifications or a single modification executed to multiple items in the grid:

Item Activation

Single Cell Selections - Each cell in the menu grid control represents a specific piece of data related to setting up a protocol. Some cells are modifiable by the User (edit fields, combo boxes, check boxes, etc) and some are not (static fields).

The cell can be activated either by clicking the desired cell or moving the cursor to the cell and pressing the Space Bar. Upon activating the cell, the User may make appropriate modifications to the information within the cell.

Single Row - Individual rows can be selected in various ways. The User may use the mouse to activate an individual row by clicking the desired row. The User may also use arrow keys to navigate to each desired row.

Multiple Rows - If the mouse is clicked and then dragged across multiple rows all rows underneath the cursor will be selected.

The User can select/deselect multiple rows by holding the CTRL key and clicking on each desired row.

The User can select/deselect multiple rows by holding the SHIFT key, clicking on the first desired row and the last desired row. All rows in between will become activated.

Note: The same concept for activating row(s) applies to menu grid controls that have multiple tabs with the configurations (Experimental Protocol Header, Data Reduction, and Recorder). If the User wants to set up information for the same item found under multiple tabs, then the User may activate the tabs similar to activating rows.

Left / Right Mouse Clicking

Left Mouse Clicking - Left mouse clicking within an activated cell allows the User to directly make modifications to the information within the activated cell. Left mouse clicking is recommended when making single changes within the menu grid control.

Right Mouse Clicking - Right mouse clicking within activated row(s) will bring up a context menu. Each **PPP3 Setup** configuration has its own unique context menu. Right clicking activities are recommended when making the same modification to multiple items in the grid control; however, the User can opt to use the context menu for making single changes as well in the configurations.

Context Menu Dialogs

Certain options in the context dialog will bring up sub dialogs where the User is able to further define information. These options will vary for different configurations.

Change dialogs

In some cases, a dialog will appear allowing the User to set a single text label for multiple items; this dialog is available as **Change Label**, **Change Unit**, and **Change Name**. If available, an **Advanced** button will be visible, displaying a list of items to be modified and allowing for advanced defining of the text label.

Below is example of setting up a **Label** using the **Advanced** feature. In the example below, ECG was selected as the "Label" to be represented for "Inputs 1 - 6". In the **Starting With** edit field, the alpha character, "b" will be appended to "ECG" for "Input 1". In the **Stepping By** field, the number "2" was entered. Therefore, for each subsequent input, an alpha character will be appended to "ECG" staring with the letter "b", but the appended letter will be increased by two.
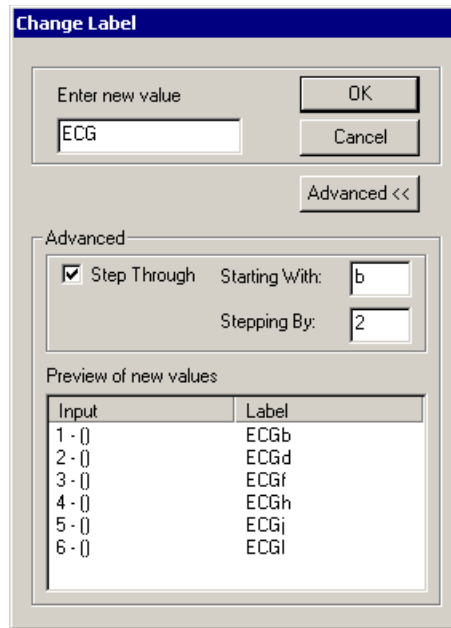
Change Label - Advanced Dialog

Advanced

This button allows the User to bring up the Advanced sections in the dialog in order to further define the label.

Step Through

This check box enables the Advanced features, allowing the User to make changes to this section.

Starting With

This edit field allows the User to enter either an alpha or numeric value (up to 3 characters) that will be tagged to the label defined in the **Enter new value** edit field.

Stepping By

This edit field allows the User to enter a numeric value. This numeric value will be used to increment the **Starting With** characters by the amount indicated in the Stepping By number.