



***POWER LEADER™***

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***PQ Analyst***

**User's Guide  
GEH-6517**

*GE Power Management Control System 6.11a*



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# PQ Analyst

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## Introduction

PQ Analyst increases the effectiveness of your PMCS product. It automatically generates a verity of power and power quality reports when a problem is detected. It can also be schedules to generate the same reports on a periodic basis. These automated reports include a complete artificial intelligence based executive level report as well as a group of descriptive charts and graphs that allows you to quickly identify and solve power related problems. This proactive reporting process is a major advancement over existing systems that require a manual review of data to spot problems.

PQ Analyst is designed to be simple to setup. For each power-monitoring device, the user is shown a list of available jobs. The user then selects the jobs they want to run and under what condition. A user can schedule a job, such as a Sag Frequency Chart, to run periodically, say, once a month, or when a power measurement parameter exceeds a user selectable threshold. Reports can be emailed or even placed on a user's web site. Users also have the ability to be paged or alarmed when a power problem occurs.

PQ Analyst is integrated seamlessly into PMCS and Waveform Analyst. Setup is minimal. During setup, PQ Analyst automatically becomes "aware" of all PMCS waveform-recording devices and keeps the list of devices current as new waveform recording devices are added to PMCS. Users can quickly view reports for any device as well as have the complete flexibility of charting the raw data using Waveform Analyst.

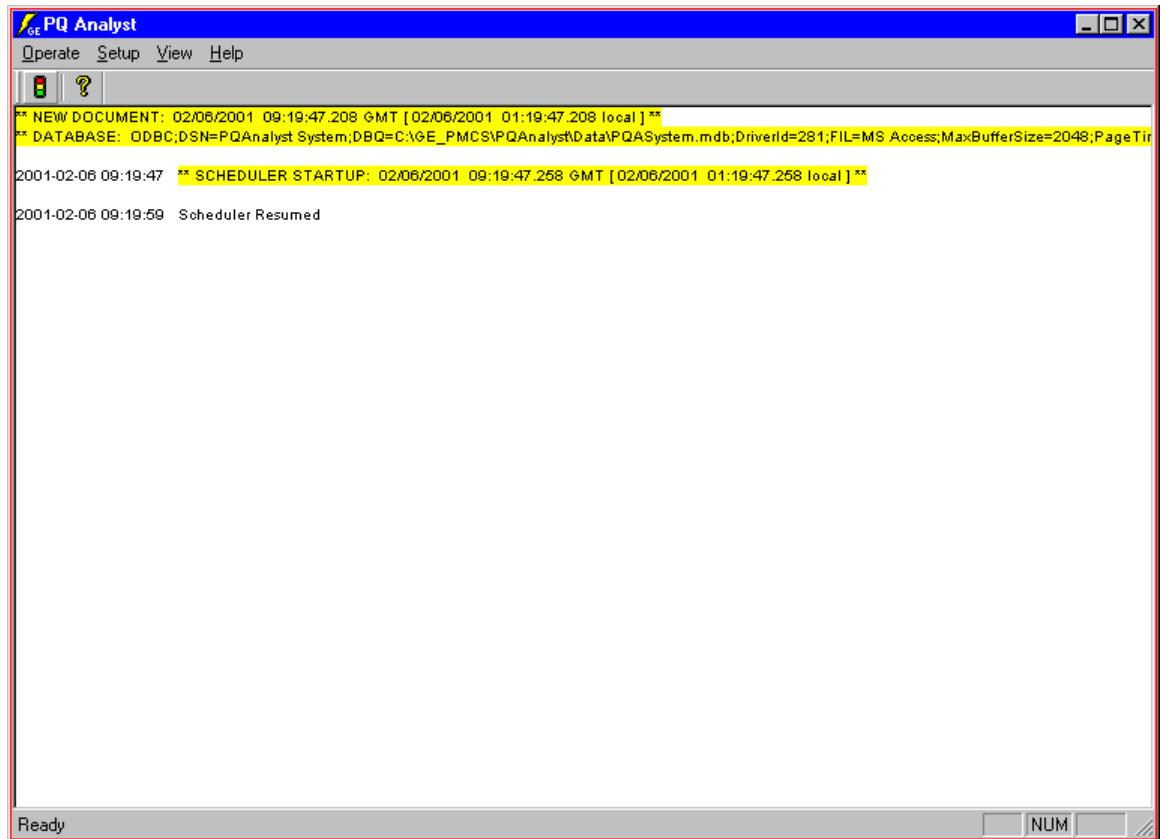
It is planned that new job and report types will be continuously added to PQ Analyst. The objective is to proactively identify problems to allow you to lower your costs and improve facility reliability.

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## Operation

### Menu Reference – Operate

The Operate menu contains the following items: Start, Stop, Save Log, Clear Log, and Exit.



## Operate Menu - Start

Select this to start the scheduler whenever it has been stopped. The 'stoplight' button on the toolbar will 'pop up' to indicate that the scheduler is running, and a message will be added to the scheduler log.

## Operate Menu – Stop

Select this to temporarily stop the scheduler. Any job that is currently running will be allowed to finish. Any job that is in a 'retry loop' will exit the retry loop.

To indicate that the scheduler has stopped, the 'stoplight' button on the toolbar will remain 'pressed', and a message will be added to the scheduler log.

You can use 'Operate' 'Stop' to temporarily stop the scheduler so that you can avoid 'locking' issues when editing device and/or job properties.



## **Operate Menu - Save Log**

Use this to save the current scheduler log to a text file.

## **Operate Menu - Clear Log**

Use this to clear the current scheduler log. You will be prompted to save the log before clearing. If you do not want to save the log, you may press 'No'. Pressing 'Yes' saves the log to a text file that you choose. Pressing 'Cancel' exits and does not clear the log.

## **Operate Menu - Exit**

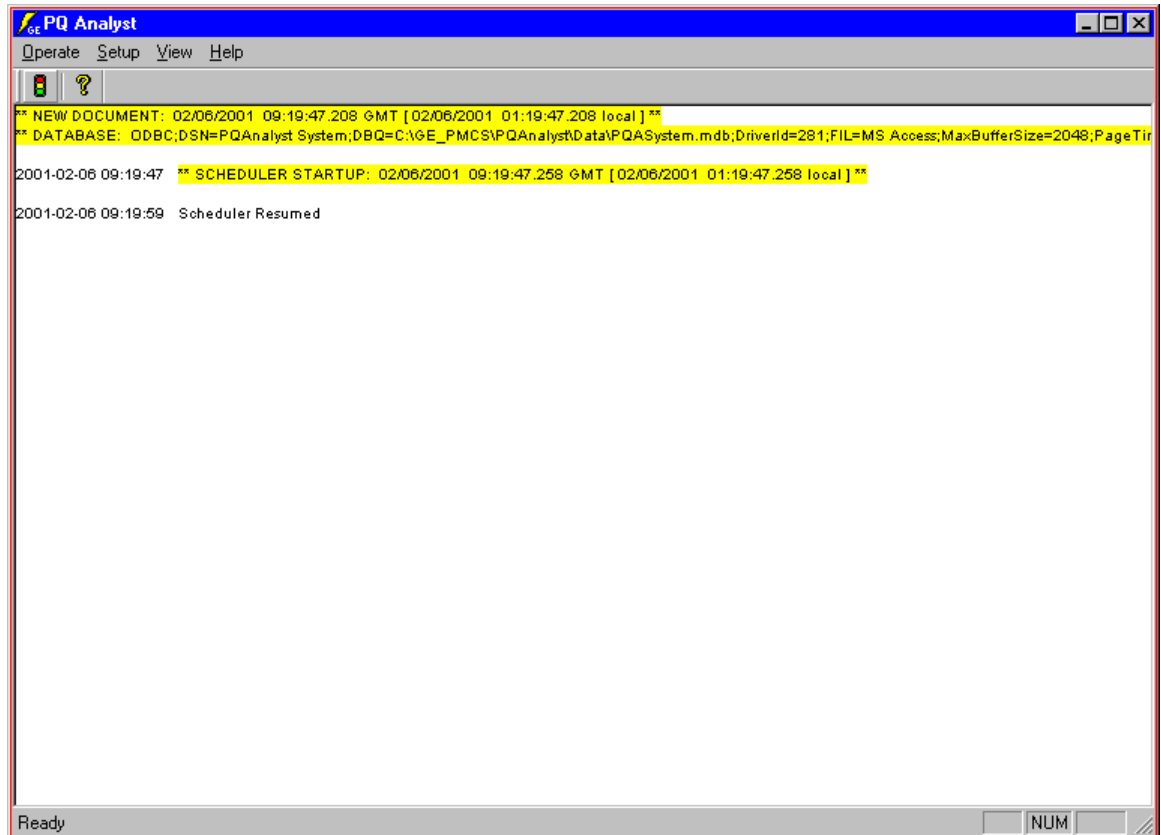
Use this to end PQ Analyst. If there are any running jobs, PQ Analyst will wait for them to complete.

You will also be presented with a dialog box that will allow you to stop any running jobs before they complete, if any jobs are in progress. You should ONLY do this if there is a problem that requires you to immediately end these jobs. You should be aware that stopping a job before it completes could create problems with the databases that would be extremely difficult to repair.

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## Menu Reference – Setup

The Operate menu contains the following items: System, Devices, and Jobs.



### Setup Menu - System

Selecting this menu first prompts you to shut down the scheduler. You should choose 'Yes' to stop all running jobs, and completely shut down the scheduler, if you plan on changing any system information. If you only want to view the system information, you do not need to shut down the scheduler. However, changes to system information while jobs are running could result in serious problems and loss of data.

You will be supplied with a dialog box similar to this one:

**DB Version:** Indicates the current database version (read-only)

**COMM Drive:** The drive on which the device 'raw' data is stored. This is normally "C:"

**PQ Drive:** The drive on which the report and graph data is stored. This is normally "C:"

**PQ Root Path:** The 'root path' for the data file storage. This is normally "GE\_PMCS\PQAnalyst\Data".

The 'root path' is assembled along with the 'PQ Drive' or 'COMM Drive' (as appropriate) to form the fully qualified path for the associated data files.

**FTP Server:** The 'ftp server' for uploading report files. If you do not have one, you should leave this blank. Otherwise it's an IP address or URL.

**FTP Root:** The 'root path' on the FTP Server. Typically this will be an 'upload root', such as '/FTPUpload', where users have write access. This will also be the initial directory when connecting to the FTP server.

**FTP PQ Path:** This duplicates the functionality of the 'PQ Root Path'. The 'FTP Root' is assembled along with the 'FTP PQ Path' to form an absolute path on the FTP server.

**FTP User:** The user name for logging on to the FTP server. This user must have write access to the path specified above.

**FTP Password:** The password associated with the user name specified above.

**MAIL Profile:** For sending e-mail, this is the 'MAPI Profile'. If you are using Outlook Express, you should select the 'mail account' name from the 'accounts' list (use 'Tools' 'Accounts' from Outlook Express, and select the 'Mail' tab to view them).

**Mail PW:** If required, the password needed to access the MAIL profile.

**Mail 'From':** The FROM address for e-mail. Typically this will be in a format similar to:

"Your Name"[yourname@yourdomain.com](mailto:yourname@yourdomain.com)

If you specify a name that is already in the address book associated with the MAIL Profile, the remaining information should be automatically filled in for you when the e-mail is sent.

**Site Server IP:** This is the IP address for the 'WFA Server', for remote access to the device (or 'site') data. If you are not running WFA Server, you should leave this blank. If you specify a Site Server IP

address, this information will be used to create '.wfr' analysis files that can be uploaded to an FTP server and used by remote clients to view the device's event and waveform data remotely.

## Setup Menu - Devices

When you select 'Setup Devices' you are presented with a list of the currently known devices. New devices are automatically added to the PQAnalyst System database by the 'COMPIMP' service whenever data from the new device has been made available by the PMCS system. PQ Analyst displays a 'snapshot' of these known devices.

Once you select a device, you will be presented with the following property sheet:

The screenshot shows a dialog box titled "Device - Basic Properties". It contains the following fields and controls:

- Description: ml760:TMC
- Device Dir: DEV00001
- Unit ID: (empty)
- Next D/L: (empty)
- DL Frequency: On Demand
- Circuit Type: 3 PHASE WYE CIRCUIT
- Nom. Voltage: 12000
- Nom. Current: 0
- Buttons: OK, Apply, Cancel
- Checkboxes: Delete Raw, Delete FTF (unchecked)
- Checkbox: Disable (checked)

**Description:** This is the device name obtained from the COMTRADE file. You can change this to a new description that better represents what the device is measuring, for example "Main Panel" or "Number 4 Milker".

**Device Dir:** This is normally assigned a unique value when the device is added to the system. You can change this if you like, but you should be certain that it does not conflict with any other devices. It normally follows the pattern of 'DEVnnnn' where 'nnnn' is equal to the device's unique 'Site Equipment ID' from the PQAnalyst System database.

**Circuit Type:** This will typically be "3 PHASE WYE CIRCUIT" or "3 PHASE DELTA CIRCUIT" (or similar). This value is initially assigned from information in the COMTRADE files when the device is added to the database. If you need to change it, you can select one of the circuit types from the 'combo box'.

**Nom Voltage:** This is the 'nominal voltage' of the circuit being measured by the monitoring device. This value is used in reports for scaling purposes and for limits calculations. It is automatically assigned to a "best value" when the device is first added to the database. However, you may find it necessary to adjust this to the actual nominal value for the circuit. Typical values are 120, 277, 480, 12000.

**Nom Current:** This is the 'nominal current' for the circuit being measured by the monitoring device. If there is no known nominal current, you can leave this blank or enter '0'. The 'nominal current' is typically used for limits calculations and in reports for scaling purposes only.

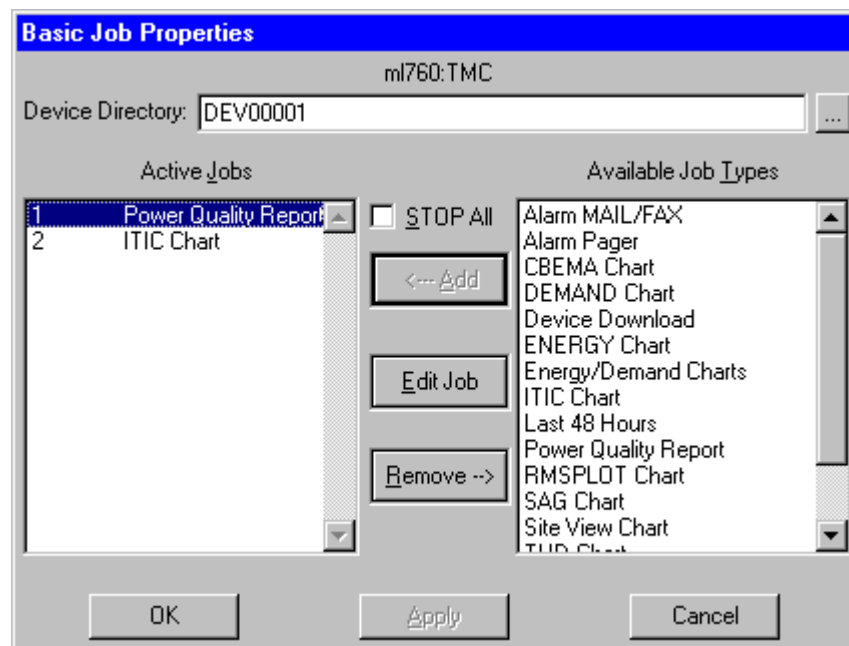
**Apply Limits/Nominals:** This uses the nominal voltage and nominal current that you enter, and applies the changes to the entire circuit being measured. It also calculates several limits for you, based upon these nominal values.

**OK / Apply / Cancel:** These buttons allow you to save changes, or cancel and close the property sheet without saving any changes. Pressing 'OK' automatically saves changes, and closes the dialog box. Pressing 'Apply' commits any changes immediately, but leaves the property sheet open. Pressing 'cancel' discards any changes since the last 'Apply' and closes the dialog box.

## Setup Menu - Jobs

When you select 'Setup Jobs' you are presented with a list of the currently known devices. New devices are automatically added to the PQAnalyst System database by the 'COMPIMP' service whenever data from the new device has been made available by the PMCS system. PQ Analyst displays a 'snapshot' of these known devices.

Once you select a device, you will be presented with the following property sheet:



**Device Directory:** This is normally assigned a unique value when the device is added to the system. You can change this if you like, but you should be certain that it does not conflict with any other devices. It normally follows the pattern of 'DEVnnnn' where 'nnnn' is equal to the device's unique 'Site Equipment ID' from the PQAnalyst System database.

**STOP ALL:** checking this box stops ALL jobs for this device

**Active Jobs List:** This is a list of active jobs for the device. The descriptions that you see here match the description that you assign to the job when you create it. By default the description matches the job type. However, you can give it a more meaningful description, such as "Carol's Report" or "Monthly Summary".

**Available Job Types:** You can add a new job by selecting one of the items in the 'Available Job Types' list, then pressing 'Add'.

**'Add' button:** Adds an item from the 'Available Job Types' list, and automatically opens the 'Job Properties' dialog box so that you can edit the job's properties before saving it.

**'Edit' button:** Opens the Job Properties dialog box for the job selected in the 'Active Jobs List'.

**'Remove' button:** Removes the job selected in the 'Active Jobs List'.

**OK / Apply / Cancel:** These buttons allow you to save changes, or cancel and close the property sheet without saving any changes. Pressing 'OK' automatically saves changes, and closes the dialog box. Pressing 'Apply' commits any changes immediately, but leaves the property sheet open. Pressing 'cancel' discards any changes since the last 'Apply' and closes the dialog box.

Whenever you edit a job, a dialog box similar to this will appear:

The screenshot shows a dialog box titled "Basic Job Properties". It contains the following fields and controls:

- Description:** Text box containing "Power Quality Report".
- Job Type:** Text box containing "Power Quality Report".
- Next Event:** Empty text box.
- Frequency:** Dropdown menu set to "User Defined -->" and a text box containing "240".
- Trigger Type:** Dropdown menu.
- Low Limit:** Text box.
- High Limit:** Text box.
- Recipient:** Text box containing "bob@server".
- Disposition:** Checkboxes for "FTP Xfer" (unchecked) and "Mail/FAX" (checked).
- Optional Message Text:** A large empty text area.
- Buttons:** "STOP Scheduling" (unchecked), "Schedule Now" (unchecked), "OK", "Apply", and "Cancel".

**Description:** Typically this will match the job type from the 'Available Job Types' list. However, you can assign your own description, such as "Carol's Report", or "Month-End Summary".

**Job Type:** Read-only job type from the 'Available Job Types' list.

**Next Event:** the next date/time on which this job will run. Initially this value is blank, which implies that it will run immediately unless you use a 'trigger' (or 'alarm') to schedule it.

**Frequency:** This indicates how often the job will run. You can select a pre-defined frequency, such as monthly, quarterly, annually, or a 'user-defined' frequency, which is in minutes. The default is 240 minutes.

You can also select 'trigger' as the frequency. In this case, a value that exceeds the settings for the specified "trigger type" will cause the job to run.

**Trigger Type:** Only active if you select 'trigger' as the job's frequency. A typical 'trigger type' might be RMS VOLTS. If one of the phase's RMS voltage were to exceed the high or low limits, a 'trigger' would be generated that would cause this job to run.

**Low / High Limit:** Enter the limits here for the 'trigger type' you selected. If you leave an entry blank, no limit will apply for that item.

**E-MAIL RECIPIENT**: If you elect to e-mail a report, this entry contains the e-mail address list. Separate each entry with a ‘;’. The e-mail addresses should take the form of “Recipient Name”<recipient@domain.com> or simply ‘recipient@domain.com’. Quote marks should be used on the recipient name whenever it is specified in addition to the e-mail address.

**Disposition**: When multiple ‘dispositions’ are possible, you will see a list that includes checkboxes labeled FTP, e-mail, and so-on. If you check the ‘FTP’ box, the reports will be sent to the default FTP server as specified in the System settings. If you check the ‘e-mail’ box, the reports will be sent via e-mail to the addresses specified in the ‘E-MAIL RECIPIENT’ box.

**Optional Message**: On many reports, especially those that can be e-mailed, the ‘optional message text’ appears on the e-mail.

**OK / Apply / Cancel**: These buttons allow you to save changes, or cancel and close the property sheet without saving any changes. Pressing ‘OK’ automatically saves changes, and closes the dialog box. Pressing ‘Apply’ commits any changes immediately, but leaves the property sheet open. Pressing ‘cancel’ discards any changes since the last ‘Apply’ and closes the dialog box.

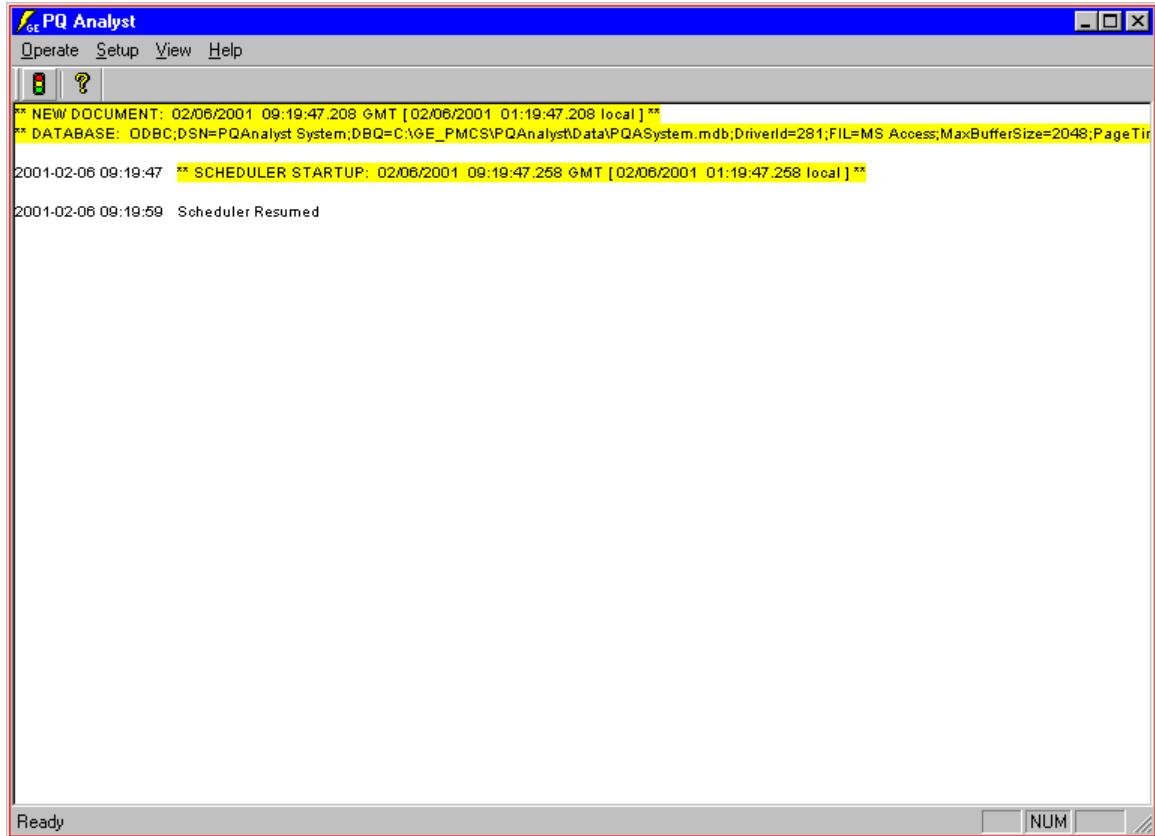
**Stop Scheduling**: By checking this box, you can temporarily stop this job from being scheduled. This may be required if a device stops producing data, or if you do not want to alter the existing report files until some outside event has taken place (such as a meeting or an audit of some kind).

**Schedule Now**: By checking this box, you can force a job to run immediately. The schedule will be updated only if the current date/time follows the next scheduled date/time.

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## Menu Reference – View

The View menu contains the following items: Toolbar, Status Bar, Reports, Graph, and Refresh.



### View Menu - Toolbar

Selecting this shows the tool bar. A check box will appear next to the menu whenever the tool bar is visible.

### View Menu - Status Bar

Selecting this shows the status bar. A check box will appear next to the menu whenever the status bar is visible.

### View Menu - Reports

Selecting 'Reports' first prompts you with a list of monitoring devices. If you select a device, PQ Analyst will open an 'explorer' window in the "history" directory where the report files are located. From here you can view the files directly by double-clicking their icons in the 'explorer' window.



## **View Menu - Graph**

Selecting 'graphs' first prompts you with a list of monitoring devices. If you select a device, PQ Analyst will open Waveform Analyst for the selected device, with month to date data pre-selected for you. As well, the device's entry will remain locked until you close Waveform Analyst. This is the safest way to view a device's data while PQ Analyst is running.

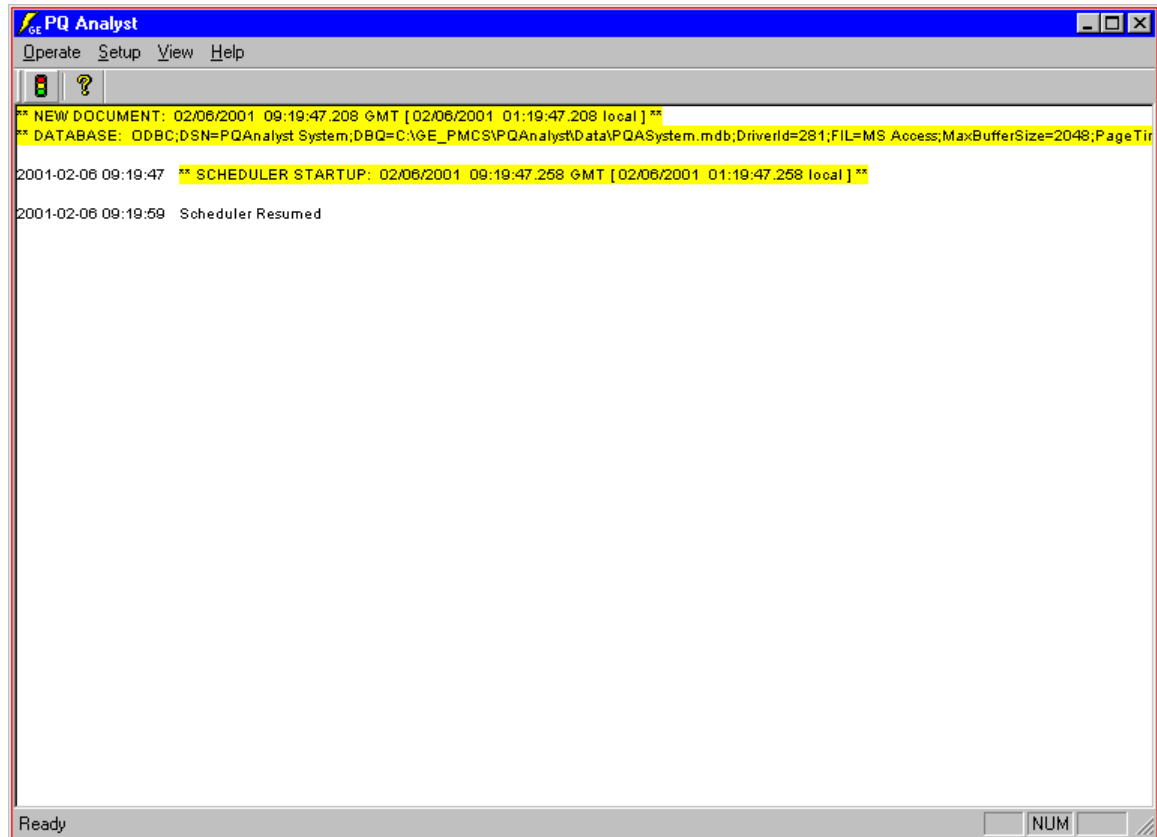
## **View Menu - Refresh**

Selecting 'refresh' forces the scheduler log display to refresh itself.

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## Menu Reference - Help

**About PQ Analyst** – displays a dialog box indicating the current version of PQ Analyst and copyright information.



# PQ Analyst - Troubleshooting

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## Troubleshooting

If you experience any problems with PQ Analyst, there are several probable causes that you should investigate yourself before seeking technical support.

### **A. PQ Analyst can't open the 'PQAnalyst System' Data Source**

- a) Most likely this is due to a problem with the ODBC configuration.
- b) From the 'Start Menu', select 'RUN' and 'ODBCAD32'
- c) From the ODBC Administrator, select the 'System DSN' tab
- d) Check for the presence of 'PQAnalyst System' and 'PQAnalyst Data'

If these data sources are missing, you will need to re-add them. Use 'Add' to re-add these data sources. By default they will use the 'MS Access 97 Database' driver, and the two '.mdb' files will be located in C:\GE\_PMCS\PQAnalyst\Data.

Additionally, you should make sure that nobody is trying to access this database using a database client application such as Microsoft Access. Such applications often "lock" the database and prevent anyone else from opening it. If an application were to 'lock' the database, PQ Analyst would not be able to open its system database and it would give you an error similar to the one you get if the database does not exist.

### **B. I keep getting an error message similar to 'Unable to get equipment info'**

Again, this is most likely due to a problem with the ODBC configuration. In this case, it would be the 'PQAnalyst Data' data source that is affected. You should make sure that the 'PQAnalyst Data' data source is properly configured using the ODBC Administrator (see above), that the 'PQADData.mdb' file is present in the PQAnalyst 'data' directory (by default, C:\GE\_PMCS\PQAnalyst\Data ) and that nobody has attempted to open this '.mdb' file with a database client application such as Microsoft Access while PQ Analyst is trying to access it. It is also possible to get this error message if there is a problem with the database. If you believe that this is the case, you can try using the 'Setup Devices' menu to view the device properties, and correct any problems.

### **C. Ai\*Power will not run a report (the log says "no IDX file" or a similar message), and it is the first day of the month.**

Sometimes at the beginning of a month there will be no data for Ai\*Power to report on, and its output files will not be generated. This is most likely caused by a device that has not generated any data yet for the current month. To solve this problem, you can manually trigger the device to generate a new set of data, or set the reporting time and frequency so that this condition is avoided.

### **D. The report was scheduled to be e-mailed, but the report was not attached to the e-mail that was actually sent.**

This can happen when a 'Simple MAPI' client OTHER than Outlook Express has been chosen. 'Microsoft Outlook' handles its attachments differently, and other mail clients may not be able to read them. To avoid this problem, open the 'Outlook Express' application on the machine that is running PQ Analyst, and select 'Tools' 'Options', and make sure there is a check in the box labeled "Make Outlook Express my default Simple MAPI Client" (this should be located on the 'General' tab).

#### **E. Adobe PDF Writer just prompted me for a file name. What do I do?**

This is a known problem with the PDF Writer. You should select an output file the first time this shows up and press 'OK', then re-run the same job after it completes so that the data is written to the correct output file. Normally it will only happen one time after installing the PDF Writer. If you continue to get prompted for an output file name, you should try re-installing the PDF Writer.

In all cases, if you experience any problems that you cannot readily solve and you believe you need technical assistance, you should do the following BEFORE contacting anyone for outside technical support:

1. Make sure you know the version of PQ Analyst that you have installed. You can determine this by selecting the 'Help' 'About PQ Analyst' menu and writing down the version number.
2. Note the type and number of devices you have installed with the PMCS system.
3. Note the version of Windows you are running, and any applicable service packs that are installed. You can get this information by opening 'Explorer', then selecting 'Help' 'About'.
4. Indicate which services are running (PMCS2FTF, COMIMP, WFASrv).
5. Make sure that the ODBC data sources for 'PQAnalyst System' and 'PQAnalyst Data' are properly configured, and that no other process (on the current machine or across the network) is attempting to access the database files exclusively.
6. Try to reproduce the problem. If you are successful, please record the exact steps you used to create the problem, and any error messages or message boxes that you encounter. Screen captures can also be useful, but are far less helpful than a simple transcription of an error message along with the steps to reproduce it.

# Waveform Analyst

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## Introduction

Waveform Analyst is a powerful graphing and charting software application to view and analyze large quantities of power measurement data in the OPEN database. Waveform Analyst allows a user to quickly identify and evaluate power problems or to generate executive level trend and summary reports.

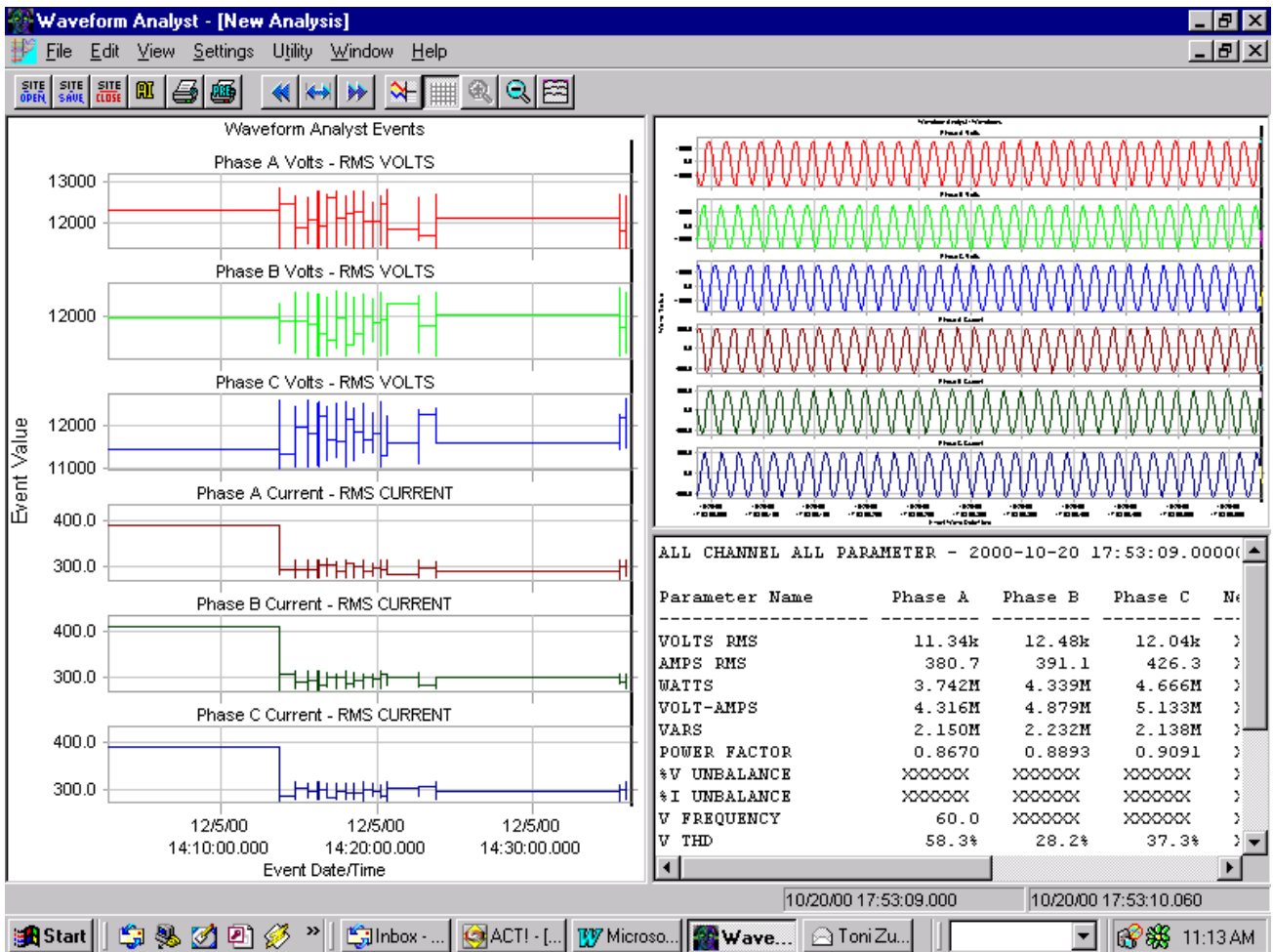
Waveform Analyst can be used to evaluate all channels from a single monitor or selected channels of any group of monitors. Up to any combination of eight channels can be displayed simultaneously. For viewing more channels multiple instances of Waveform Analyst can be launched.

Waveform Analyst has a suite of informative charts and graphs. New charts will be added regularly. Chart types include those for standard time plots, CBEMA, ITIC, sag frequency, harmonic distribution, and energy analysis.

Waveform Analyst is a desktop application. A web enabled version, Waveform Analyst Server with its corresponding client application, Waveform Analyst Remote, is discussed at the end of this chapter.

A powerful feature of Waveform Analyst is its dynamic interaction of the multi window interface. The three windows, or PANES, allow a user to quickly identify data of interest and to jump to the associated waveforms or detail that describe the event. Waveforms can be dynamically changed to phasors or harmonics by a click of the mouse.

Once these events of interest have been identified they may be manually analyzed or fed directly into an artificially intelligent sister application, Ai\*Power, which will perform additional data filtering, data analysis and report generation. The following is a typical example of how this Three Pane Browser appears when viewing an RMS time-plot, along with the waveforms associated with it.



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## Overview - Features

Waveform Analyst offers many features that are designed for ease of use

1. Interactive Windows allow jumping between analysis summaries and individual events
2. Scrolling and Zooming capability
3. Automatic circuit parameter calculations from waveform data
4. Data Filtering
5. Output to Ai\*Power for detailed power quality analysis
6. FTF and PQDIF file transfer formats for transferring data
7. ODBC client, compatible with standard database engines
8. RMS Time Plots, CBEMA, ITIC, SAG Frequency, THD Histogram, Unbalance Histogram, Energy, Demand, and Waveform plots.
9. 'All Channel All Parameter' calculations 'on the fly' for any given set of events and/or waveforms.
10. Printing and Exporting of screen output into a number of standard formats, including text files, bitmaps, and windows metafiles.

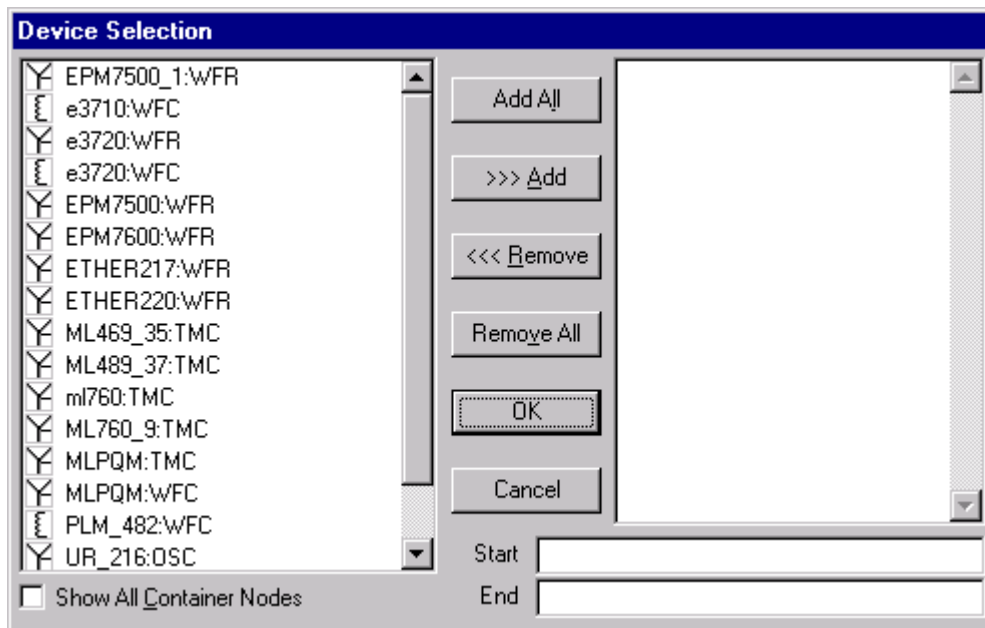
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# Waveform Analyst - Operation

## Quick Start (to view data from a single device)

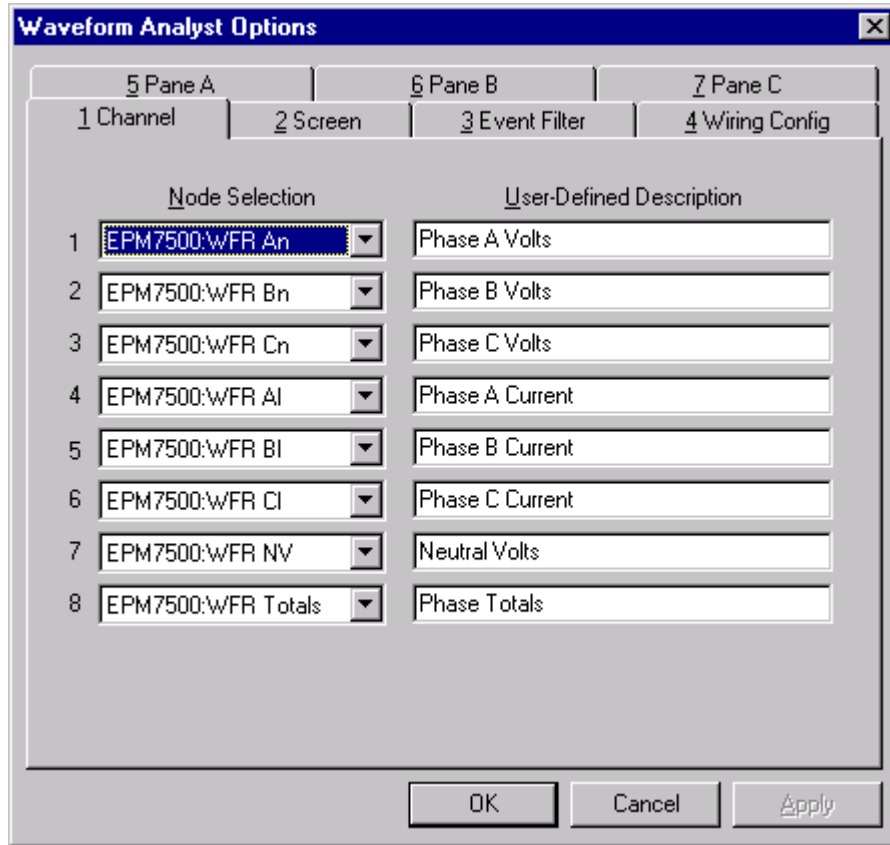
---

Launch Waveform Analyst. From the File menu select New Analysis. A list of devices should be displayed as shown in Figure X. This group of devices represents those that recorded power waveform data. If a list of devices is not displayed then it may be due to the fact that your PMCS has not collected waveform data since the installation of Waveform Analyst on your PMCS server. Waveform Analyst will create new device locations on the fly as they are added to your PMCS system. The names automatically given are the unique identifiers given by PMCS. Select the device you want and click ADD.

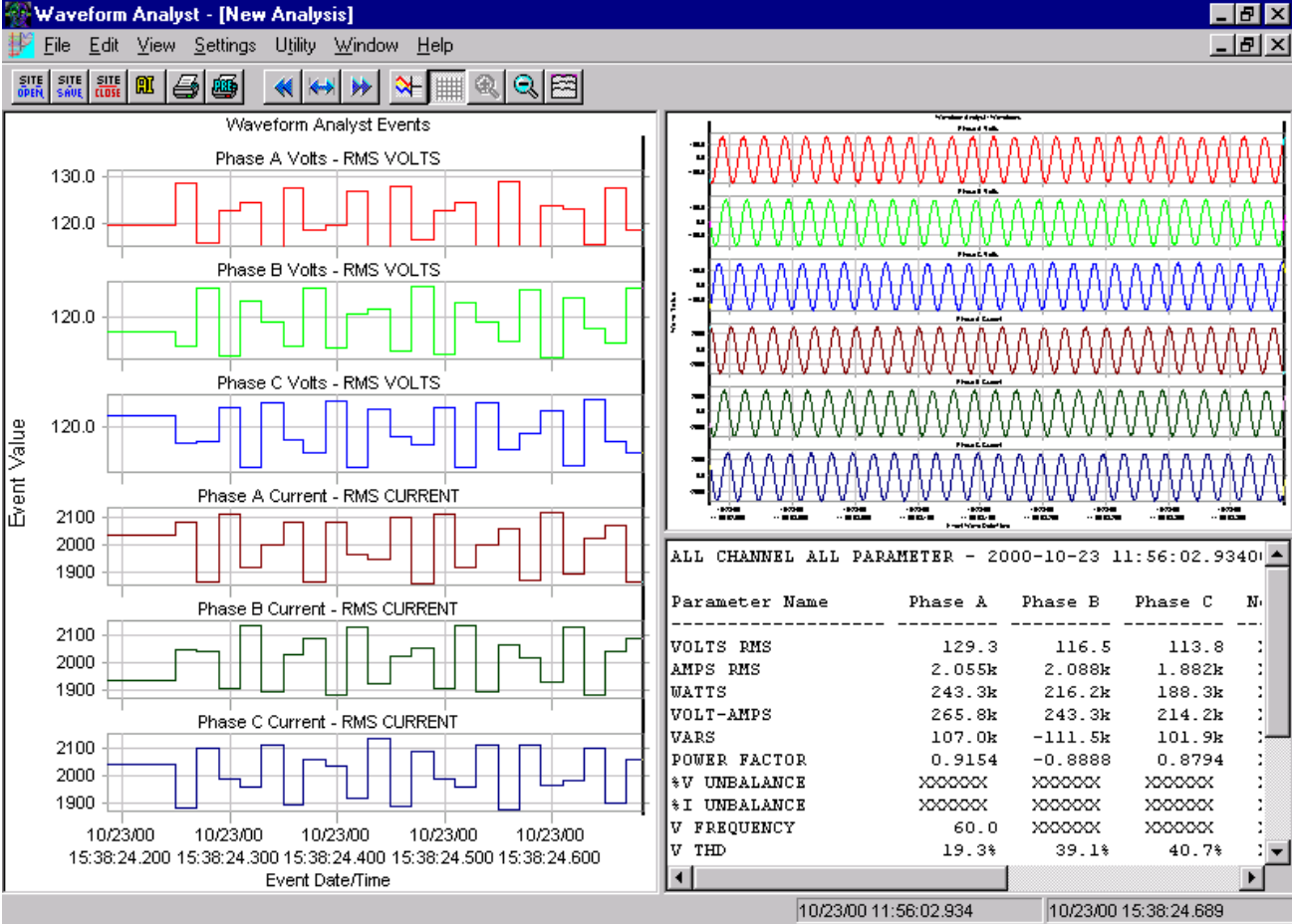




The main setup tabbed dialog box will appear with each channel mapped to a user defined description. You may change the user-defined description to any 32 character alphanumeric string. Click OK.



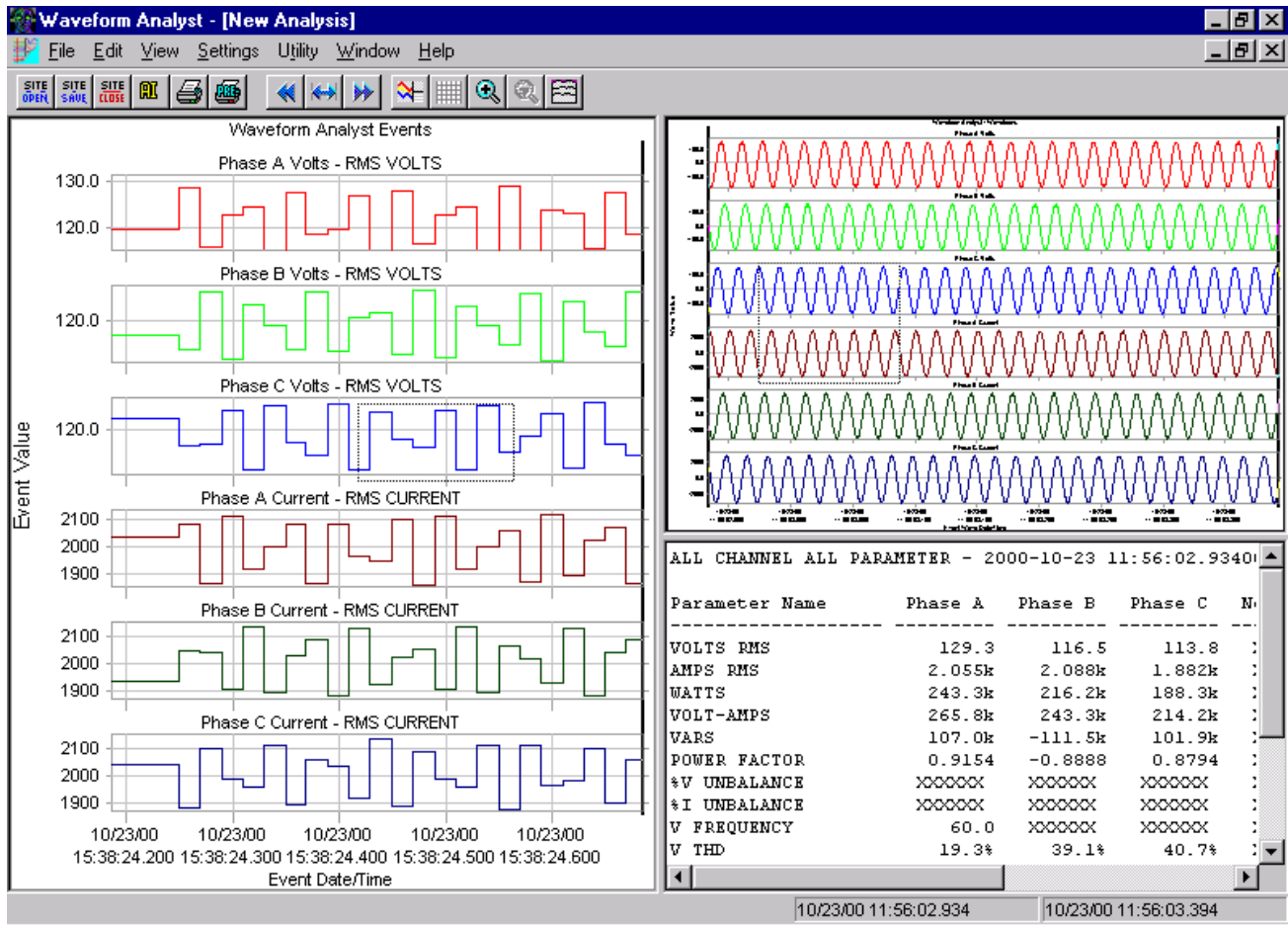
The Waveform Analyst's 3 Pane Browser will appear showing a time plot of the device's channels in the left most Pane. Follow the instructions described later in this section to change chart types and time date ranges. If you receive a message that there is no data for the time date selected right mouse click anywhere on the screen to display the main setup tabbed dialog box. Select Filter tabbed dialog box and increase the time date range until data is displayed.



Using three basic actions the user can unleash the power of Waveform Analyst.

1) Zooming

In either Pane A or B, left click and drag the mouse, then click on



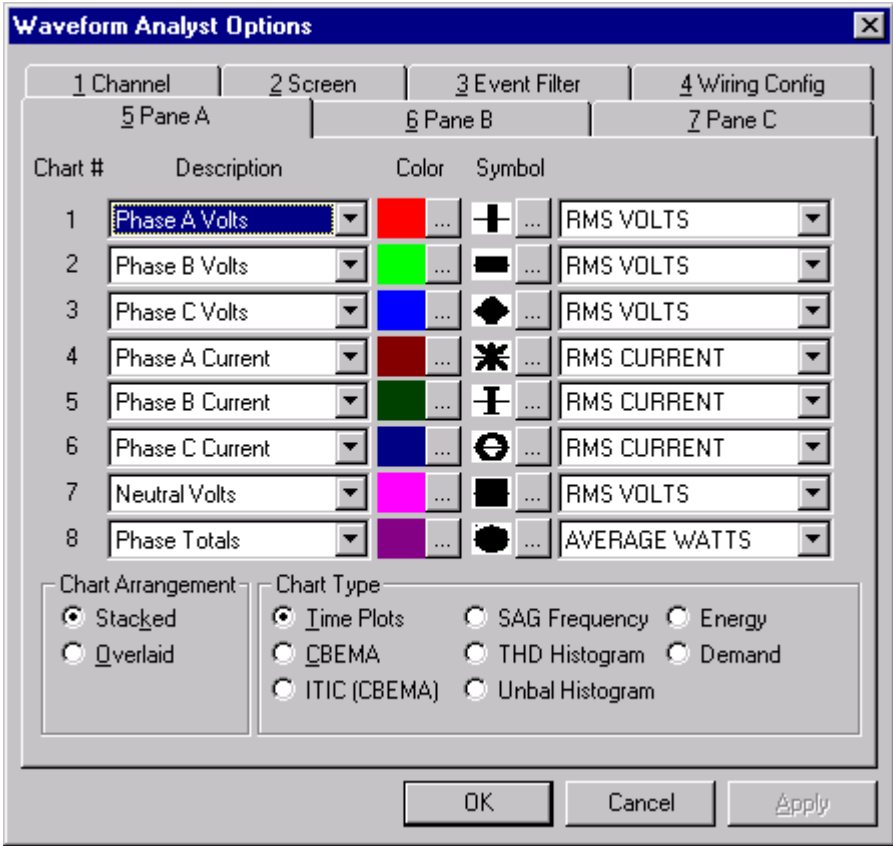
the Magnifier button to zoom in on the time plot or the waveform.

2) Double Click a point in the Pane A Summary Chart

The summary charts normally shown in Pane A are a composite of waveform events that occurred over a period of time. By double clicking a point in the summary chart, the waveform that resulted in that point will be shown in Pane B.

3) Left Mouse Click any Pane To Change the Chart Type

Each Pane can be displayed in a number of charting formats. To change the chart type, left mouse click and make your selection.



---

## Main Menu – Introduction

There are two different menus in WAVEFORM ANALYST. The first menu (no open analysis) is shown whenever there are no analyses open. The second, and full menu, is made available whenever an analysis is open.

The toolbar and menu bar of a program are very important components. They allow the functions of the program to be accessed and used with ease.

The **menu bar** is the fundamental interface for any program and its functions will be explained first.

The **toolbar** allows you to maximize your use of the program with short easy steps and the buttons will be displayed next.

- Menu (no open analysis)
- Menu (at least one open analysis)

---

## Main Menu (no open analysis)

The following menu choices are displayed when there is currently no analysis open.

File  
View  
Utility  
Help

## File Menu (no open analysis)

The File option allows you to create a new database, re-initialize an existing database, create or open an analysis, set the default printer settings, or exit the program.

## Related Topics:

[Database New](#)

[Database Initialize](#)

[New Analysis](#)

[Open Analysis](#)

[Print Setup...](#)

[Exit](#)

## Database New

Creates a new, empty O.P.E.N. database and initializes it for use by Waveform Analyst.

To create a new database:

1. From the 'File' menu, select 'Database New'.
2. Choose an appropriate '.mdb' file name and press OK.
3. The new database will be created.

Shortcut: Ctrl+N.

## Database Initialize

**Note: Use this with extreme care. Initializing a database destroys any data stored within that database!**

Initializes (or re-initializes) an existing database as an O.P.E.N. database, and initializes it for use by Waveform Analyst.

To initialize (or re-initialize) an existing database:

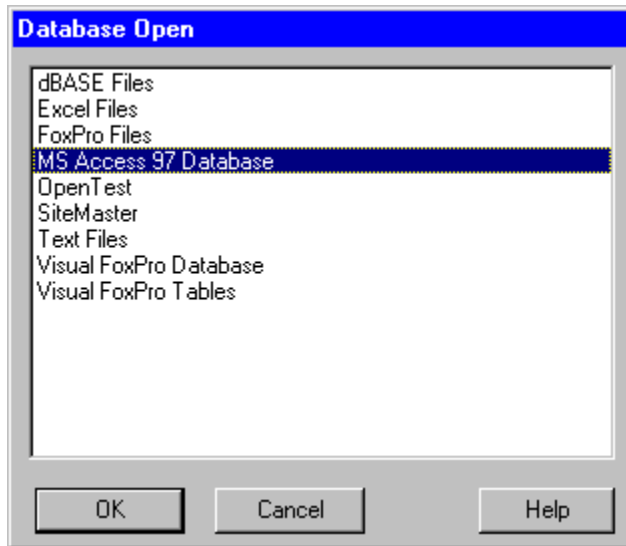
1. From the 'File' menu, select 'Database Initialize'
2. The standard ODBC data source dialog box will appear. Select the desired data source from the list (you can also use the standard ODBC dialog to create a new data source at this time).
3. The database will be initialized (or re-initialized) and any existing O.P.E.N. data will be erased. New tables will be created to support O.P.E.N. and 'master tables' will be filled with the standard values.

## New Analysis (no currently open analysis)

Creates a new Analysis in a 3 Pane Browser window.

To create a new analysis:

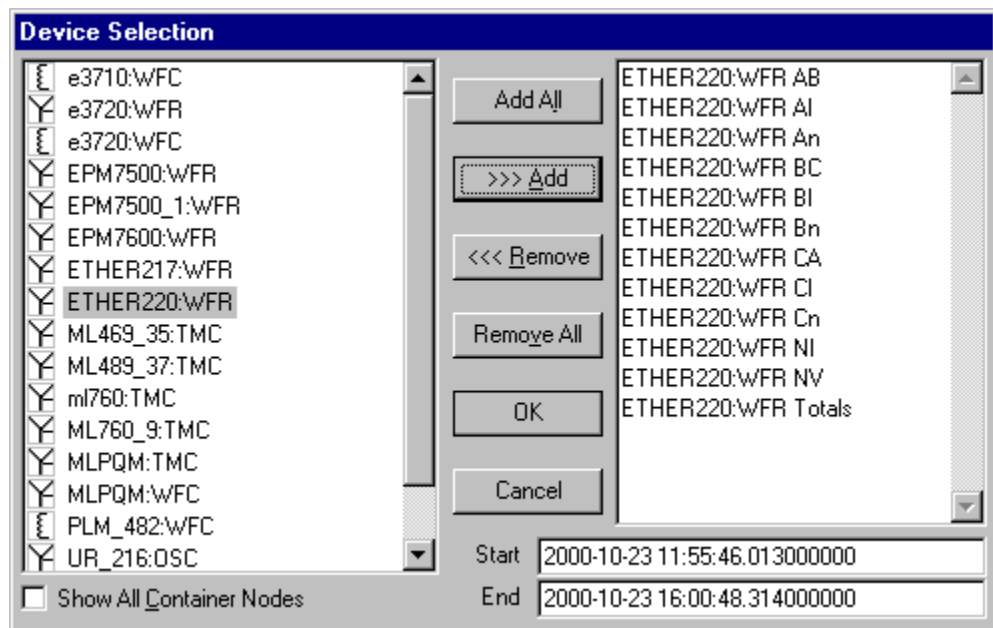
1. From the File menu, select 'New Analysis'. In the stand-alone version, if there is no "PQAnalyst Data" data source defined, the 'Database Open' dialog box will appear.



In the remote version, a similar dialog box will appear only if multiple databases have been assigned to the remote server. Otherwise, the default database will be selected for you, and you will immediately be presented with the 'Node Selection' dialog box (see item 3, below).

2. Select one of the data sources listed in the 'Database Open' dialog box. If the data source needs additional information to open the database, the ODBC driver will prompt you.
 

**NOTE:** If you want to open an Access '.mdb' file, use the 'MS Access' data source, and specify the '.mdb' file name when prompted.
3. Once the database has been successfully opened, the 'Node Selection' dialog box will appear.

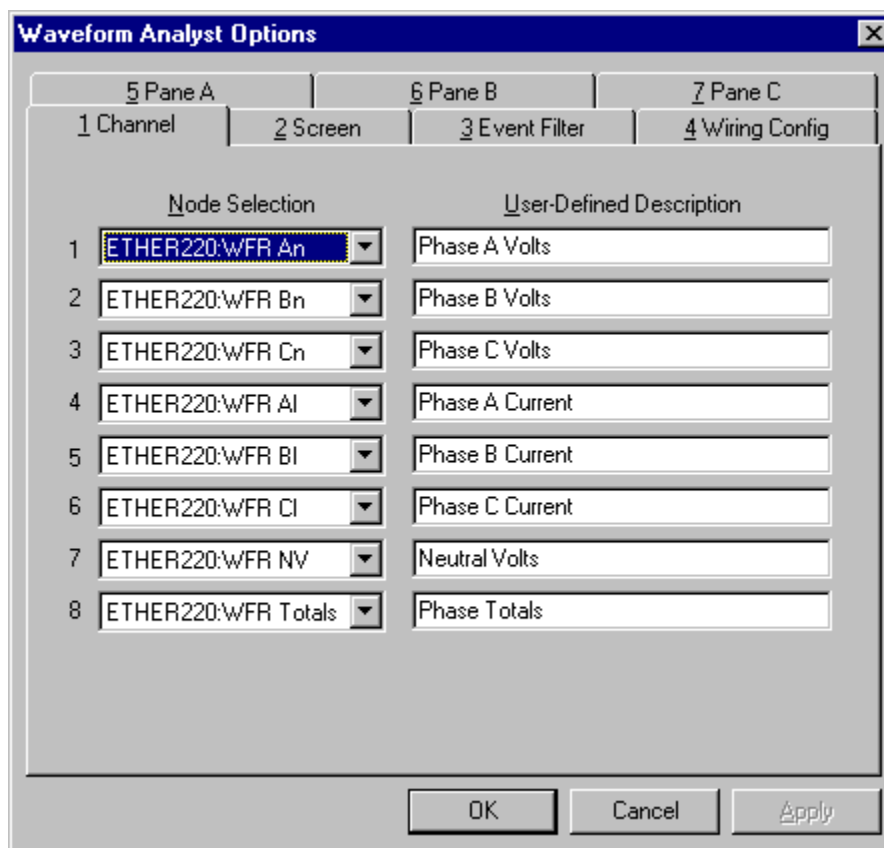


**NOTE:** In the left-hand section is a list of "top level" circuit descriptor nodes, known as "Measurement



Points”. Each of these is associated with a particular circuit, or “Measurement Point”. Associated with the “Measurement Point” is a set of ‘channels’ for the monitoring device (or ‘analyzer’). On the right hand side is a list of the desired ‘measurement nodes’ (nodes that collect events) – these will be used to ‘filter out’ all of the events that you are interested in looking at.

4. Select the desired nodes as follows:
  - a) highlight the desired circuit in the left-hand list
  - b) Press the ‘Add’ button to add all nodes related to this circuit.
 You can also select individual nodes from a circuit by first double-clicking the item in the left-hand list to display the individual measurement nodes, then select the nodes you want and press the ‘Add’ button for each.
  
5. If desired, you can adjust the date/time range as displayed in the lower right corner. Waveform Analyst automatically assigns them to the maximum range of events stored for the selected nodes. If you want a narrower date/time range, you can assign it at this time.
  
6. Press ‘OK’ to select the nodes. This will display the ‘Properties’ dialog box, where you can make additional changes before Waveform Analyst queries the database.



7. Pressing ‘OK’ on the ‘Properties’ dialog box will complete the selection process, and Waveform Analyst will collect and display the data. You can then use ‘Site Save’ to save the analysis information in a disk file, so that it can be viewed later.

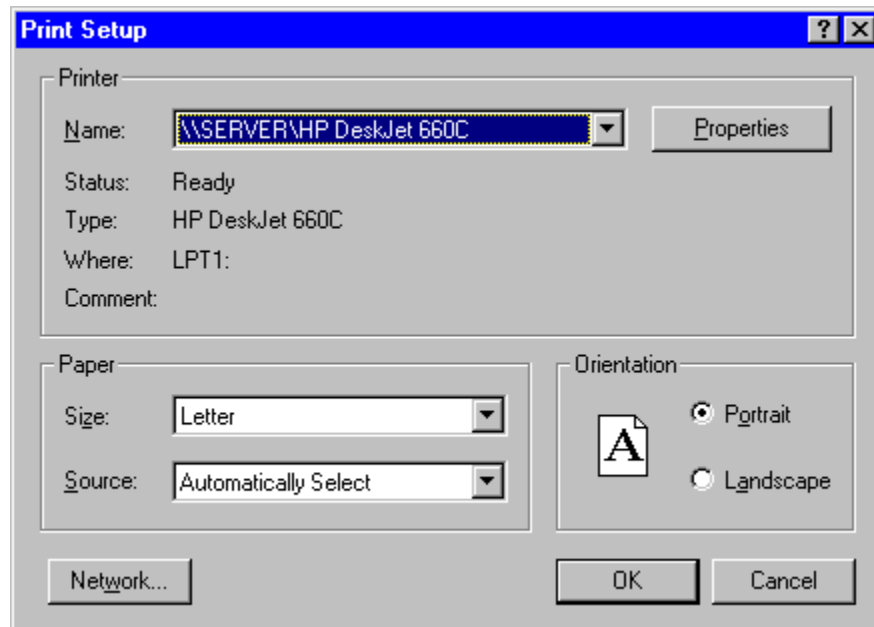
## Open Analysis

Opens an existing analysis file ('.aib' for the stand-alone version, or '.rbr' for the remote version).

To open an existing analysis:

1. From the 'File' menu, select 'Site Open'.
2. You will be presented with a standard Windows 'File Open' dialog box. The filter will be pre-selected to open files of the proper type. Using this 'File Open' dialog box, select the desired analysis file.
3. Press the OK button.

## Print Setup



Shows a listbox with standard Windows printing options. You are able to change the default printer as well as specify options that will affect the layout of the paper and printer.

## Exit

Exits *WAVEFORM ANALYST*.

Toolbar button: 

*Figure 1*

View (no open analysis)

Toolbar

Status bar

Toolbar Options

## ToolbarOptions.33Toolbar

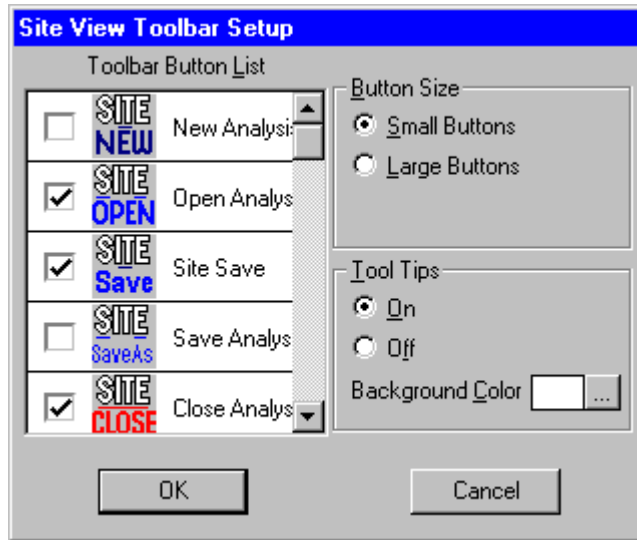
Enables or disables the toolbar. When checked, the toolbar is visible directly under the menu. When unchecked, the toolbar will be hidden from the *WAVEFORM ANALYST* main window.

## Status Bar

Enables or disables the status bar. When checked, the status bar is visible at the bottom of the *WAVEFORM ANALYST* main window and status messages will be seen and displayed during the use of the program. When unchecked, the status bar will be hidden and no status messages will be visible from the main window.

## Toolbar Options

This menu bar option brings up a dialog box that allows customization of the toolbar.



Please see [Configuring the toolbar](#) for information on how to configure the toolbar.

## Utility

[Import](#)

[Export](#)

[Re-Index Events](#)

[Re-Index Waveforms](#)

[Re-Init Master Tables](#)

## Import

Waveform Analyst allows you to import data from either 'FTF' (proprietary text file) format, or from PQDIF (Electrotek standard interchange format). Use the 'Utility' 'Import' drop-down menu to select the import type.

For FTF, you can import Waveforms, Events, or 'All'. 'All' includes both Waveform and Event FTF data, and optionally includes the 'configuration' file, which will create a new node configuration if the associated equipment does not already have node and equipment information in the selected database.

For PQDIF, you can select a single PQDIF file. Each PQDIF file imports to the database using the 'Default PQ Nodes'. It is best to begin with an empty database (see 'Database New'), and when prompted to create the default PQ Nodes, select 'Yes'. Then, select 'Import' 'PQDIF', and choose the new database (when prompted), and finally the PQDIF file (which has an extension of '.pqd'). Waveform Analyst will map the PQDIF file's channels as appropriate to the default PQ Nodes.

Once data has been imported, you can use either 'Site New' or 'Site Open' to view the data.

## Export

Waveform Analyst allows you to export data into PQDIF format. Export with no site open will export all nodes and event/waveform data from the database without any filtering. This could result in an extremely large PQDIF file that 3<sup>rd</sup> party software packages might have trouble analyzing.

To filter the data for export, you should create a new analysis (or open an existing one) using either 'Site New' or 'Site Open', then select a date/time range with the cursors and use 'Utility' 'Export' from the open analysis.

## Re-Index Events

At times it may become necessary to re-index event data in the O.P.E.N. database. Use this menu option to re-build all of the Event indices. If the database is being imported to frequently, this could correct data-related problems and make queries a lot faster.

## **Re-Index Waveforms**

At times it may become necessary to re-index waveform data in the O.P.E.N. database. Use this menu option to re-build all of the Waveform indices. If the database is being imported to frequently, this could correct data-related problems and make queries a lot faster.

## **Re-Init Master Tables**

Re-initializing the master tables is usually necessary ONLY if you have upgraded Waveform Analyst with a newer version. By re-initializing the master tables of an existing O.P.E.N. database, you will be refreshing it with the latest event, trigger condition, node type, and similar data. As the product evolves, it may be necessary at times to re-initialize master tables in existing databases in order to take advantage of the new features.

To re-initialize the master tables of an existing database, select 'Utility' 'Re-Init Master Tables', then select the appropriate data source. For an Access '.mdb' file, you can use 'MS Access 97 Database' – the ODBC driver will prompt you for the file name.

## Help

The following menu items are available under 'Help':

**Contents:** Displays the Waveform Analyst help 'Contents' (Finder) window

**Search for Help On:** Context-sensitive help

**Index:** Displays the Waveform Analyst help index

**Using Help:** Help on using Windows Help

**Technical Support:** Provides information on [Technical Support](#).

**About Waveform Analyst:** Displays a dialog box showing version and copyright information for the Waveform Analyst application.

## Main Menu (at least one open analysis)

The following options are for the menu when at least one analysis is open.

File  
Edit  
View  
Settings  
Utility  
Window  
Help

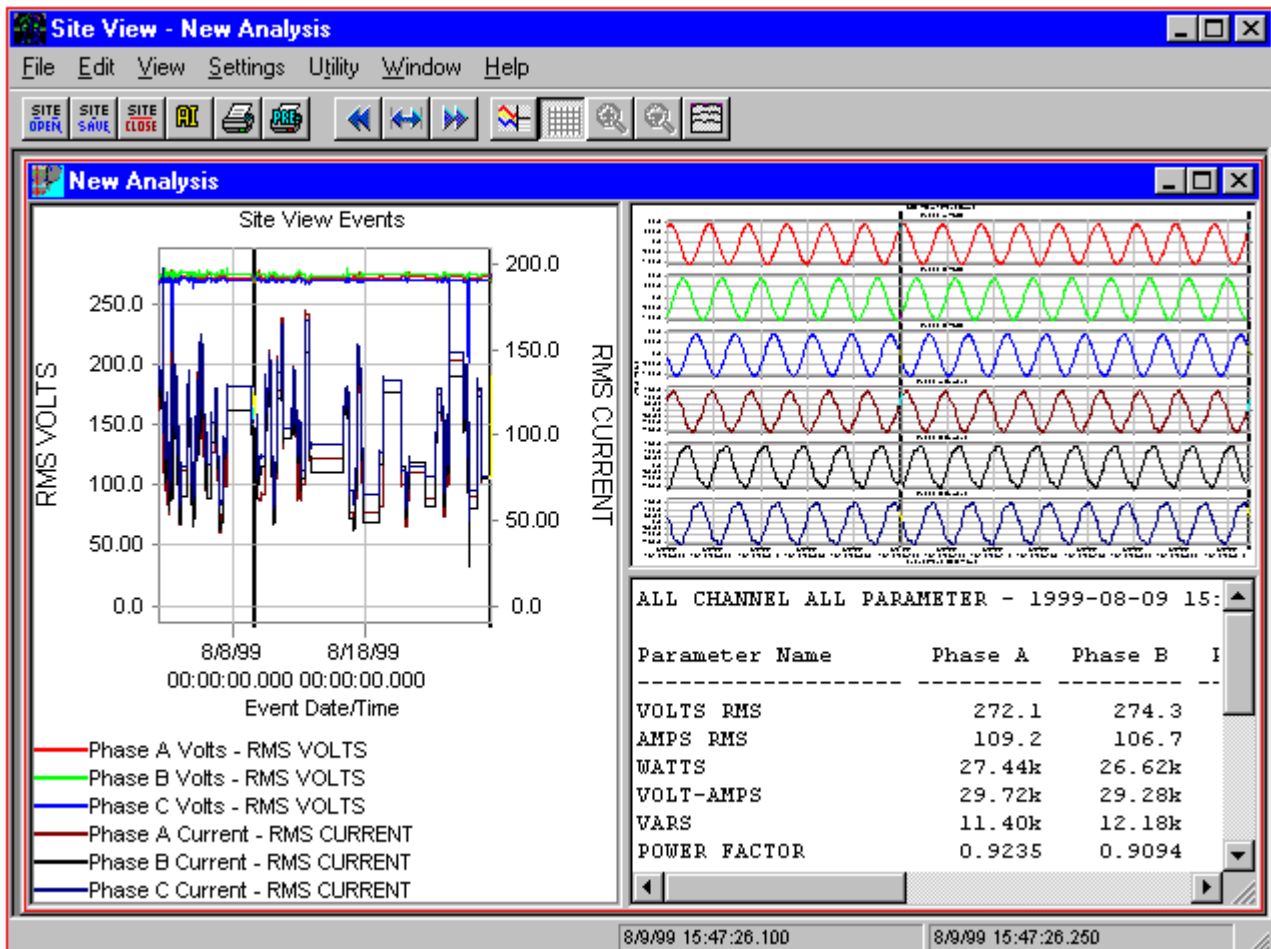


Figure 2



---

## File Menu (at least one open analysis)

New Analysis  
Open Analysis  
Close Analysis  
Print  
Print Preview  
Print Setup...  
Exit

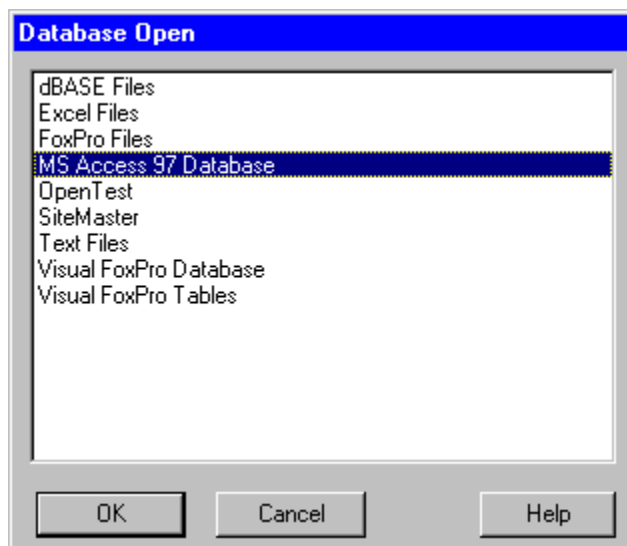
---

## New Analysis (at least one open analysis)

Creates a new Analysis in a new 3 Pane Browser window.

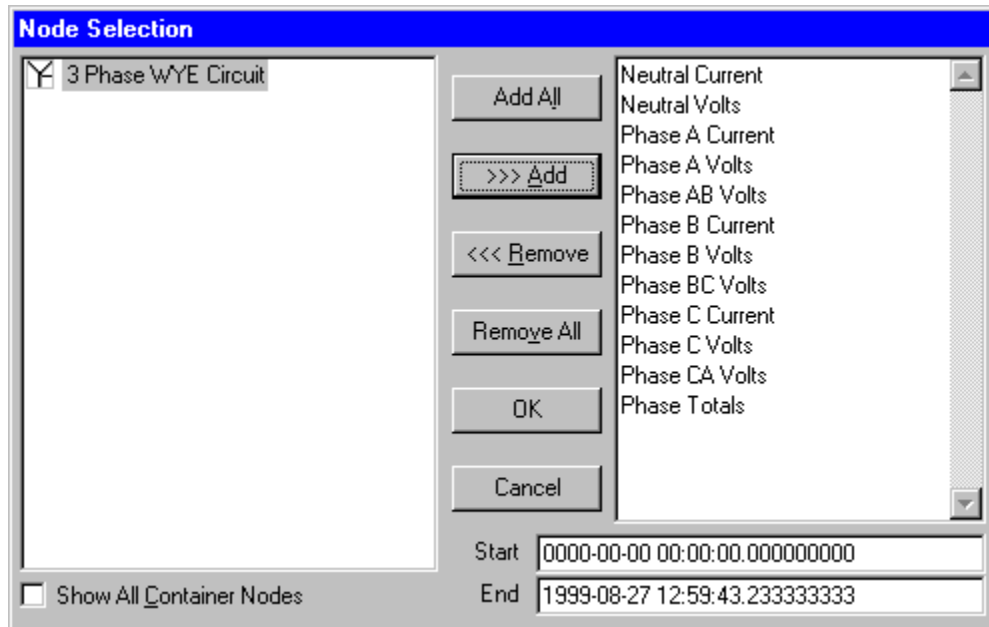
To create a new analysis:

1. From the File menu, select 'New Analysis'. In the stand-alone version, if there is no "PQAnalyst Data" data source defined, the 'Database Open' dialog box will appear.



2. In the remote version, a similar dialog box will appear only if multiple databases have been assigned to the remote server. Otherwise, the default database will be selected for you, and you will immediately be presented with the 'Node Selection' dialog box (see item 3, below).
3. Select one of the data sources listed in the 'Database Open' dialog box. If the data source needs additional information to open the database, the ODBC driver will prompt you.  
**NOTE:** If you want to open an Access '.mdb' file, use the 'MS Access 97 Database' data source, and specify the '.mdb' file name when prompted.

4. Once the database has been successfully opened, the 'Node Selection' dialog box will appear.



**NOTE:** In the left-hand section is a list of “top level” circuit descriptor nodes, known as “Measurement Points”. Each of these is associated with a particular circuit, or “Measurement Point”. Associated with the “Measurement Point” is a set of ‘channels’ for the monitoring device (or ‘analyzer’). On the right hand side is a list of the desired ‘measurement nodes’ (nodes that collect events) – these will be used to ‘filter out’ all of the events that you are interested in looking at.

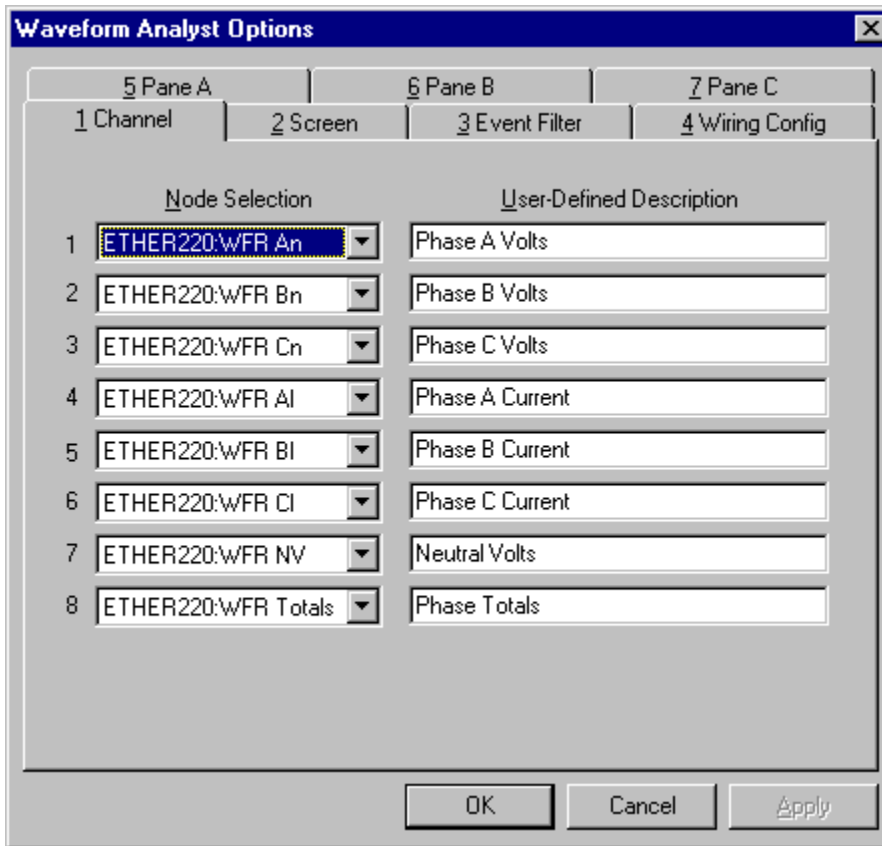
4. Select the desired nodes as follows:

- a) highlight the desired circuit in the left-hand list
- b) Press the ‘Add’ button to add all nodes related to this circuit.

You can also select individual nodes from a circuit by first double-clicking the item in the left-hand list to display the individual measurement nodes, then select the nodes you want and press the ‘Add’ button for each.

5. If desired, you can adjust the date/time range as displayed in the lower right corner. Waveform Analyst automatically assigns them to the maximum range of events stored for the selected nodes. If you want a narrower date/time range, you can assign it at this time.

6. Press ‘OK’ to select the nodes. This will display the ‘Properties’ dialog box, where you can make additional changes before Waveform Analyst queries the database.



7. Pressing 'OK' on the 'Properties' dialog box will complete the selection process, and Waveform Analyst will collect and display the data. You can then use 'Site Save' to save the analysis information in a disk file, so that it can be viewed later.

Toolbar button: 

---

## Open Analysis (at least one analysis already open)

Opens an existing analysis file (‘.aib’ for the stand-alone version, or ‘.rbr’ for the remote version).


To open an existing analysis:

1. From the ‘File’ menu, select ‘Site Open’.
2. You will be presented with a standard Windows ‘File Open’ dialog box. The filter will be pre-selected to open files of the proper type. Using this ‘File Open’ dialog box, select the desired analysis file.
3. Press the OK button.

Toolbar button: 

## Close Analysis

Closes the currently active analysis.

Toolbar button: 

*Figure 3*

## Print

Prints the active view. The active pane will be printed.

Shortcut: Ctrl+P.

Toolbar button: 

*Figure 4*

## Print Preview

Print previews the active pane. Shows the printed page on screen with margins, headers, footers, and graphics.

Toolbar button: 

*Figure 5*

## Print Setup

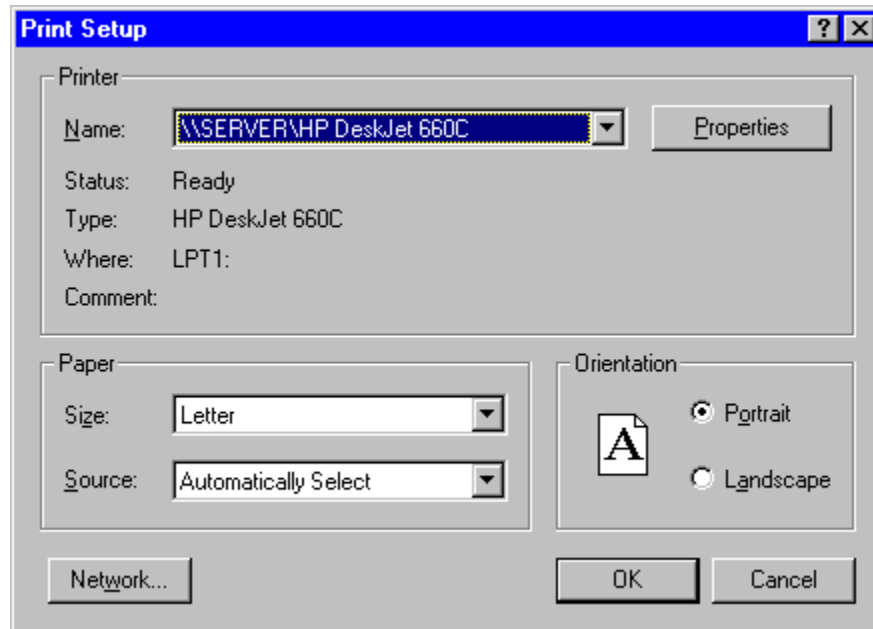


Figure 6

Shows a listbox with standard Windows printing options. You are able to change the default printer as well as specify options that will affect the layout of the paper and printer.

## Exit

Closes any open analysis and exits Waveform Analyst.

Toolbar button: 

Figure 7


## Edit

Copy

Save To File

### SaveToFile.60Edit - Copy

Copies the contents of the selected window to the clipboard. If the data being viewed is in 'listbox' or 'text' form, the data on the clipboard will be ANSI text. Listbox data will be tab-delimited for easy insertion into a spreadsheet or word processor. If the data being viewed is a graph, the data on the clipboard will either be a bitmap with the same dimensions as the current screen resolution, or a metafile, depending on the selection in the Screen Tabbed dialog box. Please see Screen for more information.

Toolbar button: 

### Edit - Save To File

Saves the data in the selected pane as either a 256-color bitmap or a tabbed delimited text file depending upon the settings of the pane. Pane "A" is saved as a 256-color bitmap when the pane is in chart mode. If the pane is in list mode, the file is saved as a text file.

Toolbar button: 

**NOTE:** A 256-color bitmap was chosen in order to preserve color integrity while at the same time ensuring compatibility on a wide variety of platforms.

---

## View (at least one open analysis)

[Previous Event](#)

[Next Event](#)

[Jump Back](#)

[Jump Forward](#)

[Active Pane as Chart or List](#)

[Grid Lines](#)

[Zoom In](#)

[Zoom Out](#)

[Expand to Cursors](#)

[Show Detail](#)

[Toolbar](#)

[Status bar](#)

[All Events](#)

## View - Previous Event

Steps to the previous event.

Toolbar button: 

## View - Next Event

Steps to next event.

Toolbar button: 

## View - Jump Back

Jumps back a group of events.

Toolbar button: 

## View - Jump Forward

Jumps forward a group of events.

Toolbar button: 

## View - Active Pane as Chart or List

This selection allows the user to alternate between list mode and graph mode for a specific pane. When the option is checked, the information in the specific pane is displayed in list mode, which shows all the data with exact values displayed. When the option is unchecked, the information is displayed in graph mode with data points shown in a graphical display.

Note: This option is available in Pane A and Pane B only

Toolbar button: 



## View - Grid Lines

This option, when checked, enables the grid lines for the active pane and when unchecked disables the grid lines.

Note: This option is only available if the specific view is in chart mode.

Toolbar button: 

## View - Zoom In

When in chart mode it is possible to view a portion of the chart in more detail than the rest of the chart. This enables more detailed readings of some points that may not be clear when viewing the chart as a whole.

Note: This option is only available once a box has been drawn with the cursor.

Toolbar button: 

## View - Zoom Out

When in chart mode it is possible to get the whole picture of the chart instead of a small portion. This option expands the chart to its original un-zoomed state.

Note: This option is only available when the chart has been previously zoomed in.

Toolbar button: 

## View - Expand to Cursors

When the cursors are used, this option zooms in to whatever is between the cursors.

Toolbar button: 

## View - Show Detail

Depending upon the current view, a detail window will be created, containing information about the current selection.

For an event in Pane A, the following dialog box is displayed:

EVENT Detail			
Event/WF ID	<input type="text" value="1"/>	Date/Time	<input type="text" value="1999-08-02 09:02:56.000000000"/>
Node ID	<input type="text" value="2"/>	Phase A Volts	
Trig Node ID	<input type="text" value="2"/>	Phase A Volts	
Meas. Value	<input type="text" value="271.80944772748"/>	GreekPrefix	<input type="text" value=""/> Units <input type="text" value="VOLTS"/>
Measurement Parameter	<input type="text" value="1"/>	RMS VOLTS	
Trigger Condition	<input type="text" value="21"/>	SNAPSHOT	
IEEE Measurement Categ.	<input type="text" value="0"/>	n/a	
Value Valid?	<input type="text" value="1"/>	ExtendedTableFlag	<input type="text" value="0"/> Duration <input type="text" value="0"/>
MinValue	<input type="text" value="0"/>	Valid?	<input type="text" value="0"/> GreekPrefix <input type="text" value=""/> Units <input type="text" value=""/>
MaxValue	<input type="text" value="0"/>	Valid?	<input type="text" value="0"/> Sample Age <input type="text" value="NULL"/>
<input type="button" value="OK"/>			

Figure 8

For a waveform in Pane B, the following window is created:

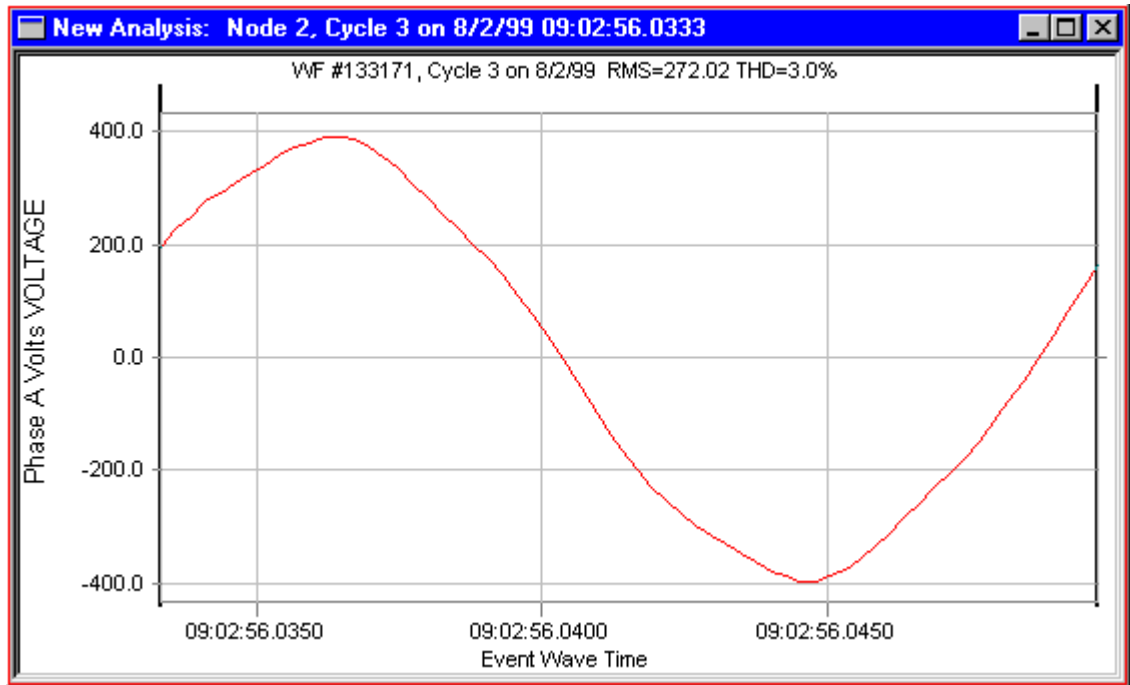


Figure 9

This window also allows you to see individual data points in 'Listbox Mode'.

For 'List of Event' data in Pane C, the following window is created:

Event Channel	Parameter	Event Value	Limit C
Phase A Volts	RMS VOLTS	272.0 VOLTS	??? VC
Phase A Current	RMS CURRENT	128.9 AMPS	??? AM
Phase B Volts	RMS VOLTS	274.1 VOLTS	??? VC
Phase B Current	RMS CURRENT	132.4 AMPS	??? AM
Phase C Volts	RMS VOLTS	269.5 VOLTS	??? VC
Phase C Current	RMS CURRENT	135.8 AMPS	??? AM

Figure 10

The type and style of report visible in this window depends entirely upon the data currently being displayed in Pane 'C'. The report attempts to correlate the data from Pane C in a meaningful fashion.

## View - Toolbar

Enables or disables the toolbar. This enables the user to add more space to their screen by removing the buttons on the top of their screen. When this option has a check mark next to it, the toolbar is enabled and can be viewed in the WAVEFORM ANALYST main window. When the option is unchecked, the toolbar is hidden, more space for the program is available, and the toolbar may not be used.

## View - Status bar

Enables or disables the status bar. When checked, the status bar can be viewed at the bottom of the WAVEFORM ANALYST main window. When the option is unchecked, the status bar is hidden, more space for the program is made available, and no status messages are displayed.

## View - All Events

Displays all events within a certain time/date range.

When checked, all events within the range are shown, and when unchecked, only the events that satisfy the current settings in the Tabbed Dialog Boxes will be shown.

### To set the time/date range

- Type the start date and time of the first event you wish to see included in the list.
- Type the end Date and time of the last event you wish to see included in the list.

**Note: All Events will display all the events inclusive of the first and last events.**

---

# Settings

[Analysis Options](#)

[Toolbar Options](#)

# Settings - Analysis Options

This opens the **SETTINGS** tabbed dialog box, as seen below:

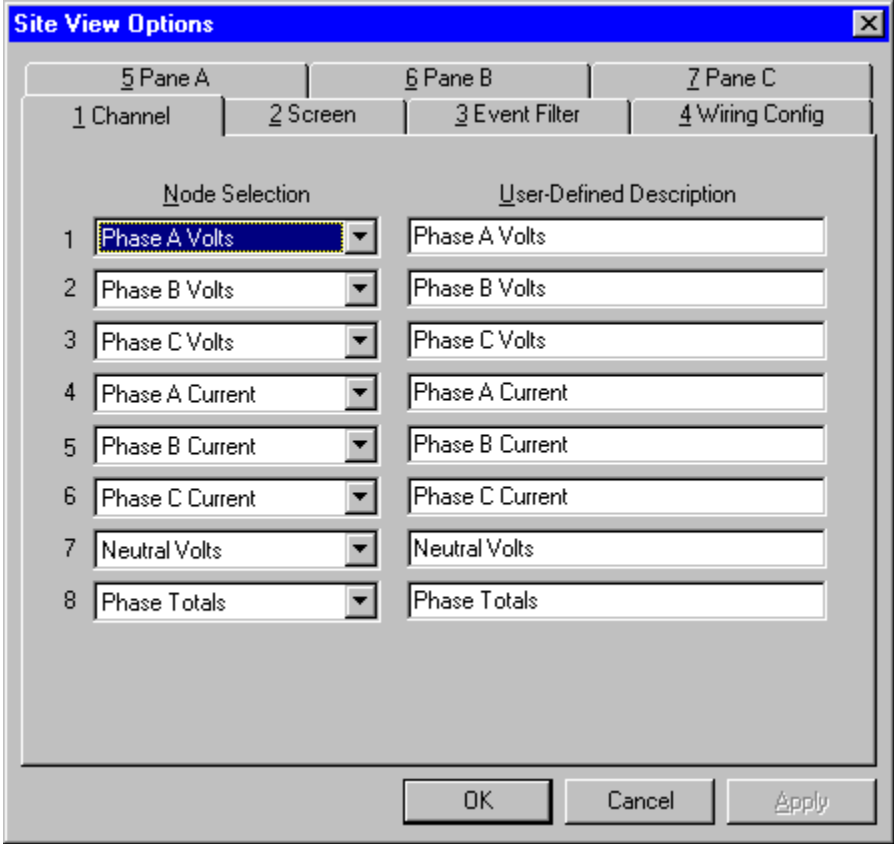
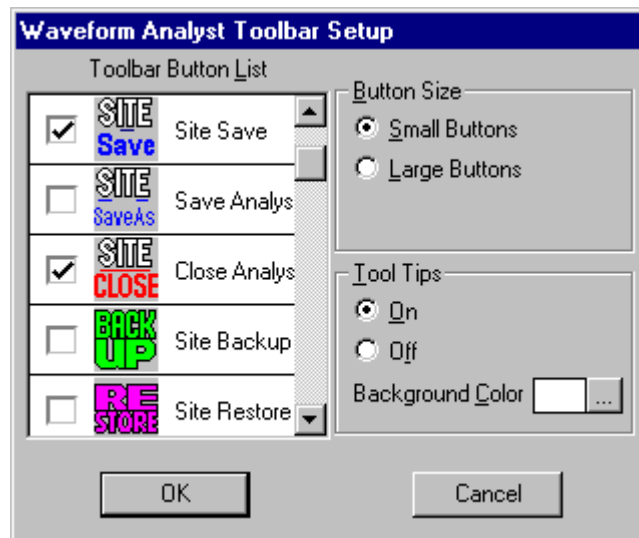


Figure 11

For more information on the settings tabbed dialog box, please see [Settings](#).

## Settings - Toolbar Options

This opens the Toolbar Setup [dialog box](#) that allows you to customize the toolbar.



For more information on customizing the toolbar, see [Configuring the Tool Bar](#).

---

## Utility

[Export](#)

[Re-Init Master Tables](#)

[Ai\\*Power](#)



## Utility – Export

This allows you to export the data for the current analysis, filtered by the date/time range of the cursors, to a PQDIF file for analysis by 3<sup>rd</sup> party applications.

To export the data into PQDIF:

1. Enclose your data between the two vertical cursors in Pane A. (For more information on Pane A please see Pane A.)
2. Select 'Utility' 'Export' 'PQDIF' from the main menu
3. When prompted, select an output file (default extension '.pqd')

Waveform Analyst will then create a PQDIF file using the selected nodes, for events and waveforms with date/time values between the cursors in Pane A.

## Utility - Re-Init Master Tables

This will re-initialize the standard values for the 'master tables' in the database. For 'legacy' databases that may have outdated information in the master tables, you can update them with the updated values for the most recent version of Waveform Analyst. This may become necessary whenever new trigger conditions, new measurement parameters, new equipment types, and so on are added to Waveform Analyst's capabilities. Legacy databases that have not been updated may not display these new parameters correctly in the list boxes and on the graphs. To correct this problem, you can use 'Re-Init Master Tables' to re-initialize the master tables with the new values.

Any customized 'master table' entries (such as those created by a device driver) that do not fall within the range of 'Reserved' values will not be affected.

## Utility - Ai\*Power

*Note: If you do not have Ai\*Power installed on your system, or you have a version that is not compatible with WAVEFORM ANALYST, this menu option and the button associated with it will be grayed out. This function of WAVEFORM ANALYST allows data to be analyzed by Ai\*Power.*

### To Analyze Data with Ai\*Power

- Enclose your data between the two vertical cursors in Pane A. (For more information on Pane A please see Pane A.)
- Click on the Ai\*Power icon or choose Ai\*Power from the menu.
- Ai\*Power will launch and begin the process of importing the data then Analyzing the data. (Please see the Ai\*Power manual for more information.)

**Note: The data you will analyze with Ai\*Power is located in Pane A. The range of events analyzed in Pane A are those on or between the vertical cursors. You may zoom in on a select group of events in Pane A then have Ai\*Power analyze them.**

---

## Window

[New Window](#)

[Cascade](#)

[Tile](#)

[Arrange Icons](#)

[Auto Size Pane](#)

[Save Pane Ratio](#)

[Toggle Split Method](#)

[Window List](#)

## New Window

When selected, this option brings up the **SETTINGS** tab in the tabbed dialog box for the purpose of configuring the data to be displayed in the new window. Once the options have been chosen, a new Three Pane Browser will be created based upon the options you select.

In this way you can compare two separate displays for the same analysis by placing them into two different windows (Ex: RMS Plot in one window, CBEMA in the other).

Toolbar button: 

## Cascade

Places the currently open windows in the standard overlapping fashion.

Toolbar button: 

## Tile

Places the currently open windows in the standard side-by-side fashion.

Toolbar button: 

## Arrange Icons

When there are multiple Three Pane Browsers open and they are minimized to the WAVEFORM ANALYST main window, this option arranges the icons in the standard side-by-side fashion.

## Auto Size Pane

This option auto sizes the active Three Pane Browser to a standard size where all windows are visible.

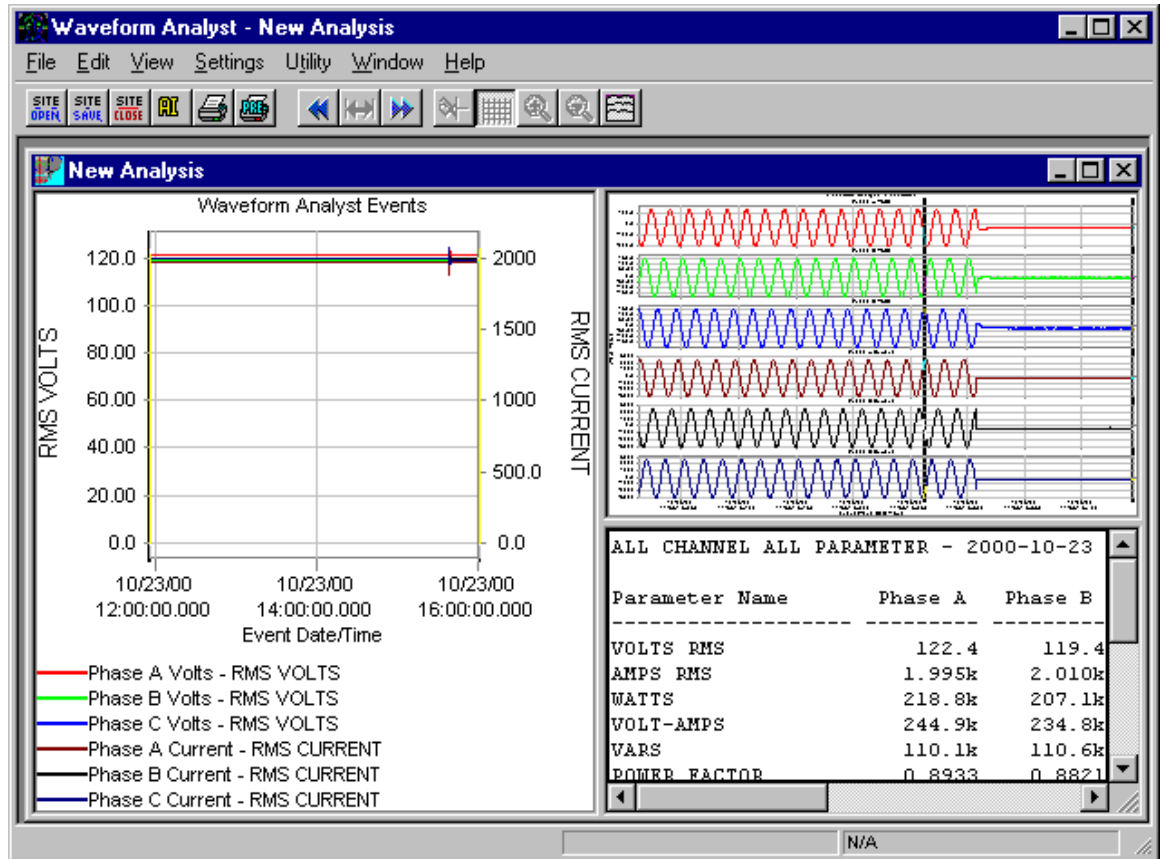
Toolbar options: 

## Save Pane Ratio

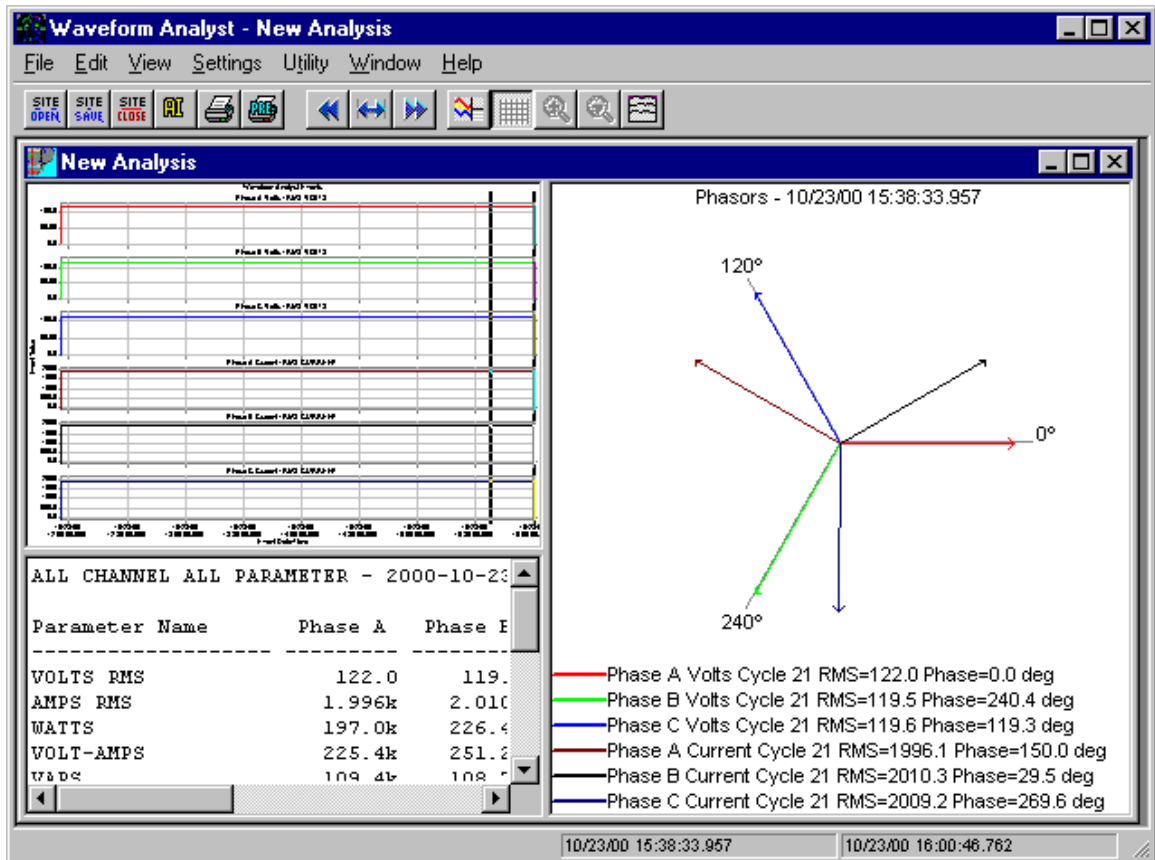
Saves the current state of the pane for the next time Auto Size Panes is used.

## Window - Toggle Split Method

By selecting this menu item you instruct the 3 Pane Browser to switch between 'split methods'. The default 'split method' puts Pane A on the left, Pane B in the upper right, and Pane C in the lower right section, as below:



The alternate 'split method' places Pane C below Pane A, and Pane B takes up the entire right-hand side, as below:



## Window List

The window list (located below the other menu items) shows all active windows and allows them to be selected individually.

## Help Menu

The following menu items are available under 'Help':

**Contents:** Displays the Waveform Analyst help 'Contents' (Finder) window

**Search for Help On:** Context-sensitive help

**Index:** Displays the Waveform Analyst help index

**Using Help:** Help on using Windows Help

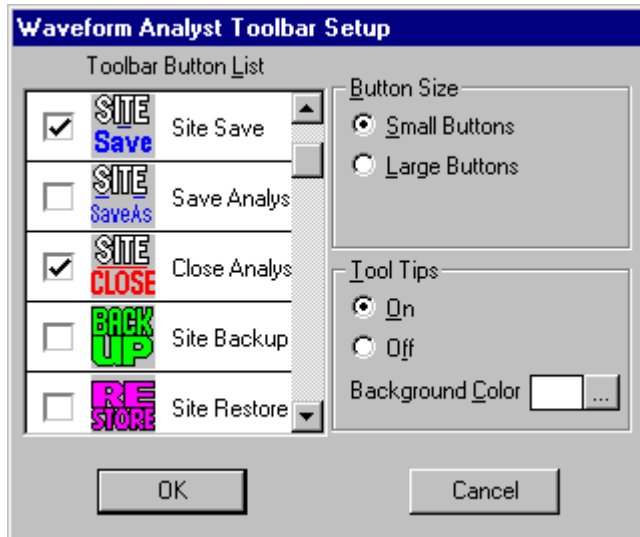
**Technical Support:** Provides information on [Technical Support](#).

**About Waveform Analyst** : Displays a dialog box showing version and copyright information for the Waveform Analyst application.

---

## Configuring the Toolbar

To configure the Toolbar, select 'Toolbar Options' from the 'View' menu. The following dialog box will appear:



To display a particular button on the toolbar, check the box next to its bitmap in the list. You may also display large buttons in lieu of small buttons (see 'button size'). The default settings only display a subset of the buttons, to accommodate smaller display sizes. Pressing 'OK' saves your changes to the 'default' settings file located in the same directory as the Waveform Analyst application.

### Related Topics:

[Toolbar Button List](#)

[Button Size](#)






















[Tool Tips](#)



## Toolbar Button List

The Toolbar Button List can be modified to include or exclude any or all toolbar buttons. You may select those that you feel are more helpful to you or those you use most frequently.

All available buttons are listed below:

<u>Button</u>	<u>Function</u>
	New <u>A</u> nalysis
	Open Analysis
	Save Analysis
	Save Analysis As
	Close Analysis
	Ai*Power
	Print
	Print Preview
	Save to file
	Exit
	Undo
	Delete
	Edit Copy
	Jump back multiple events
	Previous <u>E</u> vent
	Expand to Cursors
	Next Event
	Jump forward multiple events
	Active Pane as Chart or List
	View Grid Lines
	Zoom in



Zoom out



Preferences



Filter Events



Window New



Window Cascade



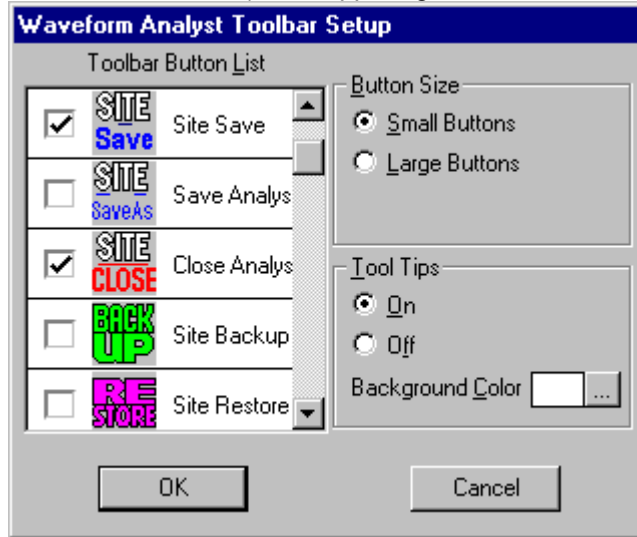
Window Tile Horizontal



Auto Size Panes

## Button Size

The button size can be modified to give you larger buttons on your screen. You may choose large or small buttons depending upon your preference by activating either the 'small buttons' or 'large buttons' setting under 'Button Size' (in the upper right corner on the dialog box shown below).

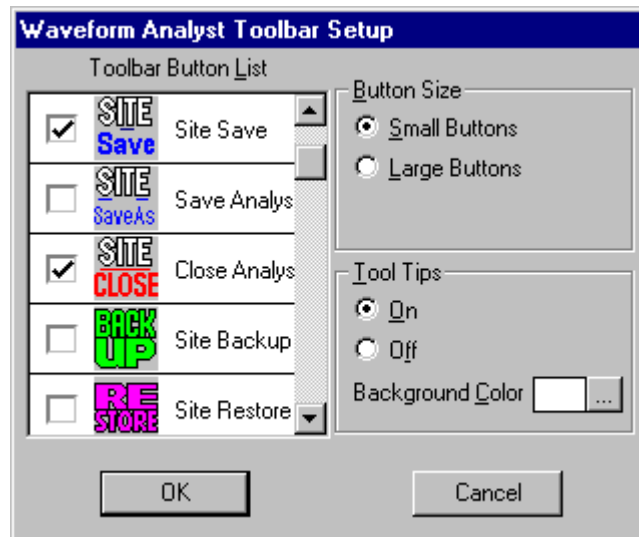


Example:



## Tool Tips

The Tool Tips are small windows that provide quick help to explain the functions of the toolbars. They may be turned on or off here. Tool Tips activates itself when the mouse cursor is placed over a specific button on the toolbar.



# Three Pane Browser

---

## Introduction

The **Three Pane Browser** is used to view the data in WAVEFORM ANALYST. This tool has many functions for viewing the data such as chart mode and list mode, and it also has many shortcuts to let you get things done quickly. These and many other functions of the Three Pane Browser will be introduced in the following sections.

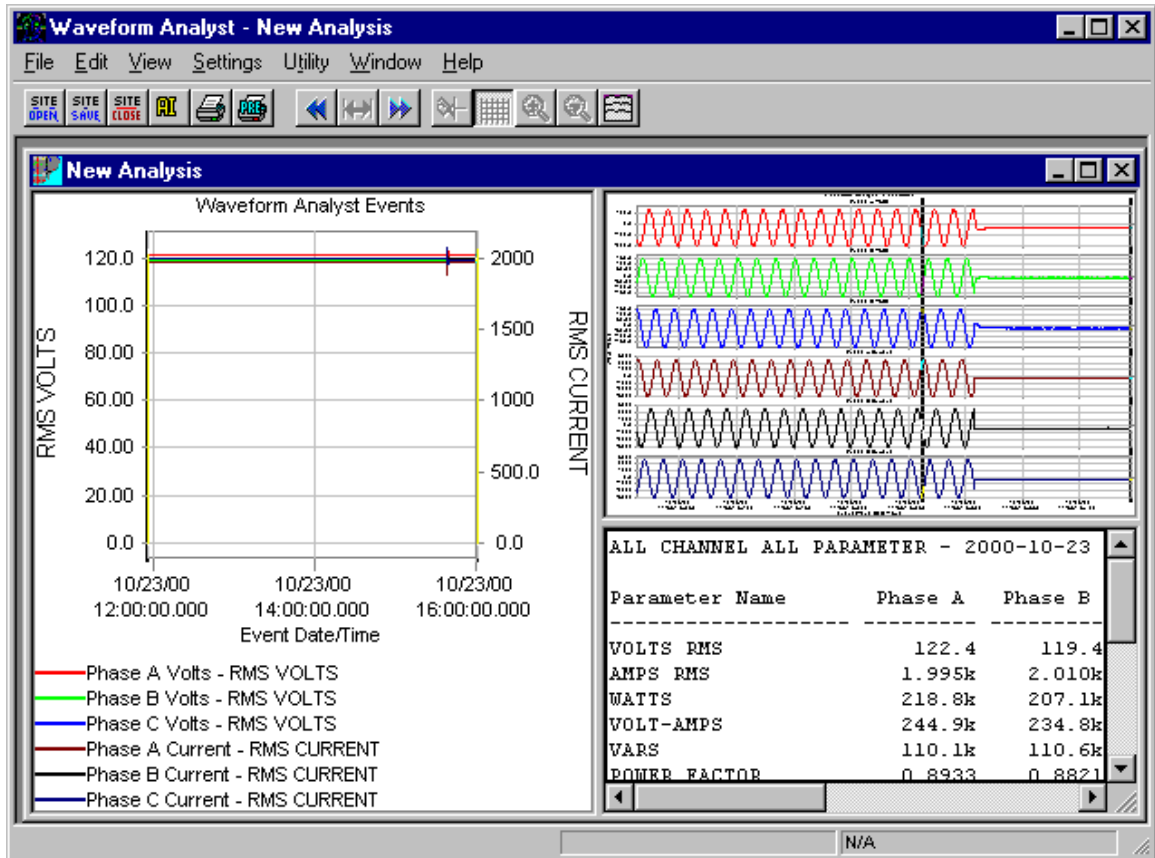
For more information, select one of the links below:

[Layout](#)

[Pane A](#)

[Pane B](#)

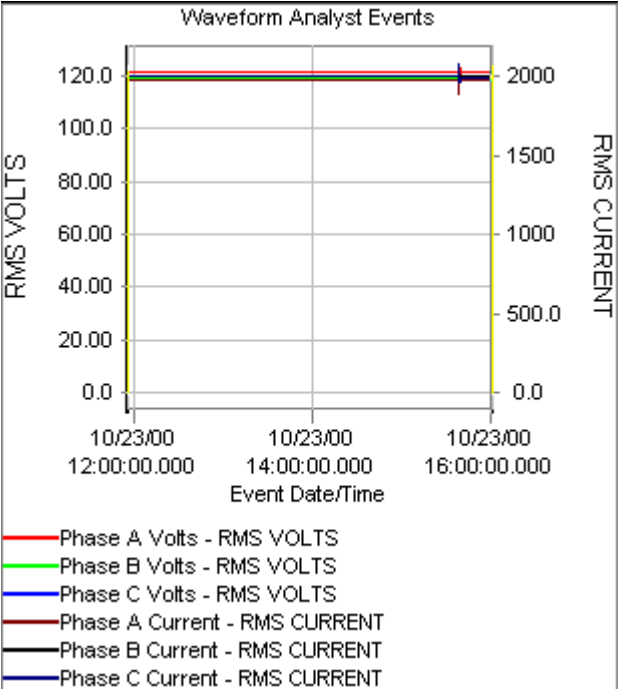
[Pane C](#)



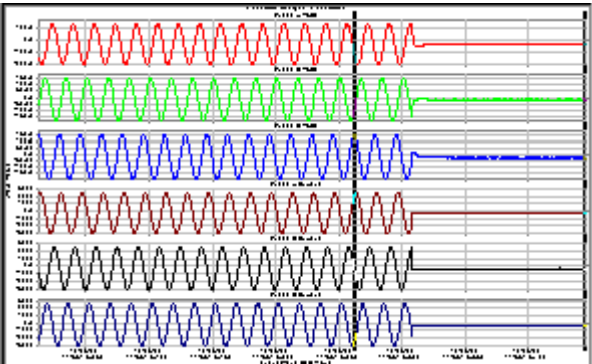
### 3 Pane Browser - Layout

The Three Pane Browser was given its name because its three main components are window panes and they are used to display and obtain information for the user. In this text, the three panes will be referred to as:

#### Pane A (Left Pane)



#### Pane B (Upper Right Pane)



c. Pane C (Lower Right Pane)

Parameter Name	Phase A	Phase B
VOLTS RMS	122.4	119.4
AMPS RMS	1.995k	2.010k
WATTS	218.8k	207.1k
VOLT-AMPS	244.9k	234.8k
VARS	110.1k	110.6k
POWER FACTOR	0.8933	0.8821

**NOTE:** In the 'alternate split method' Pane A is the upper left pane, Pane B is the right-hand pane, and Pane C is the lower left pane. You can switch between the 'split methods' using the 'Window' 'Toggle Split Method' menu. For more information on this, see [Toggle Split Method](#).

Each pane has its own functions and personality, and they all work together to allow you to browse the data in three different ways at the same time.

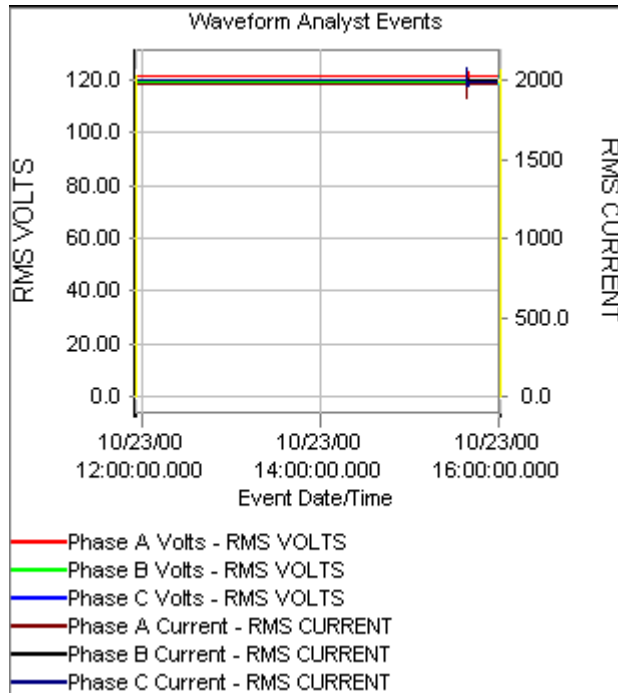
### 3 Pane Browser - Pane A

[Introduction](#)

[Chart Mode](#)

[List Mode](#)

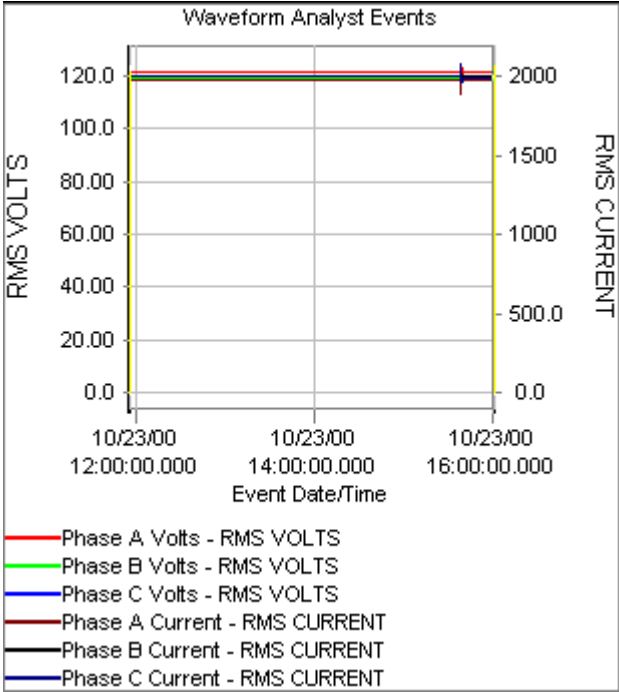
[Event Detail](#)





# Pane A - Introduction

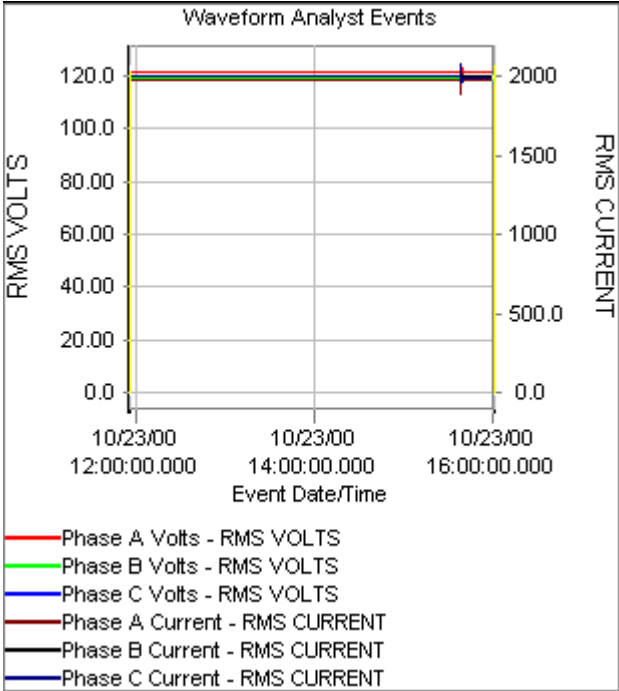
Pane **A** is the main window in the Three Pane Browser. It not only shows the timeplot of the selected events, but also displays the events over a pre-selected (if desired) period of time. Pane A shows the events in two modes: either chart mode or list mode. Chart mode displays the **graph** of the events where list mode displays the events as stored in the database.



## Pane A - Chart Mode

The first notable point in **chart mode** is the chart itself. The chart displays the event value on the left side (corresponding to the Y axis) and the Event date/time on the bottom (corresponding to the X axis).

The figure below shows the plot of the events over time:



### Related Topics:

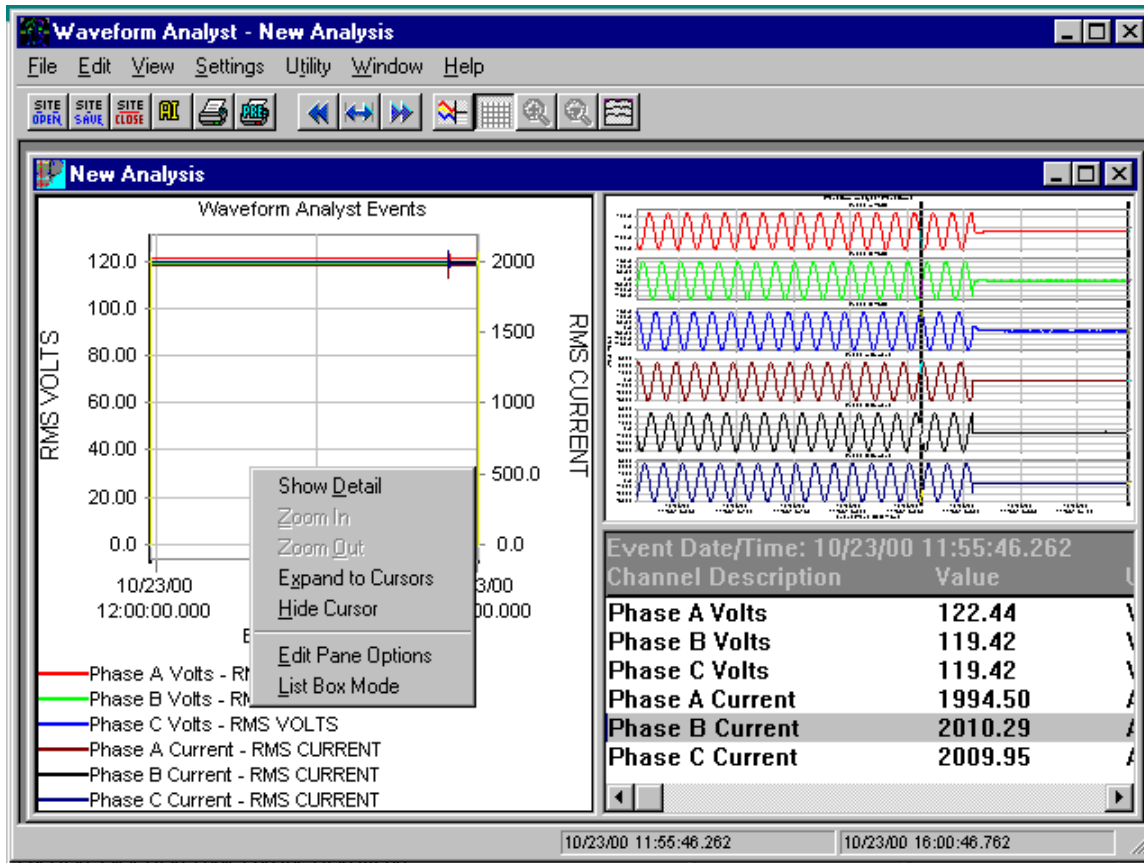
[Popup Menu](#)

[Zoom](#)

## Pane A Chart Mode - Popup Menu

There are many shortcuts in WAVEFORM ANALYST and the popup menu is one of them. This small menu has much of the functionality of the full menu, but it is made for convenience and easy use.

To access the menu, place the cursor anywhere in Pane A and click on the right mouse button. You will see a small menu that is similar to the one located on the figure below:



**Show Detail:** Clicking on the show detail button brings up the event detail dialog box with specific details about the event located within.

**Zoom In:** Contracts view of chart

**Zoom out:** Expands view of chart

**Expand To Cursors:** When the cursors enclose a portion of the chart and Expand to Cursors is selected, the chart will be expanded in on that portion of the chart that was in-between the cursors

**Edit Pane Options:** Brings up the tabbed dialog box with Pane 'A' as the tab of choice. This enables options for this specific pane to be chosen. For more information, please see Pane 'A' Config.

**List Box Mode:** Puts the pane into list box mode. Please see List Mode for more information on list box mode.

## Pane A Chart Mode - Zoom

Another feature of WAVEFORM ANALYST is the ability to zoom in on any portion of the chart you select. There are two ways to do this:

Create a box around the portion of the chart you wish to zoom in.

Choose zoom in from the menu, toolbar, or popup menu.

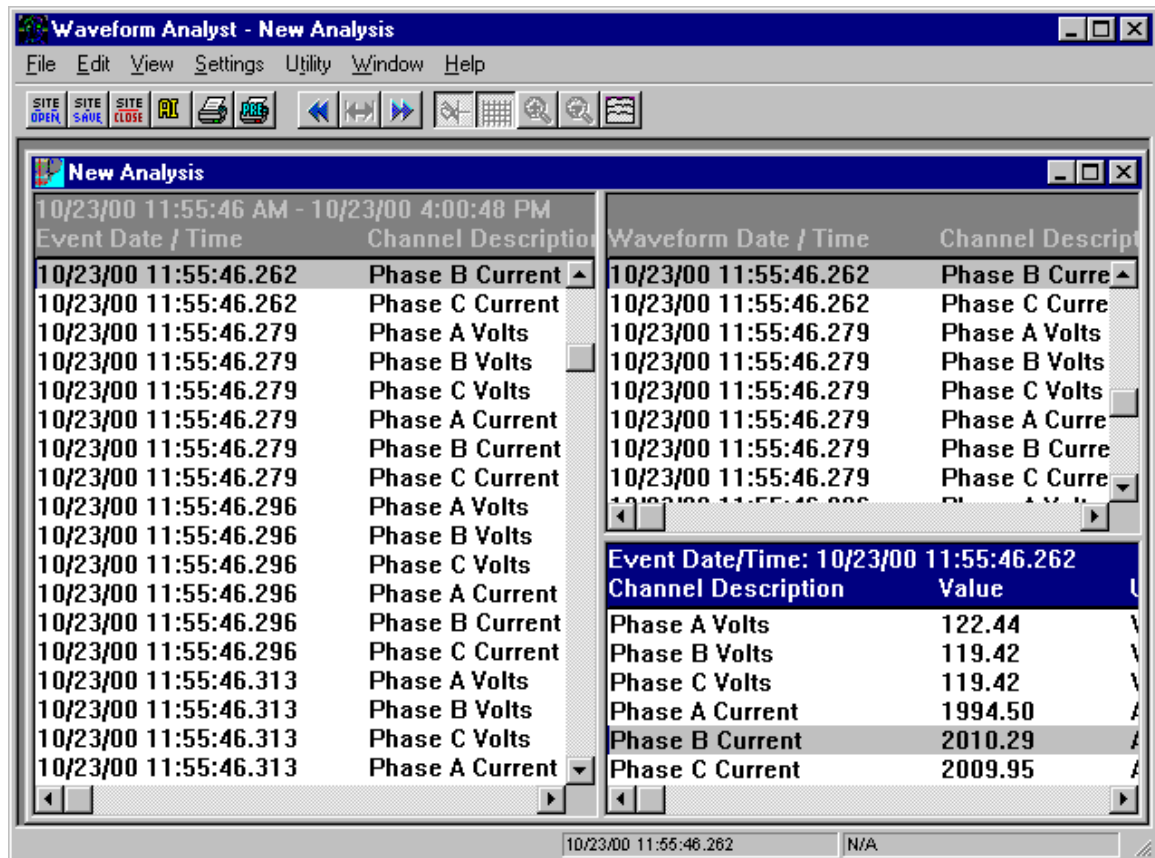
or

Drag the bar on each side of the window to enclose the portion of the chart that you wish to zoom in.

Choose expand to cursors from the menu, toolbar, or popup menu.

## Pane A - List Mode

List mode gives detailed information on each event that is displayed in chart mode. Each pane is either a list of events or the details of a specific event.



The "Active Pane as List" menu selection presents the list of numerical event information in that pane that was used to create the graph.

In Pane A, the events listed will only be those chosen in the settings menus for Pane A. Detailed information about each event can be easily displayed by double clicking on the event line or by selecting the 'View' 'Show Detail' menu.

## Pane A - Event Detail

In addition to viewing the event information in Pane A using List Mode, it is possible to double click on any single event and view the information of a single event in a report like form.

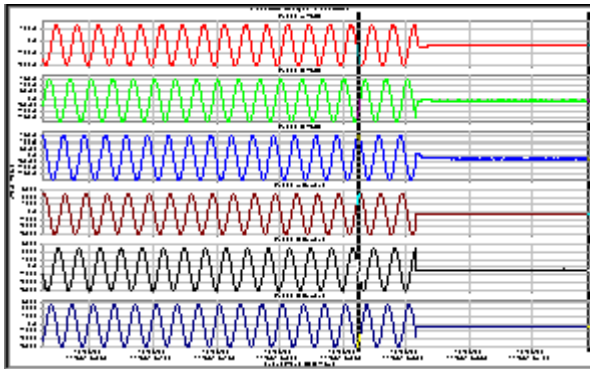
EVENT Detail			
Event/WF ID	1	Date/Time	2000-10-23 11:55:46.262481999
Node ID	192	ETHER220:WFR BI	
Trig Node ID	192	ETHER220:WFR BI	
Meas. Value	2010.29029614287	GreekPrefix	Units AMPS
Measurement Parameter	2	RMS CURRENT	
Trigger Condition	26	EVENT	
IEEE Measurement Categ.	0	NONE	
Value Valid?	1	ExtendedTableFlag	0
		Duration	0
MinValue	0	Valid?	0
		GreekPrefix	Units
MaxValue	0	Valid?	0
		Sample Age	NULL
<input type="button" value="OK"/>			

---

## 3 Pane Browser - Pane B

[Introduction](#)

[Chart Mode](#)



## Pane B - Introduction

Pane B shares many of the same functions as Pane A although the data displayed is very different. While Pane A displays event data over a period of time, Pane B displays **waveform** data associated with a particular event or groups of events that were recorded in succession.

## Pane B - Chart Mode

Chart mode in Pane B displays the event waveform values on the left side (corresponding to the Y axis) and the event waveform date/time on the bottom (corresponding to the X axis).

### Related Topics:

[Popup Menu](#)

[Zoom](#)

[List Mode](#)

[Event Detail](#)

## Pane B - Chart Mode - Popup Menu

The popup menu in Pane B has the same look and feel of the popup menu in Pane A, but the Edit Pane Options choice is different.

**Show Detail:** Clicking on the show detail button brings up the event detail dialog box with specific details about the event located within.

**Zoom In:** Contracts the view of chart.

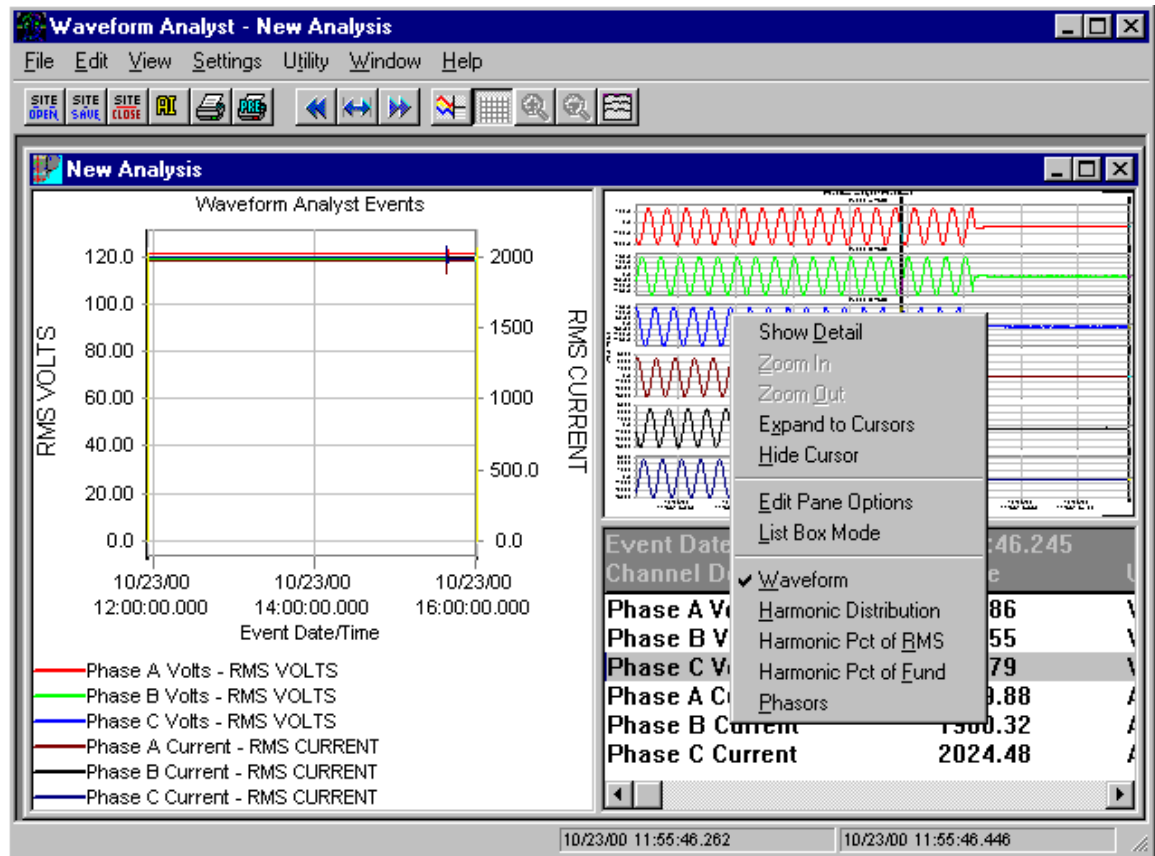
**Zoom out:** Expands the view of chart.

**Expand To Cursors:** When the bars enclose a portion of the graph and this is selected, the graph will be zoomed in on that portion of the graph that was in-between the bars.

**Edit Pane Options:** Brings up the tabbed dialog box with Pane 'B' as the tab of choice. This enables options for this specific pane to be chosen. For more information, please see Pane B.

**List Box Mode:** Puts the pane into list box mode. For more information on List Box Mode, Please see List Mode.

To access the popup menu, place the cursor anywhere in Pane B and click on the right mouse button. You will see a small menu that is similar to the one located below pop up on your screen and present you with some options:



## Pane B Chart Mode - Zoom

Another feature of WAVEFORM ANALYST is the ability to zoom in on any portion of the graph you select. There are two ways to do this:

Create a box around the portion of the graph you wish to zoom in.

Choose zoom in from the menu, toolbar, or popup menu.

or

Drag the bar on each side of the window to enclose the portion of the graph that you wish to zoom in.

Choose expand to cursors from the menu, toolbar, or popup menu.

## Pane B Chart Mode - List Mode

List mode gives detailed information on each waveform that is present in the database. Each pane is either a list of events (from the database) or a list of specific information about a group of events (events that have been filtered).

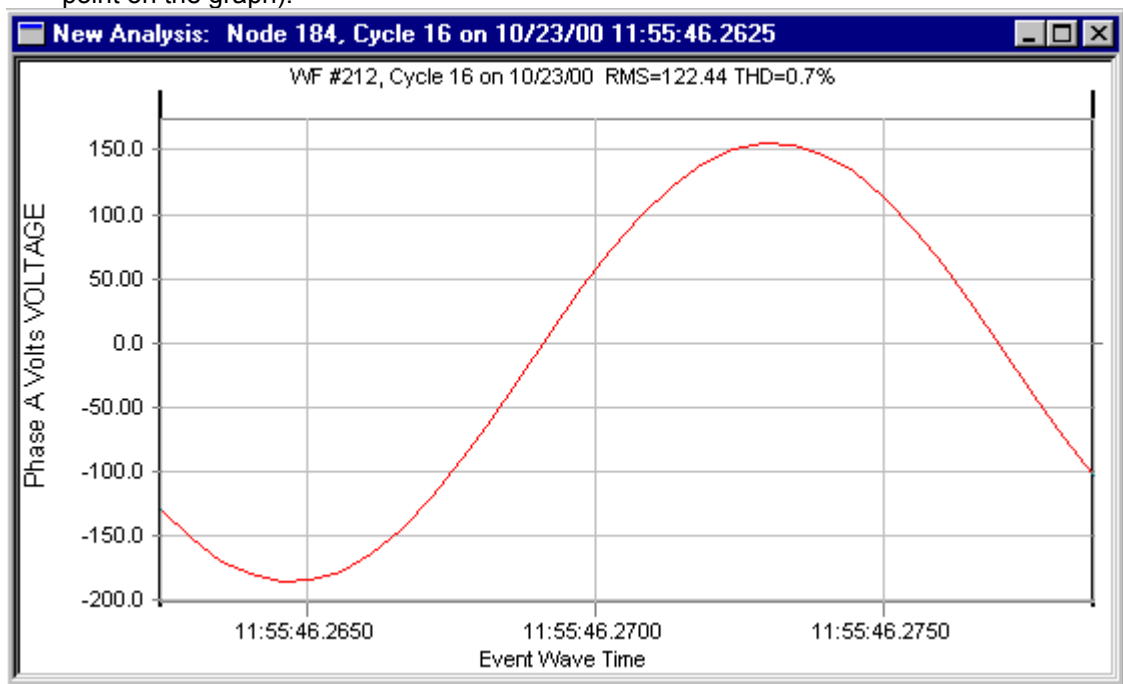
However, what the user often sees is a graph of the events created by the pane object. The "Active Pane as List" menu selection presents the list of numerical event information in that pane that was used to create the graph.



Waveform Date / Time	Channel Description
8/2/99 09:02:56.000	Phase A Volts ▲
8/2/99 09:02:56.000	Phase A Current □
8/2/99 09:02:56.000	Phase B Volts
8/2/99 09:02:56.000	Phase B Current
8/2/99 09:02:56.000	Phase C Volts
8/2/99 09:02:56.000	Phase C Current
8/2/99 09:02:56.017	Phase A Volts
8/2/99 09:02:56.017	Phase A Current ▼

## Pane B Chart Mode - Event Detail

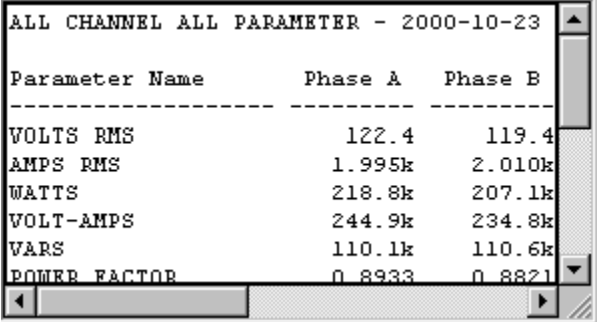
In addition to viewing the event information in Pane B using Chart Mode, it is possible to double click on any single waveform event and view the single cycle corresponding to the selected list entry (or point on the graph).



### 3 Pane Browser - Pane C

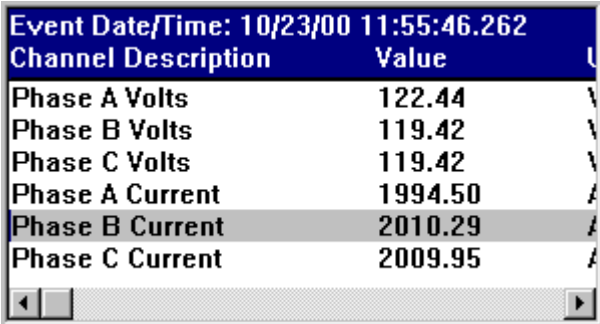
Pane C can display 'All Channels All Parameters' information, or an 'Event List' corresponding to all events for the current date/time selected in Pane A.

The following shows the 'All Channels All Parameters' display in Pane C:



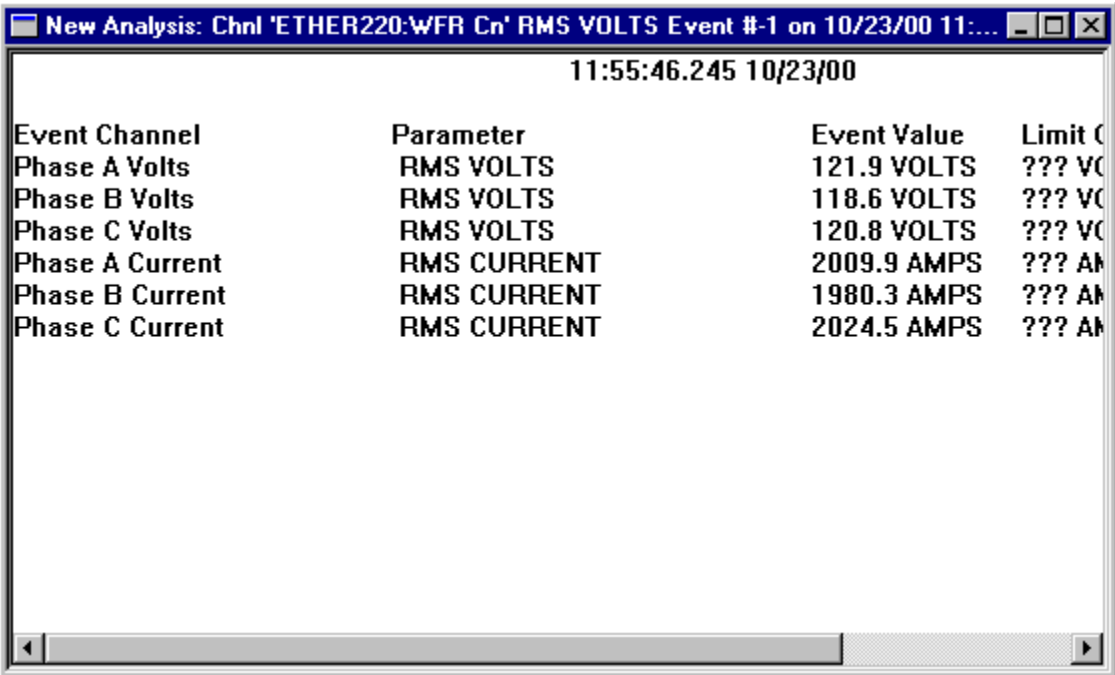
Parameter Name	Phase A	Phase B
VOLTS RMS	122.4	119.4
AMPS RMS	1.995k	2.010k
WATTS	218.8k	207.1k
VOLT-AMPS	244.9k	234.8k
VARS	110.1k	110.6k
POWER FACTOR	0.8933	0.8821

The following shows the 'Event List' in Pane C:



Channel Description	Value
Phase A Volts	122.44
Phase B Volts	119.42
Phase C Volts	119.42
Phase A Current	1994.50
Phase B Current	2010.29
Phase C Current	2009.95

Pane C shows a mini report is produced when an event is selected and double clicked in Pane C. The report describes the event with the information that can be seen in the figure below.



The screenshot shows a window with a title bar containing the text: "New Analysis: Chnl 'ETHER220:WFR Cn' RMS VOLTS Event #-1 on 10/23/00 11:...". The main content area displays a table with the following data:

Event Channel	Parameter	Event Value	Limit (
Phase A Volts	RMS VOLTS	121.9 VOLTS	??? VO
Phase B Volts	RMS VOLTS	118.6 VOLTS	??? VO
Phase C Volts	RMS VOLTS	120.8 VOLTS	??? VO
Phase A Current	RMS CURRENT	2009.9 AMPS	??? AM
Phase B Current	RMS CURRENT	1980.3 AMPS	??? AM
Phase C Current	RMS CURRENT	2024.5 AMPS	??? AM

---

## The Settings Tabbed Dialog Box

The **SETTINGS** tabbed dialog box assigns the specific options that relate to the Three Pane Browser, and the data filters for extracting information from the O.P.E.N. database.

There are seven tabs in the settings tabbed dialog box:

Channel

Screen

Event Filter

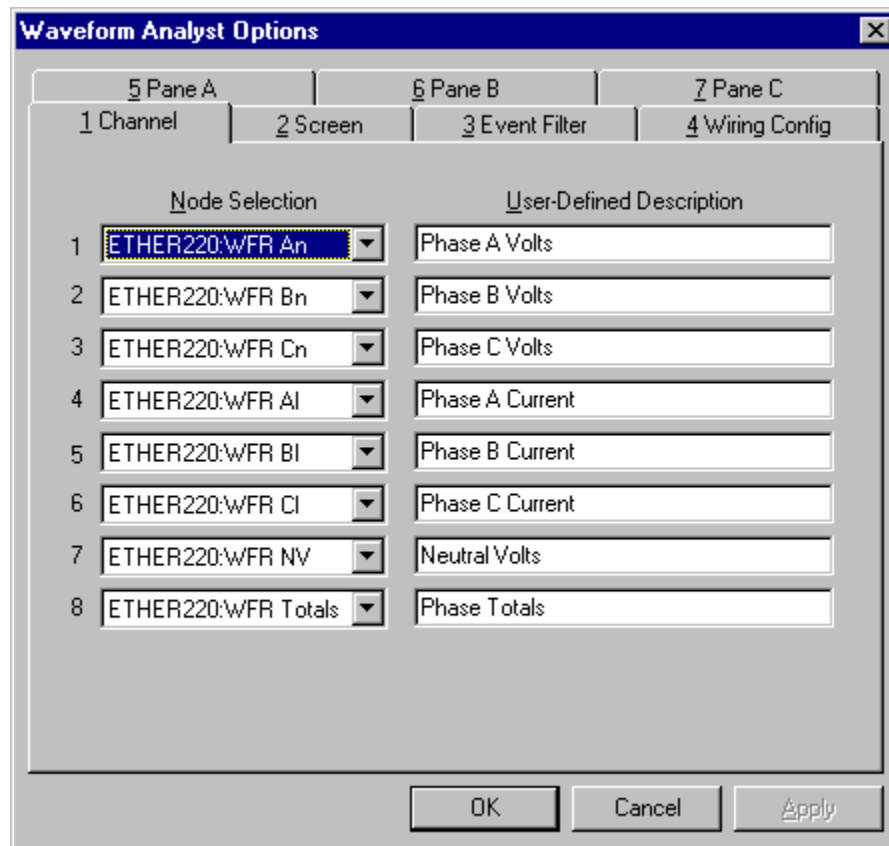
Wiring Config

Pane 'A' Config

Pane 'B' Config

Pane 'C' Config

## Settings - Channels



### Introduction

The channels tab enables you to select or deselect the channels to display.

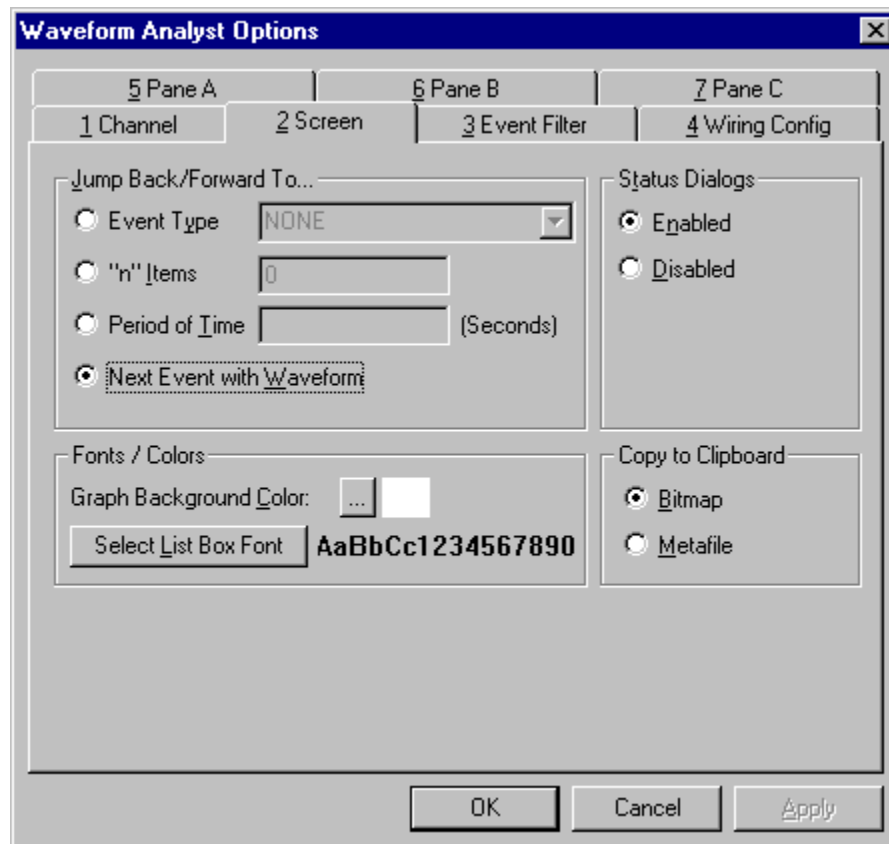
### Node Selection

This section allows you to select up to 8 nodes from the list of nodes for this analysis.(as defined when the analysis was created) by its description. Each entry must contain a different node.

## **User-Defined Description**

Here you may enter your own description for each node in the 'edit box' to the right of the corresponding node selected in the 'Node Selection' column. The description you enter here will appear on all charts and in all reports and list boxes in Waveform Analyst. This enables you to customize the charts to your own specifications.

## Settings - Screen



### Jump Back/Forward To... Group Buttons

#### Event Type

By choosing event type, the Jump Back/Forward To group buttons will jump to **this** type of event.

The options are:

- Crest Factor
- Current THD
- Demand
- Energy
- Frequency
- Harmonics Current
- Harmonics Volts
- Harmonics Watts
- Peak Current
- Power Factor
- RMS Current

- RMS Volts
- Transformer K-Factor
- Transients Current
- Transients Voltage
- Unbalance
- Voltage THD
- Volts-Amps
- Volts-Amps-Reactive
- Watts

Ex:

If **RMS CURRENT** was chosen in the "Jump Back/Forward area", and the button is checked, the next time you press either the Jump Back button or the Jump Forward button (see margin), WAVEFORM ANALYST will search for the next RMS current event.

### **'n' items**

Jumps back/forward 'n' events where 'n' is a number from 1 to 1000.

### **Period of Time (seconds)**

By selecting the unit time, the forward and reverse buttons move that amount of time forward or that amount of time backward and brings up the next event at the end of that period of time.

### **Next Event with Waveform**

By selecting the next event with waveform, the forward and reverse (multiple event buttons) will move you to the next event with a waveform.

## **Status Dialogs**

Enables or disables the displaying of informational dialog boxes throughout the program.

- |                             |          |
|-----------------------------|----------|
| 8. <input type="checkbox"/> | Enabled  |
| 9. <input type="checkbox"/> | Disabled |

## **Fonts / Colors**

### **Graph Background Color**

The Graph Background Color may be selected here by pressing the button to the left of the color (default is white).

### **Select List Box Font**

This option brings up the font dialog box that allows you to select the type of font that will be displayed in the List boxes throughout WAVEFORM ANALYST.

### **Copy to Clipboard**

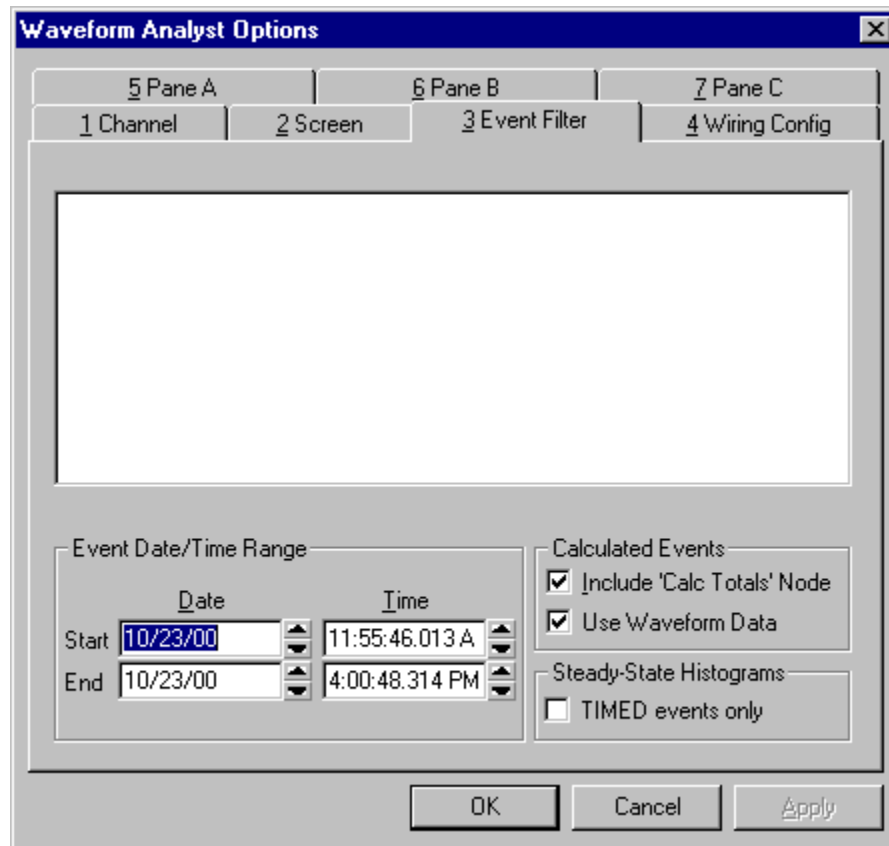
This area allows you to select how the chart will be copied to the clipboard when using the copy function.



- Bitmap
- Metafile

## Settings - Event Filter

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### Event Date/Time Range

This section of the event filter tab allows the user to specify the start and end time/date for the data displayed. The starting dates are in the left columns, and the starting times in the right columns. A value of 'NULL' indicates that no filtering will take place.

### Calculated Events

#### Include 'Calc Totals' Node:

When checked, the "Include 'Calc Totals' Node" checkbox indicates to Waveform Analyst that the 'Calc Totals' node should appear in the list of available nodes for Pane 'A'. Selecting the 'Calc Totals' node allows you to calculate 'Phase Totals' event values using waveform and event data in lieu of using the actual 'Phase Totals' node.

**Use Waveform Data:**

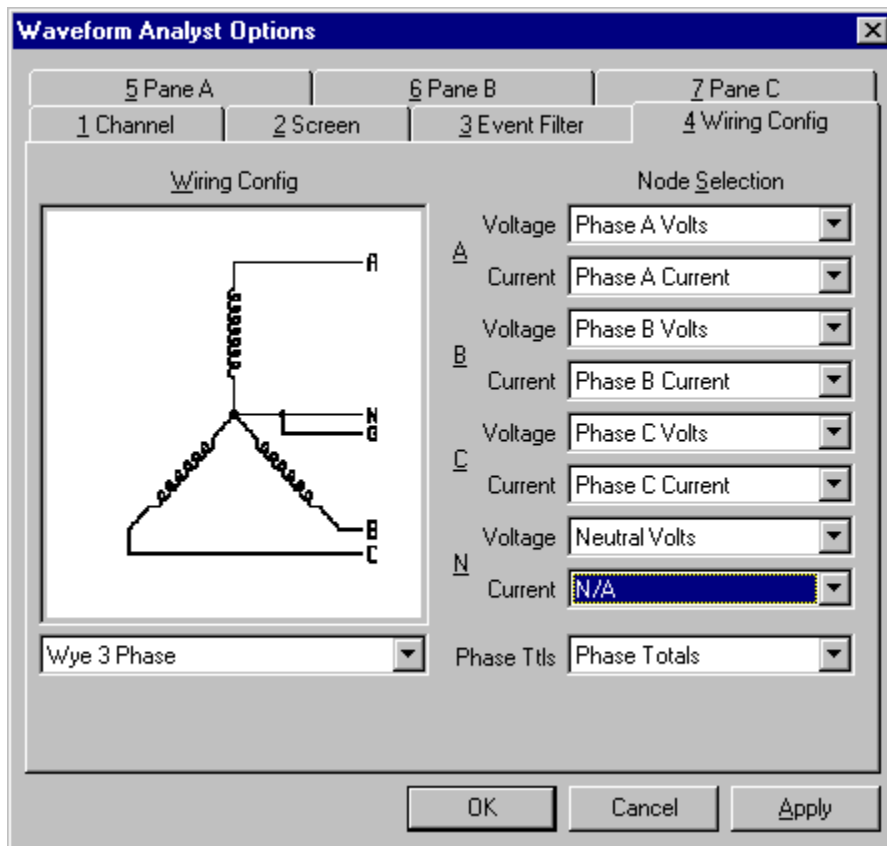
When checked, any parameter NOT available in the various Event tables for a given date and time can be automatically calculated from Waveform data by Waveform Analyst. This results in a much slower query, but more complete data.

## Steady-State Histograms

### Timed Events Only:

When checked, only those events and waveforms with a trigger condition of 'TIMED' will be considered in producing steady-state histograms. Specifically, this affects the THD Histogram and the Unbalance histogram. The purpose of this feature is to allow you to eliminate 'exceedence' events from histograms that are supposed to represent steady-state conditions.

## Settings - Wiring Config



### Introduction

The Wiring Config tab lets you assign specific nodes to 'phases' within a particular wiring configuration. When the wiring configuration is already known from the relationships between the nodes in the O.P.E.N. database, this information is filled in for you when you first create an analysis. If Waveform Analyst cannot determine the correct node assignments, you can make those assignments here.

### Wiring Config

The 'Wiring Config' display, and the corresponding 'combo box' below, allows you to select a wiring configuration and view a visual representation of the circuit. In the example above, a WYE configuration has been selected. Note the visual representation showing phases A, B, and C, and the Neutral (N) and Ground (G) connections to the common (center) connection of the WYE transformers.

## Node Selection

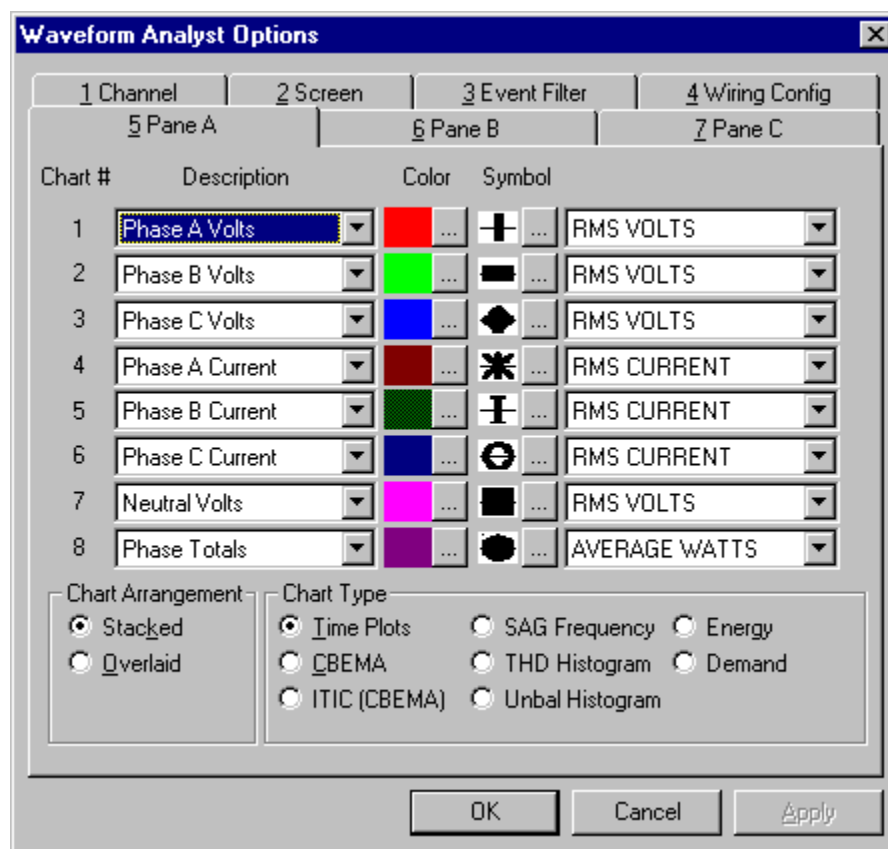
These 8 'combo boxes' allow you to choose a node that corresponds to the Phase values. The 'Voltage' and 'Current' nodes indicate which nodes will have Voltage events, and which ones will have Current events. For a WYE circuit (as well as SINGLE PHASE and SPLIT PHASE), they can be the same, if the monitoring device records both voltage and current data on the same node. For a DELTA circuit, the 'Voltage' node will have phase to phase values, while the 'Current' node will have phase values.

## Phase Totals

The 'Phase Ttls' combo box allows you to select the node that contains "phase total" data (also known as ABC or 'Circuit Totals'). "Phase Total" data will consist of a summation of all 3 phases, such as "Total Watts" (as with a revenue power meter).

In all cases with node selections, if there is no node that corresponds to that portion of the circuit, you can select 'N/A'.

## Settings - Pane 'A' Config



### Introduction

The **Pane 'A' Config** tab enables you to select a name for the channels, select a color for the channel, a symbol (if in CBEMA mode) and the type of parameter that you wish assigned to that specific channel.

### Description

The description drop down box enables you to select the label for the data that you want to see in Pane A.

The options for the description are dependent upon what is entered in the Channel Descriptors section of the Channels tab. Please see [Channels](#).

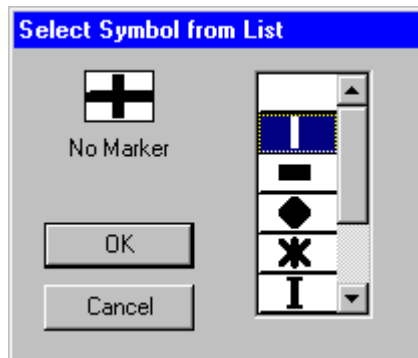
## Color

The type of color that you desire to see for that specific channel may be chosen from a standard Windows color dialog box. To select, press the button directly to the right of the color in the Pane A tab.



## Symbol

The symbol is used only for CBEMA mode and it marks the location of the data point on the chart. To select a symbol, press the button to the right of the box with a line. This will bring up the following dialog box



## Parameter Assignment

This selection is the data type that you will be viewing for the specific chart number.

## Chart Arrangement

There are two options in the Chart Arrangement

- 10. 1. Stacked
- 11. 2. Overlaid

When Stacked is selected, the charts are stacked one on top of the other which enables you to see multiple charts at once.

When overlaid is selected, each chart overlays the other and they can only be seen one at a time.

Note: The number beside the heading "number of charts" corresponds to the number of **channels** selected in the Channels tab.

## Chart Type

### **Time Plot**

Shows a plot of all the data that is in the site. What is shown is dependent upon the date and time ranges that you specify in the site open dialog box or in the Event Filter Tab Dialog Box.

### **CBEMA**

Shows a standard CBEMA plot of the data: number of cycles vs. nominal voltage.

### **ITIC (CBEMA)**

Shows an ITIC CBEMA plot of the data using a different set of limits: number of cycles vs. nominal voltage.

### **SAG Frequency**

This displays the frequency of SAG events over time by severity, using a histogram.

### **THD Histogram**

This displays the frequency of THD by severity, using a histogram. The values are calculated from waveforms if no THD events are present in the event tables.

### **Unbal Histogram**

This displays the frequency of Voltage Unbalance by severity, using a histogram. The values are calculated from waveforms and RMS events if no Unbalance events are present in the event tables.

### **Energy**

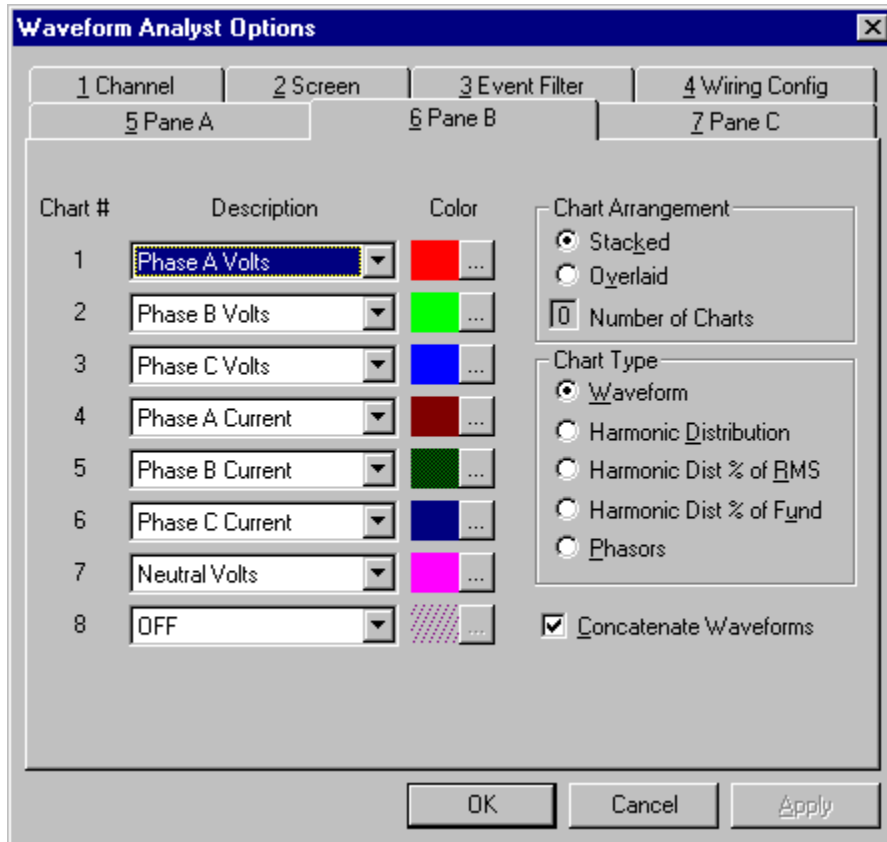
This displays an 'Energy Plot' showing averaged 15 minute intervals for energy over time.

### **Demand**

This displays a 'Demand Plot' showing the total demand over time.



## Settings - Pane 'B' Config



### Introduction

The Pane 'B' Config tab enables you to select a name for the channels, select a color for the channel, how to arrange the charts, and the type of chart.

### Description

The description is where you want to label the type of voltage or current that you wish to see on the chart. These choices correspond to the channels activated in the Channels tab for current.

## Color

The type of color that you desire to see for that specific channel may be chosen from the standard Windows color dialog box. This may be selected by pressing the button directly to the right of the color you wish to change.



## Chart Arrangement

There are two options in the Chart Arrangement

- Stacked
- Overlaid

When Stacked is selected, the charts are stacked one on top of the other which enables you to see multiple charts at once. This has an advantage of enabling you to see even more data at once.

When overlaid is selected, each chart overlays the other and they can be seen one at a time.

**Note:** The number beside the heading "number of charts" corresponds to the number of *charts* selected.

## Chart Type

### **Waveform**

Displays the waveform associated with the current event (if any).

### **Harmonic Distribution**

Graphically presents a Fourier analysis of the waveform event. The vertical bars represent the value of the 1st to the 50th harmonic. The numeric values, as well as their phase angles may be displayed in Pane C. To access numbers up to the 50th harmonic, double click on an item in Pane C to view the Single Pane Browser (Pane D).

Pane D contains all 50 harmonics as well as their number, value, and phase.

### **Harmonic Dist % of RMS**

Graphically presents the distribution of the harmonics as related to the RMS. The percentile

### **Harmonic Dist % of Fund**

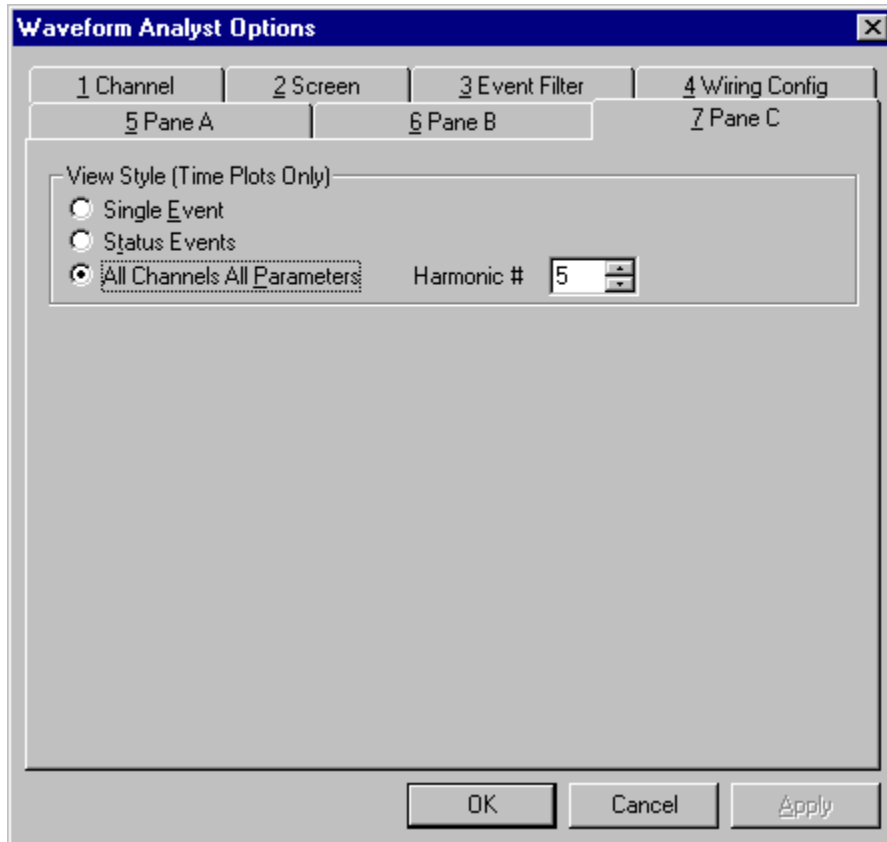
Graphically presents the distribution of the harmonics as related to the fundamental.

### **Phasors**

Graphically presents relationship of the angles at the zero crossing, with respect to each other, on an overlaid chart showing their amplitude and phase angle.

***Note: If you wish to view phasors while in scope mode, you need to select phasors before you enter scope mode.***

## Settings - Pane 'C' Config



### View Style

Pane C shows either single events, status events, or an all channel all parameter table depending upon the selection.

- Selecting Single Event shows all events occurring for the time/date of the cursor position in Pane A.
- Selecting the second option (Status Events) allows you to see status events for that site beginning with the left cursor in Pane A and ending with the right cursor.
- Selecting All Channels All Parameters allows you to view a table of a series of event parameters for each active channel including totals. Table values are taken directly from the database or computed from waveforms if they are available. This table is generated for values that occurred at the time/date of the left cursor in Pane A.

For 'All Channel All Parameters' the 'harmonic #' determines which harmonic will be used for harmonic voltage and other related calculations where a harmonic number is required.

# Waveform Analyst Server

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## Waveform Analyst Server

The Waveform Analyst Server can be used in conjunction with the Waveform Analyst Remote application to provide the full suite of Waveform Analyst functions to users who are on a network external to where the waveform data is stored. Waveform Analyst Server is installed with every installation, but must be configured via the Windows Service Control Manager if the user wishes for the service to start with Windows.

### Configuring Waveform Analyst Server

Waveform Analyst Server is automatically configured when it is installed.

The startup property for the service is set to 'manual'. In order to run Waveform Analyst server every time Windows boots, use the Windows Service Control Manager and set the startup property to 'automatic'. To run Waveform Analyst Server for a single session of Windows, use the start menu selection 'Start Waveform Analyst Server'.

Waveform Analyst Server gets its data from the 'PQAnalyst Data' DSN created by either the PQAnalyst or Waveform Analyst setup program.

# Waveform Analyst Remote

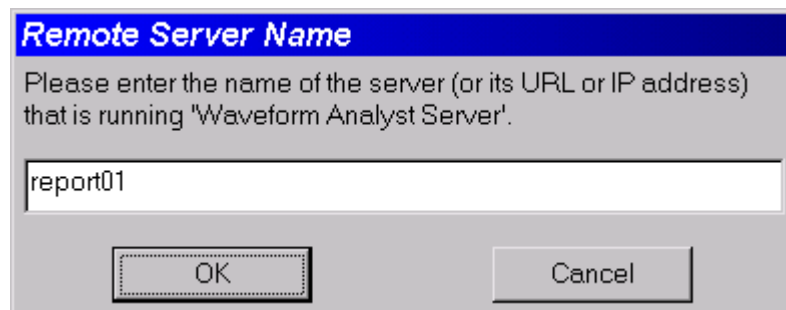
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## Waveform Analyst Remote

Waveform Analyst Remote is the client side of Waveform Analyst Server. Its interface is identical to that of Waveform Analyst, save for the method by which the user accesses the data.

### Browsing Data with Waveform Analyst Remote

From the **File** menu, choose **New Analysis**. The **Remote Server Name** dialog should appear:



Enter the IP address, URL, or in the case of a LAN, the network name of the computer running Waveform Analyst Server and click **[OK]**. The **Device Selection** dialog should appear. From this point, the interface is the same as the standalone version of Waveform Analyst. Consult the Waveform Analyst documentation for instructions.

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## Manual Mapping Application - CTRADCFG.EXE

CTRADCFG.EXE allows the user to configure two aspects of the PMCS2FTF translation service. The first is to configure the FTP function that allows the service to automatically transfer translated files to a remote server. The second is to manually map the circuit type and channel designations of a new PMCS device where the device's Comtrade files cannot be automatically deciphered by the Waveform Analyst. This mapping information is stored in the services cache file.

The screenshot shows the 'ComTrader Config' dialog box. It features three main columns of dropdown menus: 'Circuit' (set to '[e3720:WFR]'), 'COMTRADE channels' (V1, I1, V2, I2, V3, I3, I4), and 'OPEN channels' (Phase A Volts, Phase A Current, Phase B Volts, Phase B Current, Phase C Volts, Phase C Current, Neutral Current). A checkbox for 'Enable FTP' is unchecked. Below it are text boxes for 'Server', 'Upload Path', 'Username', and 'Password'. Buttons for 'Commit Changes', 'Save', and 'Cancel' are at the bottom.

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## Configuring FTP

To enable or disable PMCS2FTF's FTP functionality, check or uncheck the **Enable FTP** checkbox in the *FTP Configuration* section of the CTRADCFG.EXE dialog. If FTP is enabled, the corresponding textboxes will become active, allowing for user input. Enter the server's IP address or DNS in the **Server** field. Enter the entire upload path (starting at the root) in the **Upload Path** field. Enter the account login in the **Username** field, and the corresponding password in the **Password** field. FTP is disabled by default.

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## Editing Device Mapping

PMCS2FTF should be able to automatically determine most Comtrade file's circuit configuration and channel designations. However, in some cases a new device's Comtrade file will not supply sufficient information to allow the service, PMCS2FTF, to decipher the configuration. In these cases, the user must use CTRADCFG.EXE to manually select the circuit type and channel designations. CTRADCFG.EXE will then update the service's cache file and will cause all existing Comtrade files of that device to be immediately translated.

In order to edit a device's entry in PMCS2FTF's device cache file; first select the device from the **Device Name** list box. Use the checkbox below the **Device Name** list box to toggle whether or not all devices should be visible for editing, or just devices that the service has not been able to decipher. In the former case, undeciphered devices are marked with an "\*", whereas deciphered devices have no such denotation.

Once a device has been selected, any information that PMCS2FTF has determined regarding the device is displayed in the fields and list boxes outside of the **FTP Configuration** box.

For a device to be considered valid it's circuit type (WYE, DELTA, etc.), nominal voltage, and at least one COMTRADE channel to one OPEN channel must be mapped.

The circuit type can be selected via the **Circuit Type** list box. Numeric circuit information such as nominal values and limit values can be entered in the appropriate textboxes **Nominal Voltage**, **Nominal Current**, **Max Current** and **Min Power Factor**.

Mapping COMTRADE channels to OPEN channels can be accomplished using the two columns of list boxes on the dialog, labeled **COMTRADE Channels** and **OPEN Channels**. Simply select the COMTRADE channel one wishes to map, and select the appropriate OPEN channel in the list box across from it. There must be a one-to-one correspondence in the mapping of COMTRADE to OPEN channels. CTRADCFG.EXE will alert the user if an entry has been omitted or if an illegal mapping has been entered.

When a device has been satisfactorily mapped, click the **[Commit]** button to update the device map in memory. If **[Commit]** is not clicked, and another device is selected for editing, the changes made to the previous device will not persist. When all devices have been satisfactorily edited and had their changes committed, click the **[Save]** button to save the changes to PMCS2FTF's device cache file. Click **[Exit]** to exit the application without saving the changes to the device's mapping in the service's cache file.



# Appendix A: Technical Support

For additional technical support, please contact GE Industrial Systems. Please refer to the GE PMCS documentation for customer support contact information.

## Start-up difficulties

If you are experiencing START-UP difficulties with WAVEFORM ANALYST please have the following available when calling technical support:

- Type and speed of Computer (Ex: Dell or IBM or 'generic PC', Pentium II, Pentium III, or Cyrix, etc.) and the total number of CPU's (typically, only one).
- The operating system you are using (Ex: Windows '98, Windows NT 4.0, Windows 2000, Windows ME) and any applicable 'service pack' that has been installed (service pack 6 is recommended for Windows NT 4.0 and service pack 2 is recommended for Windows 2000).
- The total amount of RAM installed on the computer
- The total amount of hard disk space, the file systems installed on each partition (Ex: FAT16, FAT32, NTFS) and the total amount of free space on all hard drives.
- The type of network connections (if any) and whether you are using a domain or a workgroup (for Microsoft Networks).
- Any 3<sup>rd</sup> party programs that run continuously (such as FAX monitoring software, or an internet client application such as ICQ), and any legacy or non-standard devices that still require entries in either 'CONFIG.SYS' or 'AUTOEXEC.BAT' to function.
- A printout of AUTOEXEC.BAT and CONFIG.SYS (when applicable – see above)

**NOTE:** You can determine the current version and 'service pack' of a Windows operating system, as well as RAM and CPU information, by running 'Explorer' and clicking 'Help' 'About Windows' – the 'About' dialog box will display useful system information that can aid in troubleshooting problems installing and running Waveform Analyst. Disk space and partition information can be obtained by opening 'My Computer' and viewing the 'properties' dialog box for each disk drive on the computer.

## Operating Difficulties

If you are experiencing difficulties in operating WAVEFORM ANALYST, please have the following available when calling technical support:

- Configuration setup of Analyzer
- Serial Number and Model Number of Analyzer
- The circuit configuration of the device (Ex: WYE/DELTA)
- The type of database that the O.P.E.N. data is stored in (Ex: MS Access '.mdb' file, SQL Server).
- The name (and version) of the application that loads the data into the 'O.P.E.N.' database.

# Appendix B: Glossary of Terms

## Database

A set of tables that stores information applicable to Waveform Analyst. The database format used by Waveform Analyst is called 'O.P.E.N.' and stores 'node' and 'equipment' configuration information, as well as time-based 'event' and 'waveform' information on a per-node basis.

## Dialog Box

A view that enables user interaction. The Dialog box sends and receives information to the user via buttons, and controls.

## Event

A measurement associated with a single date and time, that has a value, a *Measurement Parameter* (such as RMS VOLTS or AVERAGE CURRENT), a *Trigger Condition* (such as TIMED or NORMAL TO LOW), and optional values (such as min/max and duration).

## Waveform

A cyclic measurement associated with a starting date and time that has multiple values, a *Measurement Category* (such as VOLTAGE or CURRENT), a *Trigger Condition* (such as TIMED or NORMAL TO LOW), a frequency, a cycle count, and a duration.

## ODBC Compliant Database

A database that conforms to the ODBC standard.

## Pane

Another word for a section of a window. Data is displayed in a pane which isolates that type of data. For more information on panes please see [Three Pane Browser](#).

## Site

A collection of Nodes associated with a specific circuit that includes the *Monitoring Device* as well as its *recording channels*. Where a *Measurement Point* is normally associated with the circuit being monitored, a *Site* is normally associated with the monitoring device itself.

## Analysis

A power quality survey that is associated with a specific circuit, or a set of Nodes from one or more circuits.

## Node

A unique identifier that is usually associated with waveform and event data being collected from a monitoring device. A node has *properties* that include its location, its relationship to other nodes, the type of equipment associated with it, and the type of data that is expected to be collected (if any). Each piece of equipment in the O.P.E.N. database has a node associated with it. There is a node associated with the monitoring device itself, the circuit that the data is being collected for, and each phase of the circuit.

## Circuit

Also called a ***Measurement Point***, a *circuit* refers to the points that the monitoring device is collecting data for, and the wiring configuration associated with it. Typically it will be a WYE or DELTA, with voltage and current data being collected from the individual phases.

# Appendix C: PQ Analyst – Theory of Operation

PQ Analyst uses a multi-threaded scheduler to automatically run reports, generate graphs, process alarm/trigger notifications, and FTP and/or e-mail the output files to pre-determined destinations.

PQ Analyst will periodically check to see if any job needs to be run, and if it finds anything, it will launch a new 'thread of execution' to process the job and update the next time/date when it is complete.

The data for PQ Analyst is stored in two different ODBC data sources, appropriately named 'PQAnalyst System' and 'PQAnalyst Data'. The 'PQAnalyst System' database contains scheduling information about devices, jobs, directory names, and other 'system level' information. The 'PQAnalyst Data' database contains device configuration, event, and waveform data. By default, this data is stored in 2 MS Access database files, located by default in the C:\GE\_PMCS\PQAnalyst\Data directory, named 'PQASystem.mdb' and 'PQADData.mdb'.

The output files for each job depend on the type of job being run, and the scheduling frequency. For month to date, quarter to date, year to date, and other 'period end' scheduling frequencies, the output files will be placed into a directory that represents the period. As an example, month to date data for January will be placed into the 'M01' directory. Other data, such as hourly and 'trigger' scheduling, is placed into the 'History' directory upon successful upload (when applicable) to the FTP server.

Whenever PQ Analyst runs the Ai\*Power application, it must export the data from the OPEN database format into a format that Ai\*Power can accept. It must also ensure that more than one application will not be attempting to print to the Adobe PDF Writer (when installed) at the same time. To accomplish this, PQ Analyst will only run a single Ai\*Power report at any given time.

PQ Analyst also uses a proprietary locking scheme to ensure that only one application can run a given job at any time. On occasions, a user may attempt to edit or view a job or device's properties and get a message box with an error message indicating that the job (or device) could not be 'locked'. This reflects the need by PQ Analyst to prevent changing a job or device's properties while the job (or device) has active jobs.

The basic logic flow is as follows:

1. PQ Analyst checks the list of jobs from the PQ Analyst 'System' database, and determines if any of them need to run.

2. If any are found, PQ Analyst creates a new 'thread of execution' to run the job, and then write-locks the job's entry in the PQ Analyst 'System' database. This allows other processes to read the entry, but no changes (or additional job schedules) can be performed on it.
3. The new job then gets added to the internal queue, and dependencies are assigned. As an example, an Ai\*Power report might need to run, which requires that no other Ai\*Power reports are currently running. Therefore, an Ai\*Power report must wait until no other Ai\*Power reports are scheduled or running before it can run.
4. Once output files have been generated, their disposition is determined, and the files are sent to their appropriate destination (FTP, e-mail) and copied to the appropriate history folder.
5. For FTP, if there are ANY files in the history folder that are newer than the ones on the FTP site, they will be uploaded as well as the ones that were created by the report.
6. The job is unlocked and resources freed so that other operations can be performed on it.

Whenever a job is scheduled, PQ Analyst will run it at the exact time it is scheduled for. Once complete, the original scheduled date/time is used as the basis for determining when it needs to run next, by adding the 'schedule frequency' to the original starting date/time. So, if the schedule specifies '240 minutes' (4 hours), then 4 hours will be added to the original start time. However, if the new scheduled time were to precede the current time, or were to fall within a few minutes of the current time (so that the same job would be repeating itself almost immediately), an additional amount of time equal to the schedule frequency (in this case, 4 hours) would be added to the result until the new scheduled date/time falls 'reasonably after' the current date/time.

### **Scheduler Log**

The scheduler log output indicates the jobs that have run. Dates and times are in GMT to prevent daylight savings and time zone issues from affecting the analysis. Warnings are highlighted in yellow, and errors are highlighted in red, so that they may be easily spotted in the log.

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## PMCS Device Compatibility Notes

**EPM 3710**, **EPM 3720** and **PQM** devices are not supported by Waveform Analyst or PQ Analyst. The specific waveform capture features of these devices (which permit user selection of channels) can lead to incorrectly interpreted results.

**SR 745** waveform data cannot be used to generate PQ reports. PQ reports require voltage channel data and **SR 745** devices only monitor current.

**SR745** and Universal Relay devices support multiple sources, however the Waveform Analyst and PQ Analyst assume one source per device by default. Manual intervention is required by the Waveform Analyst user in order to select another source channel for viewing. Reference the section "Manual Mapping" for instruction on how to select from several sources.



**GE Industrial Systems**

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