

Introducing PPSC Manager

PPSC Manager allows you to control your power source from your PC using an available serial port or GPIB or LAN interface (VXI-11 LXI or Raw Socket connections). In addition you can also do the following:

- View and print PPSC metered values.
- Export metered values to Microsoft Excel (*.csv file).
- Monitor power source status.
- Create arbitrary waveforms.
- Connect to a virtual PPSC using simulation files.
- Update PPSC settings offline using simulation files.
- Capture and record commands and queries sent to your PPSC.
- Create and execute output sequences based on time or cycle variations of voltage or frequency.
- Preview power source outputs during steady state or transient operation.
- Read all settings in your PPSC controller and save them to a file on your PC (backup).
- Send settings from a file on your PC to your PPSC controller (restore).
- Use your PC to view, edit and print PPSC settings

Refer to your PPSC Programmable Controller Operation Manual for additional information on PPSC operation and the values of the various PPSC settings.

System Requirements

PPSC Manager requires:

- Windows 7/8/10 PC. PPSC Studio requires Windows 7 or later.
- An available COM (serial) port or GPIB or LAN interface(not required for simulation mode)
- Serial cable or GPIB or LAN interface cable (not required for simulation mode)
- NI-VISA software

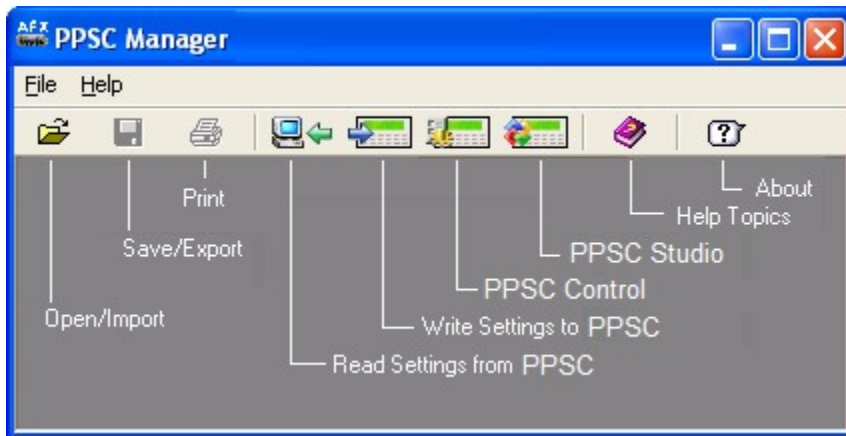
NI-VISA software is available for free download from the National Instruments web site at <http://www.ni.com/support/>.

Getting Started

To start PPSC Manager, click **Start**, then click **Programs**, then choose **Pacific Power Source**, then choose **PPSC Manager** then **PPSC Manager** .

Main Window

PPSC Manager is an MDI (Multiple Document Interface) application. As show below, the main window includes a toolbar. The toolbar allows you to perform the operations listed. The **Open/Import**, **Save/Export** and **Print** items are only enabled when a settings file or PPSC window is open.



Click below for more information on a particular toolbar item:

[PPSC Studio](#)

[PPSC Control](#)

[Read Settings From PPSC](#)

[View or Edit Settings File](#)

[Save Settings to Text File](#)

[Print](#)

[Write Settings to PPSC](#)

[Registering](#)

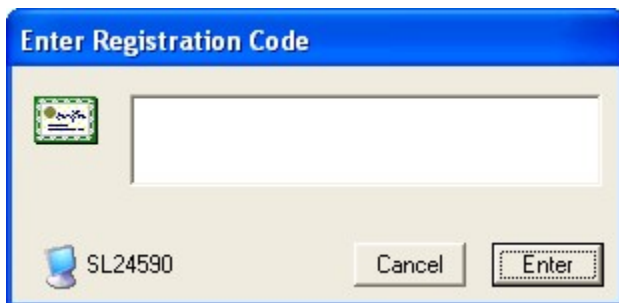
About ([System Resources](#))

Registering

Some PPSC Manager features require a registration code. If a dialog appears that explains that feature is unavailable for your PPSC, contact Pacific Power source and provide your PPSC serial number (also shown in the dialog box) to obtain the necessary registration code. To enter the registration code, choose Register from the Help menu.



Enter the registration code in the dialog box that appears. To minimize entry errors, you can copy (Ctrl+C) and paste (Ctrl+V) the code you received.



Introducing PPSC Studio

PPSC Studio provides a complete graphical interface for your PPSC controller and power source. It includes safeguards to protect your load and guides you into entering values that are appropriate for your power source. PPSC Studio can be used to directly control your PPSC through the remote interface or "offline" using simulation files. In addition, you can monitor the status of your power source and view metered values like output voltage, load current, waveforms and harmonics.

PPSC Studio features:

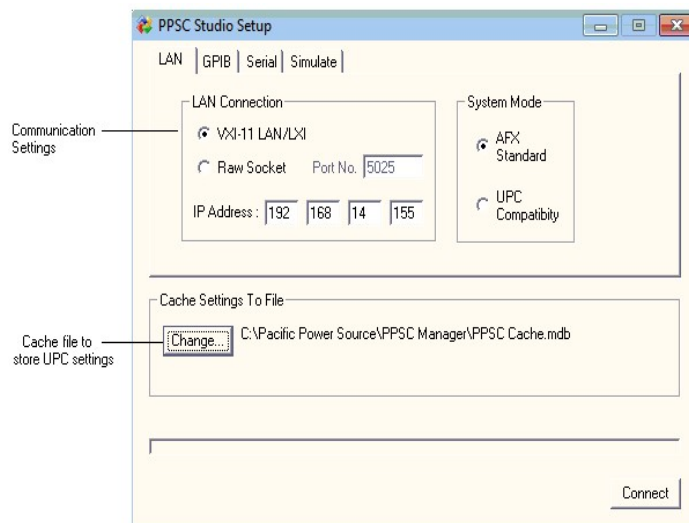
- Connect to your PPSC using a Serial port or GPIB or LAN interface card.
- Easily change power source parameters like output voltage, frequency etc.
- View and print PPSC metered values
- Develop and run test sequences, control external instruments and create custom test reports.
- Export metered values to Microsoft Excel (*.csv file)
- Monitor power source status.
- Create arbitrary waveforms.
- Create and execute output sequences based on time or cycle variations of voltage or frequency.
- Connect to a virtual PPSC using simulation files.
- Update PPSC settings offline using simulation files.
- Capture and record commands and queries sent to your PPSC.
- Preview power source outputs during steady state or transient operation.

Use the [PPSC Studio Connection Setup](#) window to connect to your PPSC.

PPSC Studio Connection Setup

Before PPSC Studio can communicate with your PPSC, you must specify the interface connection. The steps below describe how to connect to your PPSC.

1. Press the **PPSC Studio** icon in the [toolbar](#)
2. The **PPSC Studio Setup** window appears as shown below. In this example, the **Serial** interface tab was selected. Click on the tab corresponding to the interface connection of your PPSC then enter the appropriate communication settings. You can view or change the remote interface settings currently programmed in your PPSC by pressing **Fn 3,3** on the PPSC front panel.
3. Specify the cache file that will be created when controlling your PPSC. The default cache file name automatically assigned for you should be fine for most applications.
4. After you specify the appropriate connection settings, press the **Connect** button.

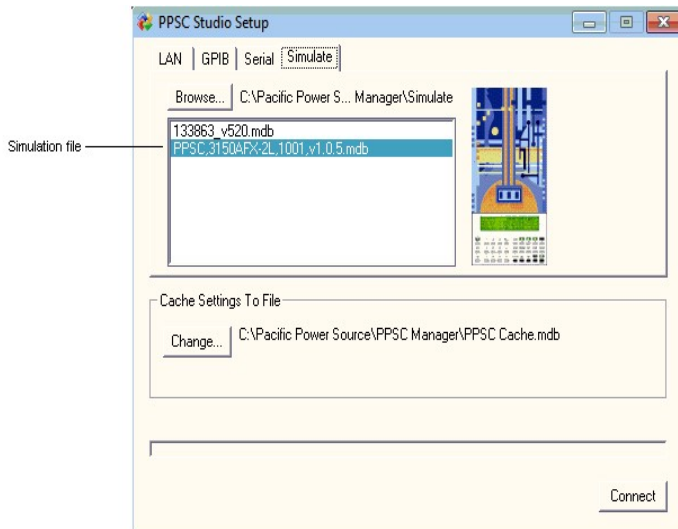


The progress of connecting is shown in the window. When the connection process completes, the [main PPSC Studio](#) window appears. Also a [PPSC Meter](#) window appears that allows you to view all PPSC measured values.

Simulation Mode

In addition to being able to connect to your PPSC using either a LAN or Serial interface, you can connect to a virtual PPSC using a simulation file. Simulation files are nothing more than PPSC Settings files and can be created using the [Read PPSC Settings](#) icon in the toolbar. Simulation files should be stored in the "Simulate" folder located in the same directory as the PPSC Manager application (typically "C:\Program Files\Ppsc Manager\Simulate" or "C:\Pacific Power Source\PPSC Manager\Simulate").

Simulation files are handy if you want to run your PPSC "off-line". You can then upload your changes to your PPSC using the [Write PPSC Settings](#) icon in the toolbar. Shown below is an example of the PPSC Studio Setup window with the **Simulate** tab selected.



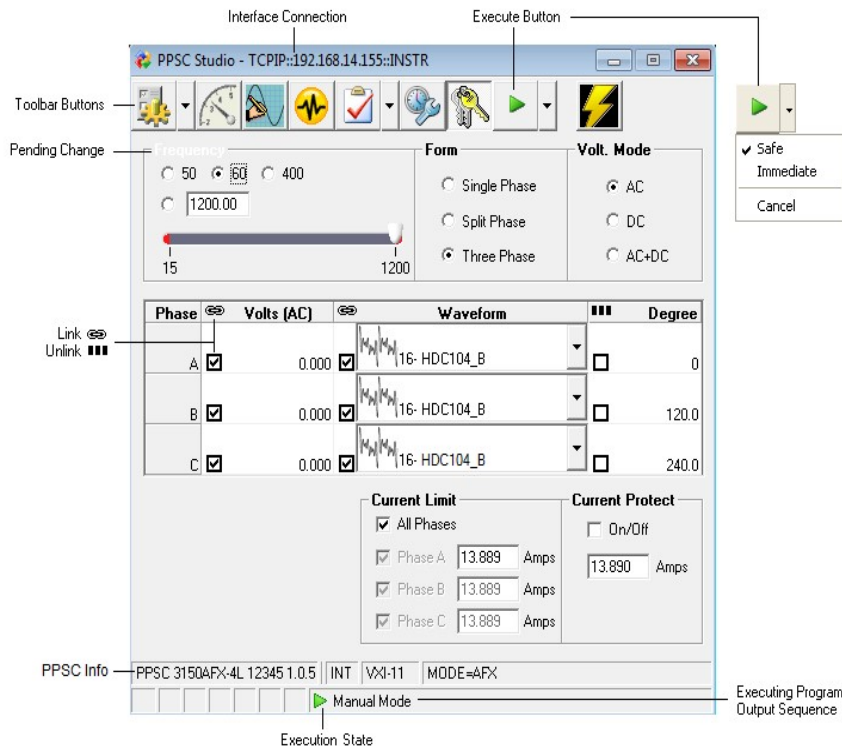
PPSC Studio Window

After you connect to your PPSC using the [PPSC Studio Setup](#) window, the main PPSC Studio window appears as shown below. The title bar of the window shows the interface connection used to connect to your PPSC. A [PPSC Meter](#) window is also associated with the main PPSC Studio window.

Operation

The PPSC Studio window shows the output values presently executing in your PPSC. Changes you make to the **CSC**, **Lock** and **Output Enable** buttons in the toolbar immediately take affect. For all other items, the change is "pending" until you press the **Execute** button. This provides a safeguard to protect the load and allows you to review all the changes before updating your PPSC. Whenever a change is pending, the bold text associated with that item flashes white. You can discard pending changes by choosing "Cancel" from the execute button drop down menu. If you want changes to take effect immediately, choose "Immediate" from the Execute button drop down menu. Enter "DANGER" when you are prompted for a password.

Some items in the window shown below only apply to certain factory installed options and may not be available for your PPSC. Right-clicking anywhere in the Frequency section or the Volts or Degree table cells opens the [Adjust window](#).



Toolbar Buttons

The PPSC Control button includes a drop down menu that allows you to view the various panels in the [PPSC Control](#) window. This menu is intended for troubleshooting purposes. Using the PPSC Control window is not recommended because it bypass the



safeguards in PPSC Studio. Choosing "Refresh" causes the values shown in PPSC Studio to be re-read from your PPSC. This normally isn't necessary unless you change values using the PPSC front panel (not recommended when PPSC Studio is connected to your PPSC), causing PPSC Studio to get out of sync.



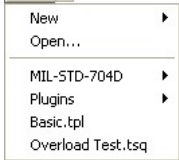
This button activates the [PPSC Meter](#) window.



This button opens the [Waveform Editor](#).



This button opens the [Output Sequence Browser](#).



The Test Manager button allows you to open test manager (*.tsq or *.tpl) files. This button includes a drop down menu that lets you create a new test plan or test sequence. The drop down menu also shows the file/directory structure of the Test Manager folder (typically located at "C:\Program Files\PPSC Manager\Test Manager" or "C:\Pacific Power Source\PPSC Manager\Test Manager"). Selecting one of these items opens that file.



toggling this button turns CSC (Continuous Self Calibration) ON or OFF. When the button is depressed, CSC is ON.



This button set the PPSC local lockout mode. When local lockout is active (Lock icon), the PPSC front panel is disabled. When local mode is active (Key icon), you can access the PPSC keyboard and view the LCD display. **Note:** You should not change items using the PPSC front panel because it will cause PPSC Studio to get out of sync.



When "Safe" mode is selected (default), pressing this button sends any pending changes you made in the PPSC Studio window (or [Adjust window](#)) to your PPSC. Pending changes are indicated by flashing white text. You can discard pending changes by choosing "Cancel". If you want changes to take effect immediately, choose "Immediate" then enter "DANGER" when prompted for a password.

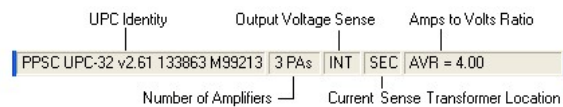


This button toggles the output contactor of your power source. A black background means the output is disabled (contactor open) and a red background means the output is enabled (contactor closed).

Link/Unlink

The **Link/Unlink** icon is available for columns in the table. This allows you to set the values for all phases independently or as a group. To change **Link/Unlink**, click in the column header. You can also selectively link items using the row checkboxes.

PPSC Info



Most of the items in the **Info** panel relate to factory installed options. These items show the firmware and hardware configuration of your PPSC and power source. **PPSC Identity** is based on the "*IDN?" query and shows the firmware options installed in your PPSC. **Output Voltage Sense** can be either internal (INT) or external (EXT) and can be reconfigured using the PPSC Control window [Setup panel](#). The **Current Sense Transformer Location** can be either primary (PRI) or secondary (SEC) and the current sense transformer ratio is also shown.

Event Status Panel

Refer to the [Event Status Panel](#) section for more information on these items.

Waveform Editor

The waveform editor is opened when you click the Waveform Editor icon the toolbar of the main [PPSC Studio](#) window or [Output Sequence](#) window. The waveform editor allows you to view all waveforms stored in your PPSC or in a particular output sequence. Waveforms stored in your PPSC are the ones currently being used to generate the output voltages of your power source. Waveforms belonging to an output sequence are stored in the output sequence file. When that output sequence is executed, the necessary waveforms are downloaded into your PPSC. The title bar of the waveform editor window shows the location of the waveforms contained in the window. In the example below, these waveforms are the ones currently loaded into your PPSC.

The waveform editor allows you to import, export, edit, print, or create arbitrary waveforms. PPSC Waveforms are based on 1024 steps which represents 360 degrees (one complete cycle). The full scale amplitude range is +/-100%. Your PPSC automatically scales these waveforms to achieve the Vrms value you enter in the main PPSC Studio window or output sequence. Note that waveform 1 (Sine) is reserved meaning the contents cannot be changed but you can edit the **Title** and **Comments**.

The screenshot shows the 'PPSC Studio Waveforms' window. At the top is a table with columns: Waveform, Title, CRC, Max Vrms, DC Offset %, and Comments. Below this is a toolbar with buttons for Import, Export, Revert, Save, Draw, Pan, Zoom, Select, and Mirror. Under the toolbar is an 'Amplitude Table' with columns: Index, Degrees, and Percent. To the right of the amplitude table is a graph titled 'Waveform #5 - Dropout' showing Amplitude % vs Degrees. A selection box is shown on the graph, and a vertical green bar highlights the corresponding rows in the amplitude table.

| Waveform | Title | CRC | Max Vrms | DC Offset % | Comments |
|----------|----------|--------|----------|-------------|------------------|
| 1 | Sine | -20844 | 150 | 0.0000 | Factory Sine |
| 2 | Triangle | -21951 | 150 | 0.0000 | Factory Triangle |
| 3 | Square | 13059 | 150 | 0.0000 | Factory Square |
| 4 | Pulse | 2995 | 70.08 | 0.0177 | Factory Pulse |
| 5 | Dropout | 58 | 150 | -3.9793 | |

| Index | Degrees | Percent |
|-------|---------|---------|
| 425 | 149.062 | 51.4 |
| 426 | 149.414 | 50.87 |
| 427 | 149.766 | 50.33 |
| 428 | 150.117 | 49.79 |
| 429 | 150.469 | 49.3 |
| 430 | 150.820 | 48.77 |
| 431 | 151.172 | 48.23 |
| 432 | 151.523 | 47.69 |
| 433 | 151.875 | 47.16 |
| 434 | 152.227 | 46.57 |
| 435 | 152.578 | 46.03 |
| 436 | 152.930 | 45.49 |

Waveforms Table

This table shows all waveforms stored in the PPSC or output sequence file. You can click in the **Title** and **Comments** cells to enter your own text. The **CRC** column shows a unique number based on the actual waveform data. This allows the waveform editor to associate the waveform name and comments to a particular waveform stored in the **waveforms reference database**. This database file is stored in the same directory as the PPSC Manager application and is automatically updated and maintained by PPSC Studio. The **Max Vrms** column shows the maximum allowable output voltage that can be achieved for that waveform for your power source using the coupling and transformer ratio selected in the main **PPSC Studio** window. The **DC Offset %** column shows the DC component of the waveform. DC offsets occur when the RMS value of the first and second half cycle of the waveform are not equal and opposite. This typically happens when simulating a half cycle dropout or spike. A warning icon is displayed if the absolute value of the DC offset is greater than 1%. You can set this value to 0 by using the **Zero DC Offset** function in the Waveform Graph Context menu.

Toolbar buttons

- Import** Refer to the Importing, Exporting and Printing section below for more info.
- Export** Refer to the Importing, Exporting and Printing section below for more info.
- Revert** This button is only enabled after you begin editing. Clicking this button will revert the waveform to the values last saved. This effectively undoes all your changes.
- Save** This button is only enabled after you begin editing. Clicking this button will save the waveform to your PPSC or output sequence.
- Draw** When this button is depressed, you can use the mouse to draw arbitrary values in the waveform graph.
- Pan** When this button is depressed, you can pan (reposition) the waveform when you click and drag the mouse in the graph. You can also use "Default" in the Waveform Graph Context menu to recenter the graph.
- Zoom** When this button is depressed, the graph zooms-in (magnifies) when you click the mouse in the graph. If you press and hold the shift key, the graph zooms-out (reduces) when you click the mouse in the graph. You can also use "Default" in the Waveform Graph Context menu to reset the zoom to normal (100%).
- Select** When this button is depressed, you can click and drag the mouse in the graph to make a selection. Some functions in the Waveform Graph Context Menu require that you first make a selection. The selection is also shown in the amplitude table.
- Mirror** This button toggles the mirror state. When the mirror button is depressed, any changes you make to the waveform are automatically "mirrored" 180 degrees. This helps to maintain 0% DC offset or to create symmetrical waveforms.

Amplitude Table

The amplitude table shows the index, degrees and amplitude (in percent) for all 1024 waveform steps. You can click cells in the **Percent** column to change a value. Editing a cell in a selection range affects all selected rows. Right-clicking in the amplitude table displays a shortened version of the Waveform Graph Context Menu.

Selection

Clicking and dragging the mouse in the amplitude table selects a range of rows. You can also "shift-click" to create a selection range. The selection also appears in the waveform graph. Clicking in the header row of the amplitude table removes the selection. If the **Select** button is depressed in the Toolbar, you can also click and drag the mouse in the graph to select a portion of the waveform. The corresponding rows in the amplitude table are also selected.

Waveform Graph Context Menu

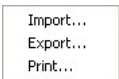
This menu appears when you right-click the mouse in the graph. A shortened version of this menu also appears when you right-click the amplitude table. Some items in this menu apply to the selection in the amplitude table or graph. Refer to the previous topic for information on making a selection.



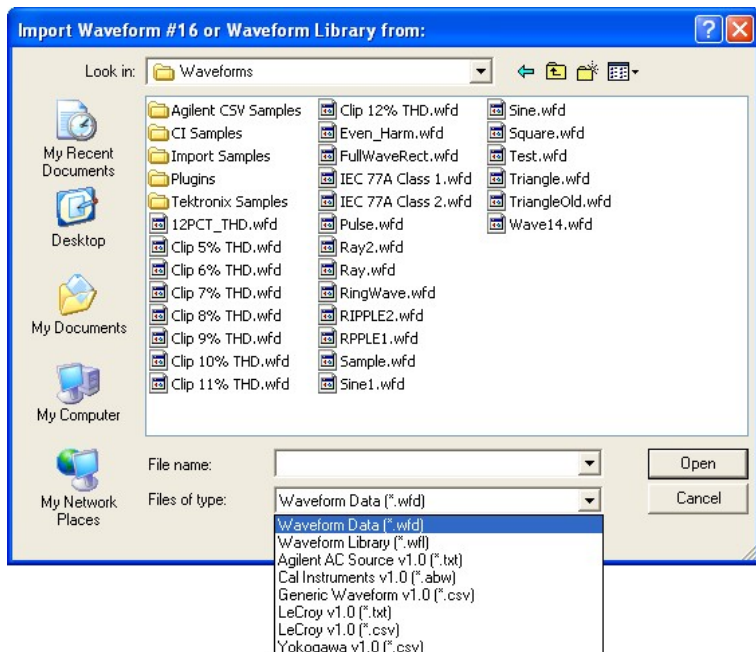
| Item | Description |
|-----------------|--|
| Default | Centers the graph view and sets the zoom level to normal (100%). |
| Show Cursor | Tracks the mouse movement in the graph with a vertical cursor. Cursor annotation text is also displayed showing the waveform index, degrees and amplitude. |
| Select all | Selects all 1024 steps (360 degrees) of the waveform. |
| Copy | Copies the selection to the clipboard. |
| Paste | Pastes the clipboard to the waveform at the start of the selection. |
| Undo | Undoes the last change. This menu item then changes to Redo, allowing you to restore the last change. |
| Scale | Multiplies the amplitude of the selection by the scale factor you enter. |
| Set | Sets the amplitude of the selection to the value you enter. |
| Offset | Shifts the amplitude of the selection by the value you enter. |
| Noise | Adds a random number (+/-) to the amplitude of the selection. The amplitude of the noise is based on the value you enter. |
| Clipped | Creates a clipped sine wave based on the THD (Total Harmonic Distortion) number you enter. |
| Ring | See the Ring Window for more information. |
| Flip Vertical | Multiplies the amplitude of the selection by -1 (inverts). |
| Flip Horizontal | Reverses the index (degrees) of the selection. This swaps the left to right orientation of the selection. |
| Zero DC Offset | Removes the DC component of the entire waveform. |
| Draw | Sets the mouse action in the graph to allow you to draw arbitrary values. |
| Pan | Sets the mouse action in the graph to allow you to move the waveform view horizontally or vertically. |
| Zoom | Sets the mouse action in the graph to zoom-in (magnify) the waveform. Holding the Shift key allows you to zoom-out (reduce) the waveform. |
| Select | Sets the mouse action in the graph to select a portion of the waveform. The selection also appears in the amplitude table. |
| Mirror | Toggles the Mirror state. When this item is checked, any changes you make to the waveform are automatically "mirrored" 180 degrees. This helps maintain 0% DC offset or to create symmetrical waveforms. |

Importing, Exporting and Printing Waveforms

Right-clicking a row in the Waveforms Table displays the Waveform Table Context menu.



Selecting Import or Export displays a file dialog. Shown below is the Import file dialog.



The file type menu at the bottom allows you to import or export a single waveform (Waveform Data), all waveforms (Waveform Library) or custom waveform. Custom waveform file formats are supported using waveform plugins. These DLL files are stored in the Plugins folder (typically located at "C:\Program Files\PPSC Manager\Waveforms\Plugins" or "C:\Pacific Power Source\PPSC Manager\Waveforms\Plugins"). Contact Pacific Power if you have a custom waveform file format you want to import or export using the Waveform Editor.

Harmonic Synthesis

Clicking the **Synthesis Tab** allows you to create waveforms based on harmonic amplitude and phase as shown below.

The screenshot shows the PPSC Studio Waveforms window. At the top is a table of waveforms:

| Waveform | Title | CRC | Max Vrms | DC Offset % | Comments |
|----------|----------------|--------|----------|-------------|----------|
| 9 | Untitled | 25927 | 150 | 0.0000 | |
| 10 | Untitled | 4403 | 150 | 0.0000 | |
| 11 | Untitled | 28236 | 150 | 0.0000 | |
| 12 | Clipped | 22256 | 150.00 | 0.0000 | |
| 13 | Odd Distortion | -26109 | 150 | 0.0000 | |

Below the table is a toolbar with buttons for Import, Export, Revert, Save, Draw, Pan, Zoom, Select, and Mirror. The **Synthesis Tab** is active, showing a sub-table of harmonics:

| Harm # | Mag % | Phase |
|--------|-------|-------|
| 1 | 100 | 0 |
| 2 | 0 | 0 |
| 3 | 20 | 0 |
| 4 | 0 | 0 |
| 5 | 5 | 0 |
| 6 | 0 | 0 |
| 7 | 0 | 0 |
| 8 | 0 | 0 |
| 9 | 0 | 0 |
| 10 | 0 | 0 |
| 11 | 0 | 0 |
| 12 | 0 | 0 |

To the right of the harmonics table is a graph titled "Waveform #13 - Odd Distortion*". The y-axis is "Amplitude %" ranging from -100 to 100. The x-axis is "Degrees" ranging from 0 to 360. The graph shows a distorted sine wave with a peak at 90 degrees and a trough at 270 degrees.

Annotations in the image point to the "Waveform number and Title" (pointing to the waveform list) and the "Harmonics Table" (pointing to the sub-table).

Right-clicking the table will display the Harmonics Synthesis Menu.

The screenshot shows a context menu with the following options:

- Load Harmonics...
- Save Harmonics...
- Sine
- Triangle
- Square
- 51 Harmonics (checked)
- 64 Harmonics
- 128 Harmonics
- 256 Harmonics
- 511 Harmonics
- Refresh F5

This menu allows you to load or save the harmonics table to a file. "Loading" is convenient when you want to use the harmonic analysis values (see below) of an existing waveform as the starting values. Selecting "Sine", "Triangle" or "Square" fills in the table with a harmonics series that creates that waveform. You can also specify the number of harmonics used to create the waveform. You can click in the table cells to enter values for **Mag %** and **Phase**. The **Synthesis tab** will include an "*" if the table values do not represent the current waveform. Press **F5** or choose **Refresh** from the menu to update the waveforms.

Harmonic Analysis

Clicking the **Analysis Tab** allows you to view the distortion and harmonic content of the selected waveform as shown below.

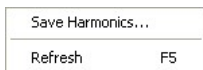
The screenshot shows the PPSC Studio Waveforms window with a list of waveforms and a detailed harmonics analysis table for Waveform #13 - Odd Distortion.

| Waveform | Title | CRC | Max Vrms | DC Offset % | Comments |
|----------|----------------|--------|----------|-------------|----------|
| 9 | Untitled | 25927 | 150 | 0.0000 | |
| 10 | Untitled | 4403 | 150 | 0.0000 | |
| 11 | Untitled | 28236 | 150 | 0.0000 | |
| 12 | Clipped | 22256 | 150.00 | 0.0000 | |
| 13 | Odd Distortion | -26109 | 150 | 0.0000 | |

| Harm # | Mag % | Phase |
|--------|---------|--------|
| THD | 20.620 | |
| DHD | 20.620 | |
| EHD | 0.000 | |
| 1 | 100.000 | 0.000 |
| 2 | 0.000 | 90.000 |
| 3 | 20.004 | 0.000 |
| 4 | 0.000 | 90.000 |
| 5 | 5.001 | 0.001 |
| 6 | 0.000 | 90.000 |
| 7 | 0.000 | 71.213 |
| 8 | 0.000 | 90.000 |
| 9 | 0.000 | 1.829 |

The graph shows Amplitude % vs Degrees for Waveform #13 - Odd Distortion, with a peak at 90 degrees and a trough at 270 degrees.

This harmonics analysis table cannot be edited and is automatically updated as waveforms are selected or changed. Right-clicking the table will display the Harmonics Analysis Menu.



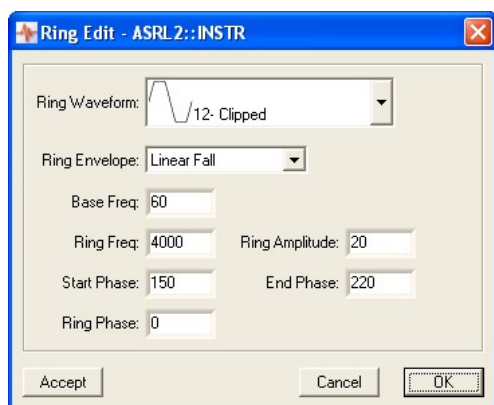
This menu allows you to save the harmonics table to a file. "Saving" is convenient when you want to use the harmonic analysis values of an existing waveform as the starting values for harmonic synthesis. The **Analysis** tab will include an "*" if the table values do not represent the current waveform. Press **F5** or choose **Refresh** from the menu to update the table.

Event Status Panel

Refer to the [Event Status Panel](#) section for more information on these items.

Ring Edit Window

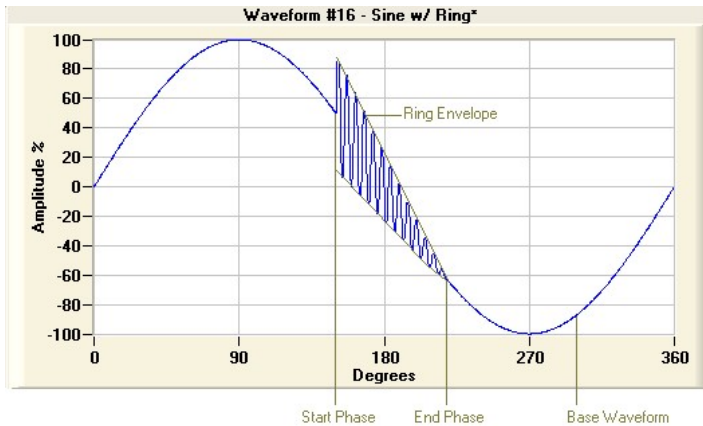
The Ring Edit window is accessed by selecting "Ring" in the Waveform Graph Context Menu in the [Waveform Editor](#). The Ring Edit window allows you to superimpose a ring onto the waveform you are editing (base waveform) in the waveform editor. Changes in the Ring Edit window are immediately shown in the graph in the waveform editor.



| Item | Description |
|----------------|---|
| Ring Waveform | This is the waveform used for the ring. The default waveform is a sine wave but you can use any waveform shown in the drop down list. |
| Ring Envelope | Defines the amplitude envelope of the ring. |
| Base Frequency | This is an arbitrary reference frequency representing the base waveform. |
| Ring Frequency | This is an arbitrary reference frequency of the ring and is relative to the base frequency. |

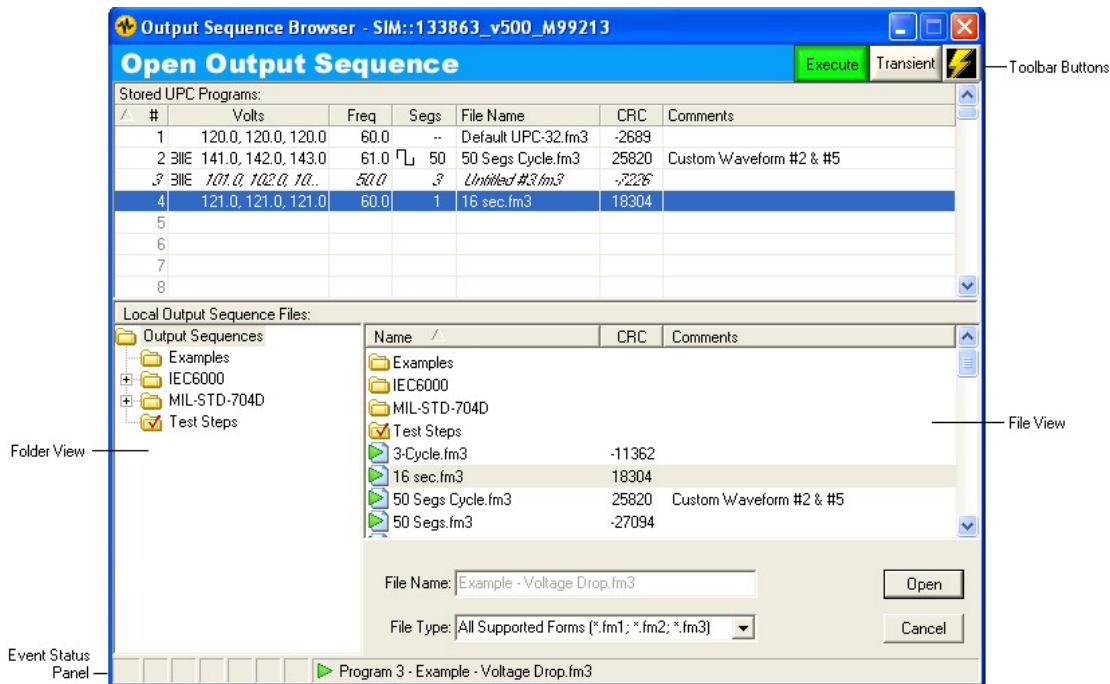
- Ring Amplitude This is the amplitude of the ring in percent.
- Start Phase This is the phase angle (degrees) of the base waveform where the ring will start.
- End Phase This is the phase angle (degrees) of the base waveform where the ring will end.
- Ring Phase This is the starting phase phase angle (degrees) of the ring waveform.
- Accept Commits the ring to the base waveform and allows you to create another ring.
- OK Commits the ring to the base waveform and closes the window
- Cancel Undoes ring editing and closes the window.

The diagram below shows how the Ring Edit values relate to the base waveform.



Output Sequence Browser



This window is accessed by pressing the Output Sequence Browser button in the main [PPSC Studio](#) window.



The top panel shows the programs stored in your PPSC. The bottom panels shows the output sequence files locally stored on your PC. The root folder for the output sequence files is located in the same directory as the PPSC Manager application (typically "C:\Program Files\PPSC Manager\Output Sequences" or "C:\Pacific Power Source\PPSC Manager\Output Sequences"). Only output sequences stored at or below this directory level are available to the browser.

Output sequence files provide a graphical interface that allow you to view and edit PPSC programs. When an output sequence is saved to your PPSC, the file itself is not transferred. Instead, the file contents are translated into native PPSC steady state and transient segment parameters. The Output Sequence Browser uses CRC information to keep track of which output sequence files are stored in your PPSC. In the above example, the browser was able to associate Programs 1, 2 and 4 to the output sequence files listed. But a local output sequence file could not be located for Program 3 (shown in italics). You can open an output sequence or stored PPSC program by selecting it in either the **Stored PPSC Programs** table or the **File View** and then click the **Open** button. Refer to the [Output Sequence](#) window section for more information. To copy an output sequence file to your PPSC, simply click and drag the file to the desired program.

Stored PPSC Programs Table

This table shows all programs in your PPSC. The table shows a brief summary of the program's voltage, frequency and transient. The transformer icon  indicates the program uses transformer coupling and the cycle icon  indicates the transient is cycle based. If the program does not contain a transient, the **Segs** entry for that program is blank. Italic text means a local output sequence file on your PC could not be found. When you open a program, the [Output Sequence](#) window is displayed using the appropriate output sequence file. If a file doesn't exist, a new one is created with the name "Untitled #n" where "n" is the program number. The Output Sequence window allows you to specify a different name (when saving) and enter any comments that will appear in the browser.




Right-clicking a row in the table allows you to access the functions in the context menu shown below.

| | |
|---------|--------|
| New | Ctrl+N |
| Cut | Ctrl+X |
| Copy | Ctrl+C |
| Paste | Ctrl+V |
| Delete | Del |
| Refresh | F5 |

Using any of these menu items immediately affects the programs stored in your PPSC. **Refresh** causes your PPSC to be queried for stored programs and checks for any associated output sequence files.

Toolbar Buttons





The toolbar buttons are available when you select a row that contains a program. These buttons are described below:

-  This button allows you to execute the steady state portion of the selected program. It turns green while the selected program is executing. Unpressing this button switches the PPSC to Manual Mode.
-  This button allows you to execute the transient portion of the selected program. It turns yellow while the transient of the selected program is running. This button also shows if a Ramp is executing. Unpressing this button stops the transient or Ramp and resumes steady state operation. Refer to the [Adjust window](#) for more information about Ramps.
-  This button indicates the output contactor state of your power source. You can click this button to toggle output state. A black background means the output is disabled (contactor open) and a red background means the output is enabled (contactor closed).

Note: Pressing the **Execute** button also turns on the output contactor.

Folder and File Views

The Folder and File views provide a Windows Explorer type interface. You can create folders, rename files, or move files by clicking and dragging. Right-clicking in either section displays the context menu shown below.

| |
|--|
| Open |
|  Add to Zip |
|  Add to 360Hz.zip |
|  Zip and E-Mail 360Hz.zip |
| Send To  |
| Cut |
| Copy |
| Create Shortcut |
| Delete |
| Rename |
| Properties |

The file extension used for output sequences is based on the output Form. The **File Type** drop down menu shows the output Forms supported by your power source. You can use this menu to filter out which files (Forms) are shown.

Event Status Panel

Refer to the [Event Status Panel](#) section for more information on these items. Note that the executing program number and output sequence file name in the event status panel match the program selected in the Stored PPSC Programs table.

Output Sequence Window

When you open an output sequence or PPSC program from the [Output Sequence Browser](#) , the Output Sequence windows appears as shown below.

Out of Range Value Program Number File Name Column Link/Unlink

Output Sequence - ASRL2::INSTR - Program #3 - 150v Stress Test

Form: 3 Freq: 15.000000 Phase: Volts: Waveform: Degrees: Output Enable

Coupling: DIRECT Elapsed

Curr Limit: 50.000000 Amps A: 120.000000 1- Sine 0

IProt: 50.000000 Amps 0.1 Sec B: 120.000000 1- Sine 120

C: 120.000000 1- Sine 240

| Seg | Freq | Volts | | | Waveform | | | Duration |
|-----|-----------|----------------|-----------------|-----------------|----------|---|---|---------------|
| | | A | B | C | A | B | C | |
| 1 | 60.000000 | 30.000000 Vrms | 120.000000 Vrms | 120.000000 Vrms | 1 | 1 | 1 | 0.500000 Sec |
| 2 | 60.000000 | 50.000000 Vrms | 120.000000 Vrms | 120.000000 Vrms | 1 | 1 | 1 | 60.000000 Cyc |
| CR | 60.000000 | 50.000000 Vrms | 120.000000 Vrms | 120.000000 Vrms | 1 | 1 | 1 | 0.250020 Cyc |

Transient Segments: Cycle Reset, Segment Selection, Vrms or % Steady State Volts, Seconds or Cycle Duration, Selection time

Transient Graph: Seg 2: 0.5 - 1.5 Sec (1.0 Sec)

Graph Checkboxes: Frequency Volt A Volt B Volt C

Event Status Panel: Manual Mode -5235 Comments: Rise to 150 Volts & Hold for 60 Cycles

TRANSIENT: Elapsed, Once, Forever, 8, Single Cyc, Auto RMS

TRANSIENT EVENT PROGRESS: 1.5042 Sec/Event, 8 Events

CRC Comments Total Transient Time

Toolbar Buttons

- Revert**: This button is only available after you make a change in the window. Clicking this button undoes all your changes and restores the output sequence to it's original state.
- Save As...**: This allows you to save this output sequence to another file or PPSC program. Refer to the [Saving Output Sequences](#) section for more information.
- Waveforms**: This button opens the [Waveform Editor](#) for the waveforms contained in this output sequence.
- Details**: This button allows you to view a [simulation](#) of the output sequence.
- Output Enable**: This button toggles the output contactor of your power source. A black background means the output is disabled (contactor open) and a red background means the output is enabled (contactor closed). This button is automatically activated when you press the **Execute** or **Transient** button.

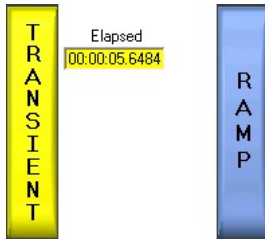
Steady State Values, Execute Button and Elapsed Time Indicator

Your power source is updated with the steady state values when your press the Execute button. Pressing the Execute button also turns the Output Enable On. The Execute button also indicates when this program is Executing. The Elapsed time indicator (HH:MM:SS.SSSS format) shows how long the program has been running. Unpressing the Execute button switches the PPSC to Manual Mode.



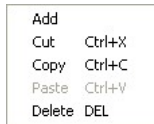
Transient Button and Elapsed Time Indicator

The Transient button executes the steady state values, turns the Output Enable On, then starts executing the transient event(s). The Transient button also indicates when the transient is running. Unpressing the Transient button stops the transient and resumes steady state operation. The Elapsed time indicator (HH:MM:SS.SSSS format) and Transient Event Progress bars show how long the transient has been running. If a Ramp is programmed (see [Adjust window](#)), the Transient button will indicate when the Ramp is running.



Transient Segments

The Transient Segment table defines a transient event. When the Transient button is pressed, the event defined by these segments is repeated by the number of events you specified by the **Number of Events** items. Right-clicking a row in the **Seg** column of this table displays the Segment Context menu shown below.



These menu items act on the location of the mouse when you right-clicked or the selected row(s). The table below describes these items.

Item Description

| | |
|--------|--|
| Add | Adds a transient segment row immediately past the current selection. |
| Cut | Cuts the selected row(s) and copies them to the clipboard. |
| Copy | Copies the selected row(s) to the clipboard. |
| Paste | Pastes the clipboard immediately past the current selection. |
| Delete | Deletes the selection. |

You can select one or more rows by clicking (or dragging) in the **Seg** column for that row. The selection is highlighted in yellow. The graph also shows the selection.

For a time based transient (**Cycle Based Transient Checkbox** is not checked), the frequency and voltage values entered in a row are the ending values. Your PPSC smoothly transitions each segment to the ending values starting with the values of the previous segment (or steady state). You can specify the units of the Volts or Duration table cells. The Volts units can be toggled between Vrms and percent steady state by clicking the **Vrms** or **%** text. Percent steady state means the segment voltage for that phase is a percentage of the corresponding steady state voltage. For the Duration table cells, you can toggle the Duration units between seconds and cycles by clicking on the **Sec** or **Cyc** text.

For a cycle based transient (**Cycle Based Transient Checkbox** is checked), the segment values for frequency and voltage immediately take affect without any transition from the prior segment. Also, the duration table cells are always 1 cycle and cannot be edited.

Cycle Reset

The Cycle Reset segment is automatically created for time based transients. Transient events always begin with the phase A zero crossing. The duration of the Cycle Reset segment is calculated from when the last user segment ends until the next phase A positive zero crossing. You cannot edit the values of the Cycle Reset segment but you can select it to view in the graph.

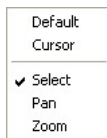
Out of Range Values

Values with **red** text are out of range. This means the value is outside the allowable range for that item. This can occur, for example, if the output sequence (file) was created on a different power source (that supported that value) or the value exceeds the limits currently programmed in your PPSC. Right-click the value to display the [Adjust window](#). The Adjust window shows the valid range of values and allows you to view or change the limits.

Transient Graph

The Transient Graph shows a graphical representation of the transient segments. Clicking in the graph highlights that segment. The graph shows the values as they transition from one segment to the next starting with the steady state values. If you specified more than one transient event, only the first event is shown. The **Total Transient Time** calculation displayed at the bottom right of the graph includes all events. A vertical cursor shows the elapsed time, voltage and frequency. You can selectively show a particular plot by clicking the Graph Checkboxes. The **Details** button allows you to see an exact [simulation](#) of the output sequence.

When you right click in the transient graph, the graph context menu appears.



The items in this menu are described below.

Item Description

| | |
|---------|---|
| Default | Sets the time axis to show the entire transient event. This undoes any Pan or Zoom. |
| Cursor | Displays a vertical cursor and annotation values that show the voltages and frequency at the cursor position. |
| Select | Clicking in the graph selects the associated segment. |
| Pan | Clicking and dragging the mouse in the graph shifts the graph left or right. This also allows you to view the steady state values before and after the transient event. |
| Zoom | Clicking the mouse in the graph zooms-in (expands) the graph time. Shift-clicking the mouse zooms-out (contracts) the graph time. |

Link/Unlink

Clicking the Link/Unlink icon toggles the Link/Unlink state of that table column. When a column is linked, changing one item in that column sets all other items to the same value.

Event Status Panel

Refer to the [Event Status Panel](#) section for more information on these items.

CRC

This is a unique number calculated from the values in the output sequence. The [Output Sequence Browser](#) uses this number to associate output sequence files to stored PPSC programs.

Comments

Text entered here appears in the [Output Sequence Browser](#) window. Note that this text is not included in the output sequence CRC calculation.

Cycle Based Transient Checkbox

Your PPSC supports two kinds of transients - time based and cycle based. Each segment of a time based transient can be any duration of time between 200 usec and 300 seconds. The frequency and voltage smoothly change from one segment to the next. Cycle based transient segments are exactly one cycle in duration based on the segment frequency. The frequency and voltage of cycle based transients instantaneously changes from one segment to the next.

Transient Waveform Auto RMS Checkbox

When this checkbox is checked (default), the RMS voltage of each transient segment/phase is based on the waveform specified for that phase. When this checkbox is not checked, the RMS voltage of each transient segment/phase is based on the steady state waveform RMS factor. Unchecking this checkbox is handy when simulating a voltage spike or drop out. Refer to the PPSC Operation Manual for more information.

Number of Events

These items determine how many times the transient segments are repeated when you press the Transient button.

Transient Event Progress

These bars show the progress of the transient based on the transient time of each event and the total number of events.



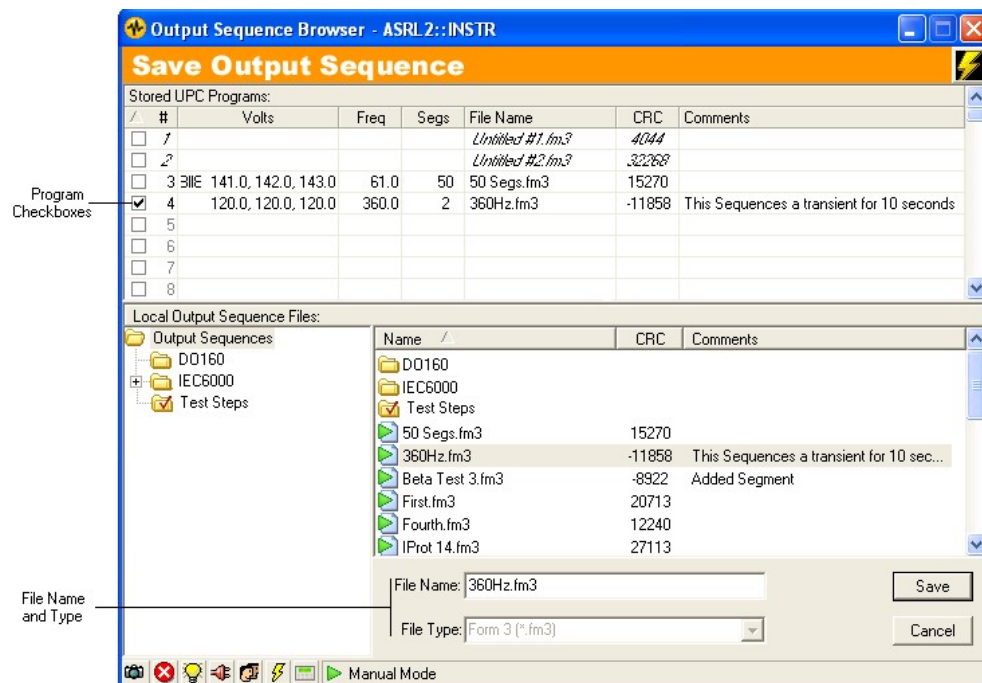
Saving Output Sequences

Output sequences are stored in local files on your PC and optionally, in one or more stored PPSC programs. You have several options when saving output sequences. When you press the **Save As..** button in the [Output Sequence](#) Window, the **Save Window** appears as shown below.

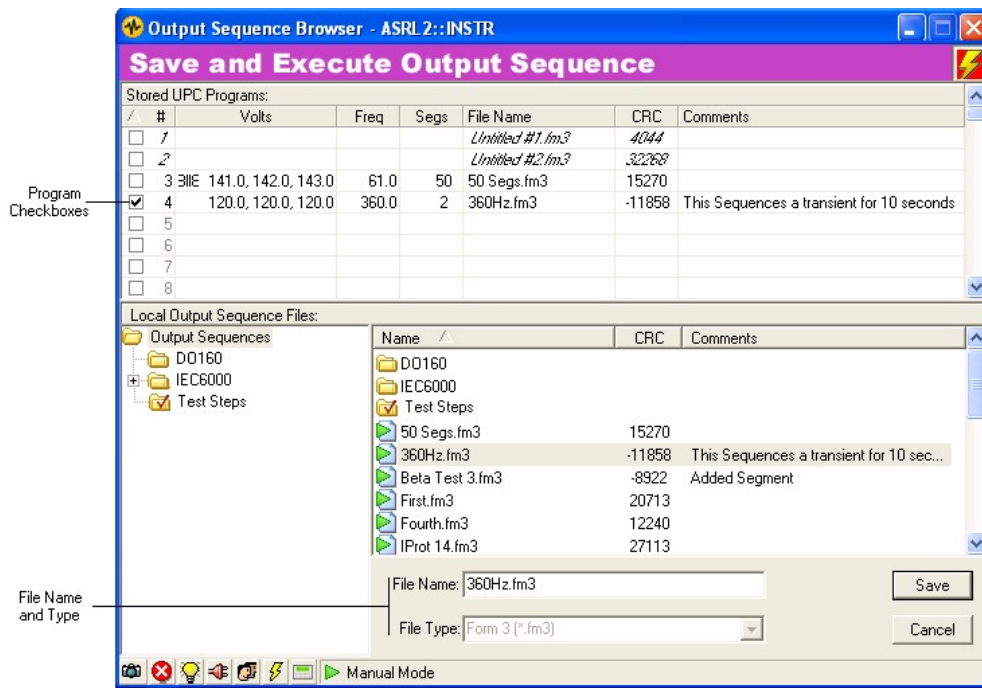
If you press the **Execute** or **Transient** button in the Output Sequence window and your changes are not currently saved to a PPSC program and file, the **Execute and Save Window** appears as shown below.

These windows are actually the Output Sequence Browser reconfigured with a series of checkboxes in the **Stored PPSC Programs** table. These checkboxes allow you to select the PPSC program to store. In the file browser section, you can select an existing file to overwrite or enter a new file name. The **File Type** is automatically selected for you. It's based on the output Form specified in the [Output Sequence](#) window. If the output sequence is currently stored in more than one PPSC program, these program rows are grouped at the top of the table.

Save Window



Save and Execute Window

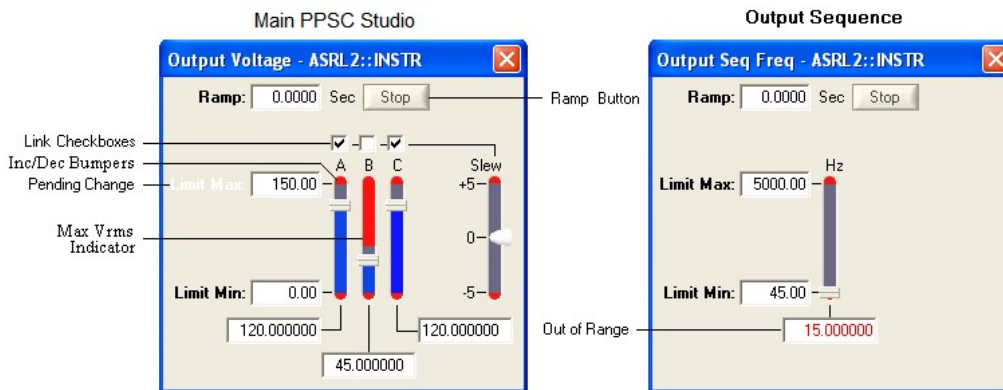


Event Status Panel

Refer to the [Event Status Panel](#) section for more information on these items.

Adjust Window

This window can be accessed from the main [PPSC Studio](#) window or [Output Sequence](#) window. It appears when you right-click the **Frequency** or the **Volts** or **Degrees** table cells. The examples below show the Adjust window after right-clicking one of the **Volts** table cells in PPSC Studio and the steady state **Frequency** in the Output Sequence window.



Use the sliders or the number boxes at the bottom to change values. Changing a value with the **Link** checkbox "checked" means all other "checked" phases will be affected.

Ramp

This number box allows you to control the transition time (in seconds) used when changing values. A ramp time of 0 means the output immediately changes to the new value. Programming a Ramp time provides a smooth transition to the new value. When the Ramp is executing, the button changes (shown below) indicating the Ramp is in progress and it also allows you cancel the Ramp.



Note: Voltage or Frequency changes can be ramped but not Phase (degrees) changes.

Pending Change

Whenever a Min or Max Limit change is pending, the bold text associated with that item flashes white. The way changes are handled in the Adjust window tracks the Execute mode presently configured in the main PPSC Studio window. Refer to the [Execute button](#) section for more information.

Note: Pending changes only apply if the Adjust window was accessed from the main [PPSC Studio](#) window.

Max Vrms Indicator

This applies only when using the Adjust window to change the voltage. The red indicator shows the maximum voltage allowed for that phase based on the Waveform, Form and Coupling presently indicated in the main PPSC Studio window or Output Sequence window. Based on these values, there may be cases where your power source may not be capable of setting the output voltage for that phase to the **Limit Max** value. You can hover the mouse over the slider to see the max Vrms value allowed. Refer to the [Waveform Editor](#) for more information about **Vrms max**.

Out of Range

Values with **red** text are out of range. This means the value is outside the allowable range for that item. The Voltage range is determined by the Form, Coupling, Waveform (of that phase) and the Limit Min/Max value. The Frequency range is determined by the Limit Min/Max value. The Phase (degree) range is 0 to 359 degrees.

Note: You will not be able to Execute an output sequence that contains an out of range value.

Slew

This is a "spring loaded" control that allows you to slew the values up or down. The further from the center (0), the greater the change and the scale is logarithmic. Only phases that are checked will be slewed. Slew changes the values in real time when the Execute mode is "Immediate" so it behaves similar to the PPSC front panel slew controls.

Note: The slew control is not available for Output Sequences.

Inc/Dec Bumpers

Clicking at either end of the sliders changes the output by a fixed value. You can view or change this value by right-clicking on the sliders.

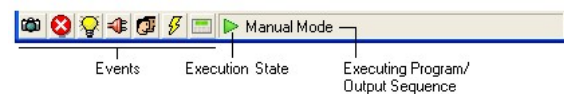
| |
|-----------------|
| Edit Inc/Dec... |
| ▼ 0.25 |

Limit Min/Max

These items limit the allowable values you can enter for the voltage or frequency. Attempting to set your power source outside these limits will be prevented. The Info panel in the [PPSC Control](#) window shows the maximum and minimum values (range) you can enter for the voltage or frequency limits.









Event Status Panel

The Event Status Panel shown below appears at the bottom of most [PPSC Studio](#) windows.







Events

Events are shown at the bottom left of the **Event Status Panel**. Except for the **Capture** icon, PPSC Studio polls your PPSC and automatically updates these icons. These icons indicate a particular event occurred and they remain latched until you clear them by clicking on that icon.

-  This icon means that Command/Query [capture mode](#) is on. Click this icon or press the **Probe** tab to view the commands and queries that have been sent to the PPSC or to turn Capture mode off.
-  This icon means an error occurred. A message box also appears describing the error. This event is automatically cleared when you close the message box.
-  This icon means a power-on event has occurred with your PPSC. You should normally disconnect (close) PPSC Manager first before turning on/off your PPSC. This event can alert you that one or more settings may have been changed and that you should refresh the affected views.
-  This icon means the power source has shut down due to an output overload condition.
-  This icon means the PPSC was operating in the **Local** mode and someone pressed the Local/Remote key on the PPSC front panel. This event can alert you that one or more settings may have been changed and that you should refresh the affected views.
-  This icon means the PPSC output was turned off because the output current or voltage exceeded the programmed threshold.
-  This icon means the remote interface is unavailable because your PPSC is not in the V/I Display mode. Press the "Clear" or "Display" buttons on your PPSC keyboard to return to the V/I Display screen.
-  This icon means the remote interface is not responding. This can be because your PPSC is turned off or the interface cable is disconnected.

Execution State

-  This icon means the steady state portion of the executing program listed is executing.
-  This icon means the transient portion of the executing program listed is executing.
-  This icon means a Ramp is currently executing. Ramps provide a smooth transition when changing an output parameter (like volts or frequency) or when executing a new program. You can view or program the Ramp time using the [Adjust window](#).
-  This icon means no programs are executing. This is most likely caused by an illegal program parameter that would prevent it from being executed.

Executing Program

This is the program number (or Manual Mode) of the currently executing program. You can use the [Output Sequence Browser](#) to specify which program to execute. Manual Mode is automatically entered whenever an output parameter of the last executing program was changed. If the program is based on an output sequence, the output sequence file name is also shown.

Introducing Test Manager

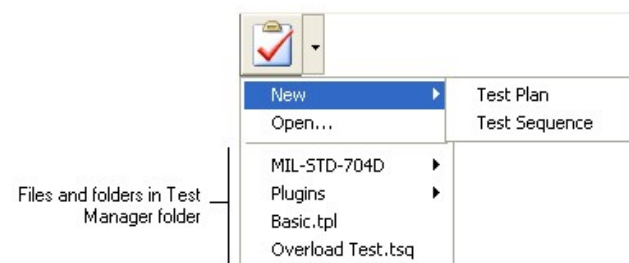
Test Manager allows you to quickly create and run test sequences and test plans. Test sequences consist of one or more test steps designed to run a test, automate a task, or control and monitor your power source or other instruments. Test results are stored in user defined test reports. Test plans manage and simplify complex tasks by allowing you to link together a series of test sequences into a single test.

Test Manager features:

- Automate instrument compliance testing and certification. Obtain pre configured test sequences and test plans from Pacific Power Source for a variety of standard and custom applications.
- Built-in editor allow you to create and run your own custom test sequences and test plans.
- No compiling needed. Run entire tests or individual steps immediately after making changes.
- Test sequences support 8 built-in test step types including Steady State Output, Transient Trigger, PPSC Control, User Prompt, User Input, Timer, VISA (generic instrument control) and PPSC Metering.
- Complete PPSC metering support including waveform capture and V/I/F/Power/Harmonics. Specify measurement functions and phases, value limits, out-of-limit behavior and data logging.
- Embed Scripts to create custom functions with full access to test manager objects.
- Run an entire test or control test flow using Single Step, Run-To-Next, Run Selected, Stop or Resume. Disable individual steps for troubleshooting, reconfiguring, prototyping and debugging.
- Total, elapsed and remaining time indicators for the entire test and individual steps. Monitor the progress and results of each step while the test runs.
- Custom report generation, printing and print preview. Create report templates using MS Word with page header/footer, page/paragraph/character formatting, graphics and form fields.
- Test reports fully document and record parameters and results for each test step. Built-in error handling helps isolate the root cause of failures.

Opening and Creating Test Sequences and Test Plans

The **Test Manager** button in the main [PPSC Studio](#) window allows you to open an existing test sequence or test plan. The drop down menu also lets you create a new test sequence or test plan file and contains a list of available files located in the test manager folder (typically located at "C:\Program Files\PPSC Manager\Test Manager" or "C:\Pacific Power Source\PPSC Manager\Test Manager") on your PC. Selecting one of these items opens that file.

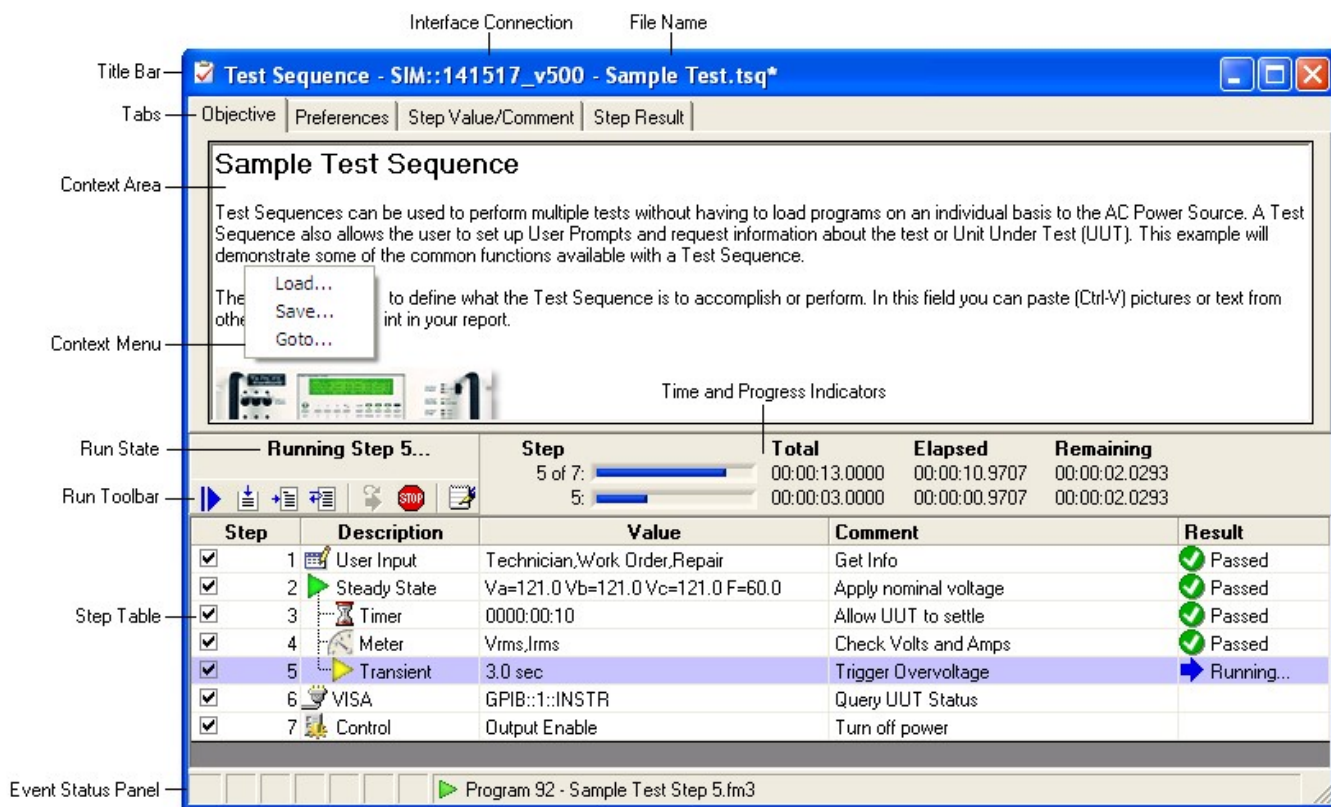


Refer to the [Test Sequence](#) or [Test Plan](#) topics for more information on editing and running these files.

Test Sequence Window

Test sequences consist of one or more test steps designed to run a test, automate a task, or control and monitor your power source or other instruments. The results of a test sequence are stored in a [test report](#).

A test sequence file contains all the information necessary to run the test. This makes it easy to transfer the test sequence to another location or PC. When you open an existing test sequence file or create a new one using the Test Manager button in the [PPSC Studio](#) window, the test sequence window appears as shown below.



Title Bar

The title bar shows the interface used to connect to your PPSC and the test sequence file name. An "*" at the end means the file is currently being edited and the changes have not been saved. If the test sequence is part of a test plan, the test plan file name is shown first.

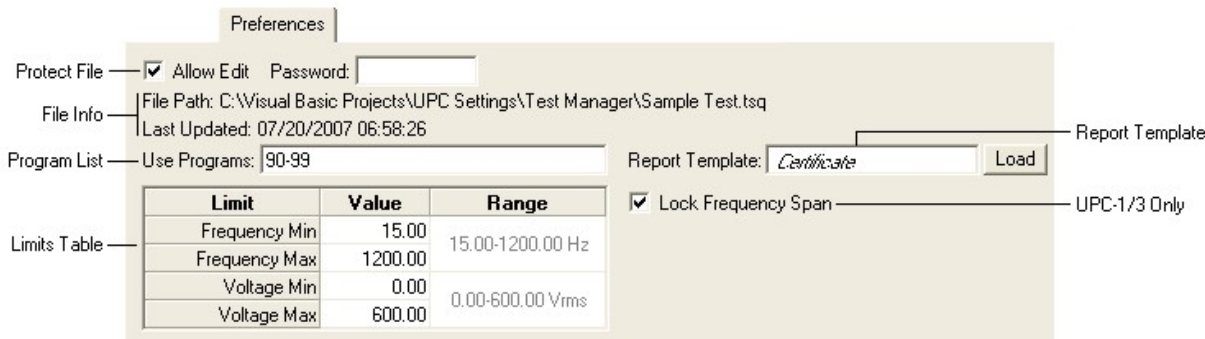


Objective Tab, Context Area and Context Menu

Selecting one of the tabs updates the **Context Area** with that item. In the above example, the **Objective** tab is selected. The objective is intended as a brief summary or description of the test sequence and is automatically included in the test report. You can type directly into the context area or copy and paste text or graphics from another application. Right-clicking the context area displays the **Context Menu**. You can **Load** or **Save** the objective from a Rich Text (*.rtf) or Plain Text (*.txt) file. **Goto...** shows the current cursor location and allows you to position the cursor to a particular line and column.

Preferences Tab

The **Preferences** tab shown below, displays general settings and file information for the test sequence.



You can protect a test sequence from inadvertent changes by unchecking the **Allow Edit** checkbox. For additional security, you can assign a **Password**. Once a password is assigned, you will be prompted to enter it in order to allow editing. The **File Info** section shows the full path of the test sequences database file and the last time it was updated. The program list defines which stored programs in your PPSC the test

sequence can use. These programs will be overwritten as necessary when running the test sequence. The program list can be a range (90-99), comma separated values (90,93,97) or both (90-93, 99). The **Limits Table** lets you to define the minimum and maximum frequency and voltage values allowable during the test. The test sequence will not run any Steady State or Transient test steps that contain values outside these limits.

The **Report Template** shows which [template](#) is used with this test sequence. This is useful if the test sequence updates form fields in the report or you want the test sequence to always use a particular template. If this item is **red**, that template file is missing from the Templates folder (typically "C:\Program Files\PPSC Manager\Test Reports\Templates" or "C:\Pacific Power Source\PPSC Manager\Test Reports\Templates"). Pressing the **Load** button initializes the report with that template (if it's not already loaded). Clicking the report template text box displays a drop-down list of template files installed on your computer that you can select. The "Manual" selection means the test sequence uses whatever template file is currently loaded. An "*" means the test report has been updated and changes have not yet been saved. Note: If the test sequence is opened from a [test plan](#), the test plan report template is used.

If the **Lock Frequency Span** checkbox is checked, the highest frequency in the test sequence is used when setting the frequency span. This prevents the frequency span from changing and leaves the output enabled during the test. If this checkbox is not checked, the optimal (lowest) frequency span is selected for each step. This provides the maximum output waveform resolution and greatest metering accuracy but may cause the output to be temporarily disabled as the test runs. This checkbox is only available for PPSC power sources.

Step Value/Comment and Step Result Tabs

Refer to the [Step Table](#) topic for more information about these tabs. Note that these tabs apply to the currently selected step in the step table.








Run State

The Run State section above the Run Toolbar shows the current status of the test. The various run states are shown below.

| | |
|--------------------------|--|
| Idle | No test or steps have completed or are currently running. |
| Running Step n... | Step "n" is currently running. |
| Stopped | The test was stopped. The results column in the step table shows which step was stopped. A test is stopped by pressing the Stop button in the run toolbar or the Stop button in a User Prompt , User Input or Transient Prompt dialog box. |
| Failed | The test failed. The results column in the step table shows which step failed. Click in the results column for that step to view additional information. |
| Done | The test or selected step(s) have successfully completed. |

Run Toolbar

The table below describes the buttons in the Run Toolbar. Some items (like **Run Step**) require one or more selected rows in the step table.

| | |
|---|--|
|  | Start - Clears the test report then runs the entire test starting from step 1 (regardless of which step is currently selected). |
|  | Continue - Resumes the test starting with the currently selected row (step). The test continues to the last step. |
|  | Run Step - Runs the selected step(s) then pauses. Run Step is convenient for testing and troubleshooting. |
|  | Run To Next - Runs the selected step. When the step completes, the test pauses with the next row selected. Run To Next allows you to "single step" through a test sequence. |
|  | Show Running Step - When a test is running, pressing this button selects and shows the currently running step, scrolling the step table if necessary. |
|  | Stop - Stops the test and disables the power source output. |
|  | Show Report - Shows the test report window |

Running a test using **Start** first initializes the test report then appends the test data to the report after each step completes. This creates a clean test report each time the test is run. Running a test using the other controls does not first clear the test report, making it easier to troubleshoot (single step etc) a test.

Time and Progress Indicators

The upper time and progress indicator shows the values for the entire test (all enabled steps) and the lower one shows the values of the selected step(s). The total time values update as step rows are selected making it easy to see when that step begins relative to the start of the test, even if a test is not running. The total time values take into account if step rows are not enabled (step checkbox not checked). Time and progress indicators are updated as the test runs. Step times are estimates based on the type of step, programmed values and system performance. Time values are shown in HH:MM:SS.SSSS format. The actual elapsed time of each step is recorded in the test report.

Step Table

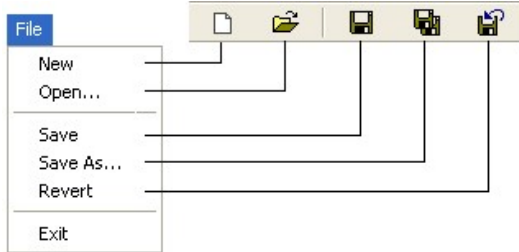
Refer to the [Step Table](#) topic for more information.

Event Status Panel

Refer to the [Event Status Panel](#) section for more information on these items.

File Menu and Toolbar

The file menu and MDI toolbar (shown below) allow you to create a **New** test sequence, **Open** an existing file, **Save** or **Save As...** (to a different file) or **Revert** the test sequence to the last saved version. The Save and Revert items are only enabled if the test sequence has been edited but not yet saved (the file name in the title bar shows an "*" at the end).



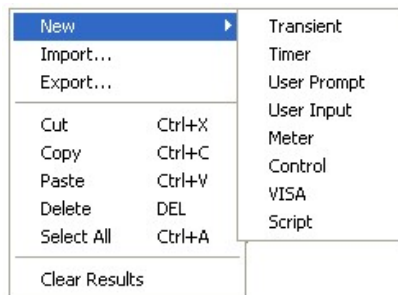
Test Sequence Step Table

The step table shown below appears at the bottom of the [Test Sequence window](#) . The type and order of steps in the table defines the operations performed by the test sequence.

| Step | Description | Value | Comment | Result |
|-------------------------------------|----------------|-----------------------------------|-----------------------|--------|
| <input checked="" type="checkbox"/> | 1 User Input | Technician,Work Order,Repair | Get Info | |
| <input checked="" type="checkbox"/> | 2 Steady State | Va=121.0 Vb=121.0 Vc=121.0 F=60.0 | Apply nominal voltage | |
| <input checked="" type="checkbox"/> | 3 Timer | 0000:00:10 | Allow UUT to settle | |
| <input checked="" type="checkbox"/> | 4 Meter | Vrms,Irms | Check Volts and Amps | |
| <input checked="" type="checkbox"/> | 5 Transient | 3.0 sec | Trigger Overvoltage | |
| <input checked="" type="checkbox"/> | 6 VISA | GPIB::1::INSTR | Query UUT Status | |
| <input checked="" type="checkbox"/> | 7 Control | Output Enable | Turn off power | |

Adding or Removing Steps

If you right-click in the step table, the step context menu appears as shown below.



The menu items apply to the currently selected step(s). New steps are added or pasted after the selected step. To add a step at the beginning, first click the table header. To add a step at the end, first select the last step or click the blank area at the bottom of the table. The items in the step context menu are described below. For more information about each step type, click on one of the following topics: [Steady State](#), [Transient](#), [Timer](#), [User Prompt](#), [User Input](#) , [Meter](#), [Control](#), [VISA](#), [Script](#) .

- New** Adds a new step after after the selected step. There are 8 different step types to choose from. Note that the Transient step requires a prior Steady State step (see **Import** below).
- Import** Loads a step from a file. You can load Output Sequence files (*.fm1, *.fm2, *.fm3) or test step files (*.tsp). Output sequence files contain Steady State and optional Transient values. If both are present, two steps are added after importing an output sequence.
- Export** Saves the selected step to a file. When used with Import..., this is convenient for transferring steps from one test sequence to another.
- Cut** Copies the selected steps to the clipboard and then deletes them from the table.
- Copy** Copies the selected steps to the clipboard.

- Paste** Pastes the clipboard after the selected step.
- Delete** Deletes selected steps.
- Select All** Selects all steps.
- Clear Results** Clears the results column of the selected steps.

Step Table Columns

The columns in the step table are described below.

- Step** Step enable checkbox and step number. Steps that aren't checked are skipped when the test sequence runs. Unchecking a step is a convenient way to temporarily disable a step while troubleshooting or reconfiguring a test.
- Description** Step icon and name. Note that Transient steps are linked to a particular Steady State step. The description column for all steps up to and including the transient step is automatically indented.
- Value** Shows a brief one-line summary of the values in the step. Clicking in the Value column for a particular step automatically selects the Step Value/Comment tab in the test sequence window, allowing you to edit the value.
- Comment** Shows the step comment. Clicking in the comments column for a particular step automatically selects the Step Value/Comment tab in the test sequence window, allowing you to edit the comment.
- Result** Shows the results state (Pass, Fail, Stopped, Skipped) the last time this step was run. It also shows if a step is currently running. Clicking in the results column for a particular step automatically selects the Result tab in the test sequence window, providing additional information.

If the test sequence is part of a test plan, the step numbers in the step table contain a decimal point as shown below. The number to the left of the decimal point is the test plan step number and the number to the right is the test sequence step number.

| Step | Description | Value |
|---|--------------|-----------------------------------|
| <input checked="" type="checkbox"/> 3.1 | Steady State | Va=120.0 Vb=120.0 Vc=120.0 F=60.0 |
| <input checked="" type="checkbox"/> 3.2 | Meter | Vrms,Irms |
| <input checked="" type="checkbox"/> 3.3 | Transient | 3.0 sec |
| <input checked="" type="checkbox"/> 3.4 | VISA | GPIB::1::INSTR |
| <input checked="" type="checkbox"/> 3.5 | Control | Output Enable |

Test Plan Step Number | Test Sequence Step Number

Control

The Control step allows the test sequence to change PPSC setup parameters like CSC, Output Enable, Transition Time etc. These items are normally defined in the [Setup panel](#) in the PPSC Control window. The Control step design window is shown below.

Voltage and Frequency Limits

Objective | Preferences | Step Value/Comment | Step Result

Step 1 - Control

| Item | Value |
|-----------------|--------|
| Transition Time | 0.1000 |
| ProgZo State | On |

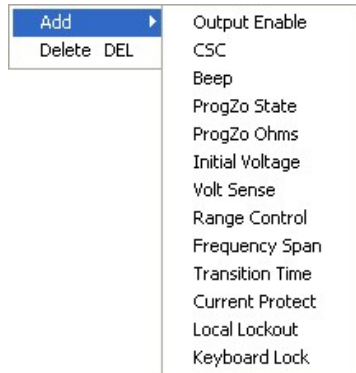
Right-click table to add/remove item. Drag "Item" column to reorder rows.
 Changing this item may temporarily disable the output.

Comment: Ramp Mode and ProgZo

| Idle | Step | Total | Elapsed | Remaining |
|------|---------|---------------|---------------|---------------|
| | 1 of 1: | 00:00:00.0000 | 00:00:00.0000 | 00:00:00.0000 |
| | 1: | 00:00:00.0000 | 00:00:00.0000 | 00:00:00.0000 |

| Step | Description | Value | Comment | Result |
|---------------------------------------|-------------|------------------------------|----------------------|--------|
| <input checked="" type="checkbox"/> 1 | Control | Transition Time,ProgZo State | Ramp Mode and ProgZo | |

The **Control Table** contains entries that change PPSC setup values. To change an existing entry, click in the value column for that row. To add a new item, right-click the item column to activate the Control Menu as shown below.



The items in the menu vary depending on the features supported by your power source. Items already in the table are disabled (grayed). Selecting one of these items adds it to the table. The new item is added after the row you right-clicked the mouse. To add an item at the beginning, right-click the Item column in the table header. To add an item at the end, right-click the Item column of the last row. The order of the items in the table is not critical but you can rearrange them by clicking the item column for a row and dragging it to the new location. To delete a row, click the item column for that row then press the Delete key.

The text you enter in the **Comment** box automatically appears in the step table and test report.

Notes:

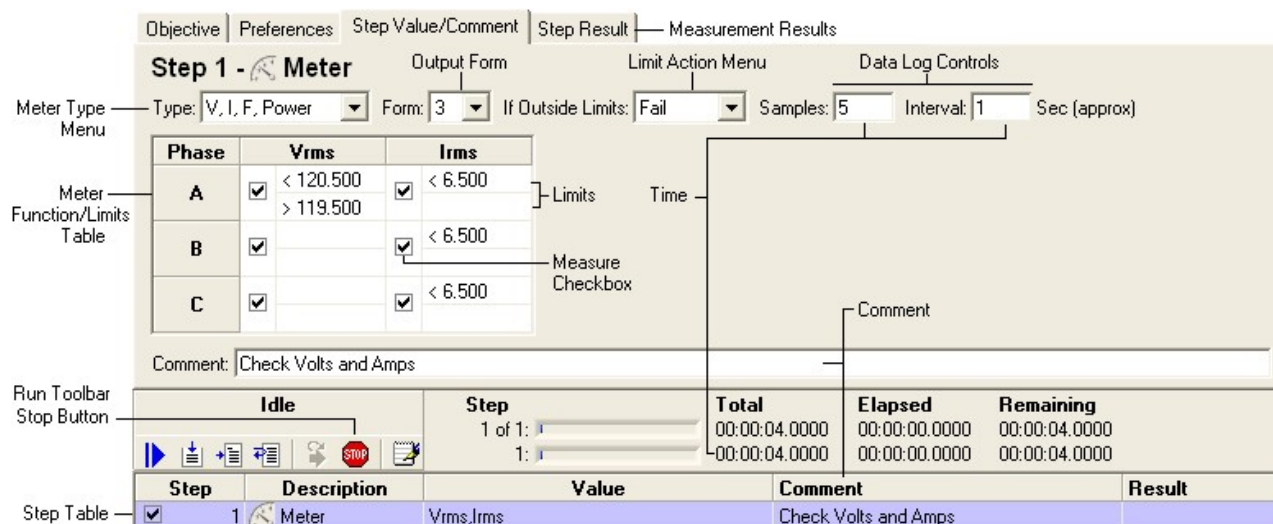
- The Steady State and Transient test steps automatically enable the output and select the optimum frequency span so it's not necessary to add a control step to do this.
- Depending on your PPSC model, changing some items may temporarily disable the output. These items are marked with the **Output Warning** icon ⚡.
- The Output Enable value may actually change first or last depending on whether it's being enable or disabled and the other items and values in the control table that you specified.
- Avoid using multiple control steps back-to-back to only change one item. Changing all needed items in one step reduces output enable changes and speeds up the test.
- Only include items that need changing. Including unnecessary items slows down the test and may unintentionally change a value set by another step. To delete a row, click the item column for that row then press the Delete key.
- The voltage and frequency limit values can only be set in the [test sequence Preferences](#) tab.
- The control table does not allow changing the hardware configuration (Transformer Ratio, Amps Volts Ratio, CT Location, Amplifiers).
- The value of the Beep item controls the PPSC beep duration.

Meter

The Meter step allows the test sequence to measure voltage, current, power, frequency, harmonics and waveforms using the built-in metering functions in your PPSC. These functions are normally performed manually using the [PPSC Meter](#) Window. The meter step also supports limit checking, out-of-limit behavior and data logging.

When a test sequence runs a Meter step, the requested measurements are made, updating the progress/time indicators and step result with the measured values. If specified, limit checking is also performed on the measured values. If you specify that the test should fail if a value is outside the limits, the test will stop with "Failed" results. Pressing the **Stop Button** in the **Run Toolbar** stops the test with "Stopped" results. When the Meter step is allowed to complete, the test sequence proceeds with the next step.

The Meter step design window is shown below.

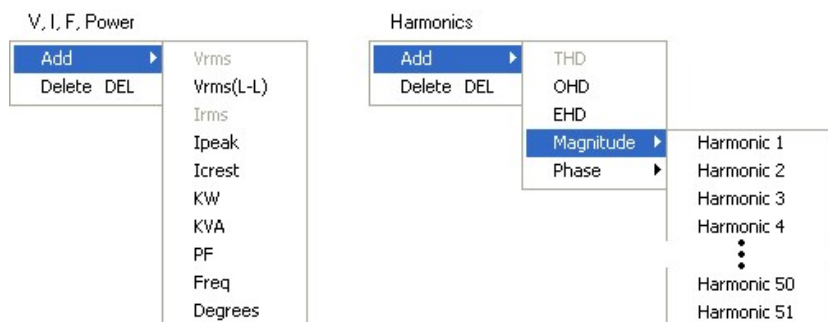


The **Meter Type Menu** selects which measurement category you want to use. The choices are shown below.

| Meter Type | Available Functions | Limit Checking | Data Log |
|----------------|--|----------------|----------|
| V,I,F,Power | Vrms, Vrms(L-L), Irms, Ipeak, Icrest, KW, KVA, PF, Freq, Degrees | Yes | Yes |
| Volts Harm % | THD, OHD, EHD, Magnitude (1-51), Phase (1-51) | Yes | Yes |
| Amps Harm % | THD, OHD, EHD, Magnitude (1-51), Phase (1-51) | Yes | Yes |
| Volts Harm Abs | THD, OHD, EHD, Magnitude (1-51), Phase (1-51) | Yes | Yes |
| Amps Harm Abs | THD, OHD, EHD, Magnitude (1-51), Phase (1-51) | Yes | Yes |
| Waveform | Volts, Amps | No | No |

The **Output Form** menu specifies the data format of the metered data. An error occurs if the present PPSC output form (set by a previous [Steady State](#) step) does not match this setting when the meter step is run.

The **Meter Function/Limits Table** allows you to specify which functions are measured and any limit checking you want performed. To add a function to the table, right-click the header of the table and the Meter Function menu appears. Shown below are the V,I,F,Power and Harmonics meter function menus.



Items already in the table are disabled (grayed). The new item is added after the column you clicked the mouse. You can rearrange columns by click the table header for that column and dragging it to the new location. To delete a column (function), click the mouse in the column header then press Delete. The order the columns appear in the table is also the order the measurement appears in the **Step Result** tab and test report.

For maximum performance, include only the meter functions and phases you need. Unchecking the **Measure Checkbox** allows you to skip that function/phase from being measured. When metering output form 2, the Vrms(L-L) function should be used instead of Vrms. Each measured value can be checked against none, one or two limit values. This allows high/low range checking for each measured value. Limit entries can use any of the following relational operators followed by a number.

| Operator | The measured value must be... |
|----------|-------------------------------|
| > | Greater than |
| >= | Greater than or equal to |
| < | Less than |
| <= | Less than or equal to |
| = | Equal to |
| <> | Not equal to |

The **Limit Action Menu** controls what happens if a measured value is outside the limits. **Continue** means the meter step completes normally.

Fail means the meter step stops the test with "Failed" results. In either case, the out-of-limit measured value is highlighted in red in the **Step Result** tab and test report.

Data Logging

The **Data Log Controls** specify the number of measurement **Samples** and time **Interval** between measurements. Data logging allows you to monitor values over an extended period of time. When making multiple measurements, the total time the meter step takes is (Samples - 1) * Interval. The first measurement is taken immediately when the meter step starts running. The meter step completes immediately after the last measurement is made (no final delay). Specifying short time intervals between measurements may not be achievable with your power source or PC. The Step Result tab and test report shows the actual elapsed time of each measurement and is highlighted in red if it didn't achieve the interval you specified. The progress/time indicators update as the step runs and the Step Result tab lets you view measurements as they are being made. Data log measurement samples are stored in separate rows as shown below.

| Date/Time | Elapsed | Vrms(L-N) A | Vrms(L-N) B | Vrms(L-N) C | Irms A | Irms B | Irms C |
|---------------------|---------|-------------|-------------|-------------|--------|--------|--------|
| 07/24/2007 09:57:54 | 0 | 120.120 | 120.051 | 120.033 | 6.483 | 6.481 | 6.470 |
| 07/24/2007 09:57:54 | 0.500 | 120.104 | 120.058 | 120.023 | 6.484 | 6.480 | 6.470 |
| 07/24/2007 09:57:55 | 1.000 | 120.117 | 120.076 | 120.036 | 6.484 | 6.480 | 6.470 |
| 07/24/2007 09:57:55 | 1.604 | 120.102 | 120.065 | 120.027 | 6.484 | 6.481 | 6.470 |
| 07/24/2007 09:57:56 | 2.104 | 120.098 | 120.073 | 120.038 | 6.484 | 6.480 | 6.753 |

Time Interval Not Achieved

Outside Limit

Notes:

- When requesting a single sample, each phase uses a separate row in the step result and test report, similar to the layout of the Meter Function Table in the meter design window.
- Setting Local Keyboard Lock (local lockout) On and CSC Off improves metering performance.

Waveform Metering

When using **Waveform** in the Meter Type menu, the actual voltage and current waveforms for each selected phase (1 cycle) are plotted in a graph and stored in the Step Result tab and test report.

Script

The Script step allows the test sequence to perform custom operations using Microsoft Visual Basic Scripting. In addition to the full VBScript language support, the script has access to various test manager objects. Scripts are very fast and efficient and run without needing a compiler or other programming tools. The Script step design window is shown below.

The screenshot displays the 'Step 1 - Script' design window. It features a 'Code Window' containing the following VBScript code:

```

Test Manager Script Starter Code
Public Const kScriptTime = 0
Public Const kTimeOut = 10
Sub ScriptMain()
  TM.RtfProgress.SetText = "Hello World!"
  If (TM.RunErrCode <> TM.RunCodeRun) Then Exit Sub
  TM.RunErrCode = TM.RunCodeDone
  TM.RunErrDate = Now
End Sub
    
```

Below the code window is a 'Run Toolbar' with buttons for Run, Stop, and other functions. At the bottom is a 'Step Table' with one entry for the script step, showing its description, value, comment, and result.

| Step | Description | Value | Comment | Result |
|------|-------------|----------------------------------|--------------------|--------|
| 1 | Script | Test Manager Script Starter Code | "Hello World" Demo | |

The above example shows the default script created when you add a new Script step to the step table. The script starter code simply puts "Hello World!" in the **Step Result** tab and test report. You can enter or edit code directly in the **Code Window** and immediately run it using the **Run Toolbar**. Running a script step calls the ScriptMain subroutine.

The first line of the script (usually a comment) appears in the value column of the step table. Two optional constants at the top of the code window define time information (seconds) used by the test sequence prior to running the script. **kScriptTime** is the step time estimate used for the progress/time indicators and **kTimeOut** is the maximum time the script should be allowed exclusive control your PC before a message box is displayed asking if you want to cancel the script.

Test Manager Object Reference

This section defines the various methods and properties available to a script. Test manager objects begin with "TM".

Notes:

- The range for program numbers is 0-99, where 0 refers to the Manual Mode program.

- Script coding errors (syntax and run-time) are reported in the Step Result tab.
- Use Goto ... in the **Context Menu** to view the current cursor location or locate a particular line and column.
- Scripts can use the **Step** object to read but not change the values and result of any step in the Step Table.
- When a script starts, the prior results are automatically cleared. You can use form fields in the test report to simulate "global" variables or to pass values between script steps.
- To assist troubleshooting and debugging, use **TM.RunMsgBox** and **TM.RunInputBox** to show or enter variables.
- Do not use TM.RunVisa to change values of your power source. Instead, use the methods and properties provided by the **Run** and **PPSC** objects.
- Creating and debugging scripts require prior programming experience with VBScript. Contact Pacific Power for assistance in developing custom scripts.
- The property Get and Let definitions listed below should be treated as variable assignments (e.g. result = **TM.RunErrCode** or **TM.RunStepProgress** = t) in your script code.
- Refer to the script samples included with PPSC Manager for additional information and programming techniques.

Run Object

Public Property Get **TM.RunStep()** As Integer

Returns the step number currently running (the script step).

Public Property Get **TM.RunNextStep()** As Integer

Returns the step number that will be run after the script step completes. The default value is 0 which means to run the next step.

Public Property Let **TM.RunNextStep(ByVal step As Integer)**

Sets the step number to be run after the script step completes. The default value is 0 which means to run the next step. Changing the next step is essentially the same as a "Goto". Be careful when changing TM.RunNextStep because it makes the test difficult to analyze and can create endless loop situations.

Public Property Get **TM.StepElapsedTime()** As Double

Returns the elapsed time in seconds since the script step started.

Public Property Let **TM.RunStepProgress(ByVal elapsed As Double)**

Updates the progress and time indicators with "elapsed" time

Public Property Get **TM.RunStepPercent()** As Single

Returns the step percentage completed.

Public Property Let **TM.RunStepPercent(ByVal percent As Single)**

Updates the progress and time indicator with the "percent" complete. Only applies if kScriptTime = 0.

Public Sub **TM.RunDoEvents()**

Gives the test manager time to update (not normally necessary).

Public Function **TM.RunUserPrompt(ByVal Caption As String, ByVal prompt As String) As Integer**

Displays a [User Prompt](#) window. Refer to the TM.RunCodeXXX properties for the return values. "Caption" is the title bar of the window and "prompt" can be Rich or Plain Text. If "modal" is set to false, this function returns immediately, without waiting for user input. This allows you to use the User Interface object described below to build a custom user interface.

Public Function **TM.RunUserInput(ByVal Caption As String, ByVal parameter As String, data As Variant, Optional modal As Boolean = True) As Integer**

Displays a [User Input](#) window. Refer to the TM.RunCodeXXX properties for the return values. "Caption" is the title bar of the window and "parameter" is a formatted string that defines the input table rows and columns. "data" is a string containing the values input by the user. Refer to the TM.ReportInputXXX properties for constants that define the various input types (Textbox, Checkbox, Listbox). The easiest way to determine the "parameter" string format is to create a user input step and export it to a file then examine the files contents. If "modal" is set to false, this function returns immediately without waiting for user input. This allows you to use the User Interface object described below to build a custom using interface.

Public Function **TM.RunControl(ByVal param As String) As String**

Updates PPSC setup values. The easiest way to determine the "param" string is to create a [Control step](#) and export it to a file then examine the file contents. The return value is the query response string.

Public Function **TM.RunVisa(ByVal param As String) As String**

Sends a command string to an instrument and return the response. The easiest way to determine the "param" string is to create a [Visa step](#) and export it to a file then examine the file contents. You only need to include values that relate to the interface (resource) you are using. If the "command" uses commas, you must replace them with TM.VisaCommaChar. The comma will be restored when the VISA step runs.

Public Function **TM.RunProgramDefine(ByVal progNum As Integer, ByVal field As String, ByVal data As String, Optional ByVal prefix As String) As Boolean**

Sends a program define string to the PPSC. You can send a single "field" with "data" or group multiple fields together. When updating multiple fields, the "field" contains comma delimited field and data pairs except skip the final comma and data value. Then set the "data" value to the data for the last field. Refer to the PPSC Operation Manual for the available program define fields and data values. Returns True if the program define was sent successfully.

Public Function **TM.RunProgram(ByVal progNum As Integer) As Boolean**

Executes a program. Returns False if the program is not stored.

Public Function **TM.RunTransient()** As Boolean

Triggers a transient. Returns True when the transient completes.

Public Function TM.RunOutputSequence(ByVal step As Integer) As Boolean

Runs the output sequence in the specified step even if that step is not enabled. The step can either be a steady state or transient. Returns False if the output sequence could not be run.

Public Sub TM.RunErrClear()

Clears the test manager error state. This is normally used when the script uses "On Error Resume Next" and you want to handle errors and continue.

Public Property Get TM.RunPreferences() As String

Returns the test sequence preferences.

Public Property Get TM.RunErrCode() As Integer

Returns the current error code. Refer to the TM.RunCodeXXX properties for the return values. This property allows you to determine if the test manager has generated an error.

Public Property Let TM.RunErrCode(ByVal errCode As Integer)

Sets the error code. Refer to the TM.RunCodeXXX properties for the available values.

Public Property Get TM.RunErrDate() As Date

Returns the date and time the error reported by TM.RunErrCode occurred.

Public Property Let TM.RunErrDate(ByVal errDate As Date)

Sets the data and time the error occurred.

Public Property Get TM.RunErrDesc() As String

Returns a description of the error reported by TM.RunErrCode.

Public Property Let TM.RunErrDesc(ByVal errDesc As String)

Sets the description of the error.

Public Property Get TM.RunCodeRun() As Integer

Returns the value for the "Running" state. This is the normal state of a step when it's running.

Public Property Get TM.RunCodeStop() As Integer

Returns the value for the "Stopped" state. This is the state when a step is stopped.

Public Property Get TM.RunCodeDone() As Integer

Returns the value for the "Done" state ("Passed"). This is the state when a step has completed normally.

Public Property Get TM.RunCodeFailed() As Integer

Returns the value for the "Failed" state. This is the state when a step has failed.

Public Property Get TM.RunCodeSkipped() As Integer

Returns the value for the "Skipped" state. This is the state when the test sequence attempts to run a step and the enable checkbox is not checked.

Public Function TM.RunMsgBox(ByVal prompt As String, Optional ByVal flags As Long = vbOKOnly, Optional ByVal title As String = "VBScript") as Integer

Calls the standard Visual Basic MsgBox function modally in the test manager workspace.

Public Function TM.RunInputBox(ByVal prompt As String, Optional ByVal title As String = "VBScript") as String

Calls the standard Visual Basic InputBox function modally in the test manager workspace.

Public Function TM.FilePath() As String

Returns the file path of the test sequence.

Step Object

Public Property Get TM.StepEnabled(ByVal i As Integer) As Boolean

Returns the enable checkbox state of the requested step.

Public Property Get TM.StepType(ByVal i As Integer) As Integer

Returns the numeric index of the type of the requested step.

Public Property Get TM.StepDesc(ByVal i As Integer) As String

Returns the description of the requested step.

Public Property Get TM.StepComment(ByVal i As Integer) As String

Returns the comment of the requested step.

Public Property Get TM.StepSeconds(ByVal i As Integer) As Single

Returns the time estimate of the requested step.

Public Property Get TM.StepInvalid(ByVal i As Integer) As Boolean

Returns True if the requested step contains invalid values.

Public Property Get TM.StepSummary(ByVal i As Integer) As String

Returns the text summary for the values of the requested step.

Public Property Get TM.StepParameter(ByVal i As Integer) As String

Returns the parameter value of the requested step.

Public Property Get TM.StepCount() As Integer

Returns the total number of steps in the test sequence.

Public Property Get TM.StepResultCode(ByVal i As Integer) As Integer

Returns the result code of the requested step. Refer to the TM.RunCodeXXX properties for the available values.

Public Property Get TM.StepResultDate(ByVal i As Integer) As Date

Returns the date and time the requested step completed.

Public Property Get TM.StepResultElapsed(ByVal i As Integer) As Single

Returns the elapsed time in seconds the requested step took to complete.

Public Property Get TM.StepResultTitle(ByVal i As Integer) As String

Returns the result title (Passed, Stopped, Failed, Skipped) of the requested step.

Public Property Get TM.StepResultRtf(ByVal i As Integer) As String

Returns a Rich Text string of the result data for the requested step.

Public Property Get TM.StepResultSelected(ByVal i As Integer) As Boolean

Returns True if the Result tab for requested step is currently selected.

Public Property Get TM.StepReportFlags(ByVal i As Integer) As Integer

Returns the report flags of the requested step. Refer to the TM.ReportStepXXX properties for the available flags.

Public Property Let TM.StepReportFlags(ByVal i As Integer, ByVal report As Integer)

Sets the report flags of the requested step. Refer to the TM.ReportStepXXX properties for the available flags. To include multiple items, add them together (i. e. TM.ReportStepTitle + TM.ReportStepResultTitle + TM.ReportStepResultData)

Report Object

Public Sub TM.ReportGetInfo(path As Variant, fileDirty As Variant, template As Variant)

Sets "path" to the current report file path. Sets "fileDirty" to True if the file has been changed but not saved. Sets "template" to the current template name.

Public Function TM.ReportSave(ByVal path As String) As Boolean

Saves the test report to the file specified by "path". Returns True if the file was successfully saved.

Public Function TM.ReportGetTemplate(ByVal Index As Integer, name As Variant) As Boolean

Sets "name" to the template name of the specified index. This function allows you to query the available templates. Start with an index of 0 and continue until the function returns False.

Public Function TM.ReportSetTemplate(ByVal name As String) As Boolean

Changes the report template to "name". This also clears the test report. Returns True if the template name exists and the report was initialized.

Public Function TM.ReportGetFieldInfo(ByVal Index As Integer, name As Variant, checkboxfield As Variant) As Boolean

Returns information about the form fields in the test report. Sets "name" to the field name. Sets "checkbox" to True if the field is a checkbox. This function allows you to query the available form fields in the current test report. Start with an index of 0 and continue until the function returns False.

Public Function TM.ReportGetField(ByVal name As String, val As Variant, ByVal checkboxfield As Boolean) As Boolean

Sets "val" to the value of the form field specified by "name". Sets "checkboxfield" to True if the field is a checkbox. Returns False if the requested field name does not exist in the test report.

Public Function TM.ReportSetField(ByVal name As String, ByVal val As String, ByVal checkboxfield As Boolean) As Boolean

Sets the form field specified by "name" to "val". You must set "checkboxfield" to True if the field type is a checkbox. Returns False if the requested field name does not exist or the checkboxfield value does not match the actual field type in the report.

Public Property Get TM.ReportStepTitle() As Integer

Returns a constant that controls if the step title is included in the test report. See **StepReportFlags** above.

Public Property Get TM.ReportStepSummary() As Integer

Returns a constant that controls if the step summary is included in the test report. See **StepReportFlags** above.

Public Property Get TM.ReportStepComment() As Integer

Returns a constant that controls if the step comment is included in the test report. See **StepReportFlags** above.

Public Property Get TM.ReportStepResultTitle() As Integer

Returns a constant that controls if the step result title is included in the test report. See **StepReportFlags** above.

Public Property Get TM.ReportStepResultData() As Integer

Returns a constant that controls if the step result data is included in the test report. See **StepReportFlags** above.

Public Property Get TM.ReportStepAll() As Integer

Returns a constant that controls if the all step items are included in the test report. See **StepReportFlags** above.

Public Property Get TM.ReportRtfClear() As String

Returns a string that can be used to reset formatting and clear text in a RichTextBox.

Public Property Get TM.ReportGraphWidth() As Long

Returns the width in pixels of the waveform graph created by the [Meter step](#) .

Public Property Let TM.ReportGraphWidth(ByVal Width As Long)

Sets the width in pixels of the waveform graph created by the [Meter step](#) .

Public Property Get TM.ReportGraphHeight() As Long

Returns the height in pixels of the waveform graph created by the [Meter step](#) .

Public Property Let TM.ReportGraphHeight(ByVal Height As Long)

Sets the height in pixels of the waveform graph created by the [Meter step](#) .

Public Property Get TM.ReportInputTextbox() As Long

Returns a constant that defines the Textbox type used for the TM.RunUserInput function "parameter".

Public Property Get TM.ReportInputCheckbox() As Long

Returns a constant that defines the Checkbox type used for the TM.RunUserInput function "parameter".

Public Property Get TM.ReportInputListbox() As Long

Returns a constant that defines the Listbox type used for the TM.RunUserInput function "parameter".

PPSC Object**Public Function TM.UpcGetProgramNameCRC(ByVal progNum As Integer, name As Variant, crc As Variant) As Boolean**

Sets "name" to the output sequence file name and "crc" to the program CRC for the specified program. Returns False is no program is stored at "progNum".

Public Function TM.UpcGetExecutingProgram() As Integer

Returns the currently executing program number. 0 is the Manual Mode program and -1 means no program is currently executing.

Public Property Get TM.UpcGetInfo() As String

Returns info about the PPSC you are currently connected (IDN, serial number, supported features etc).

Public Property Get TM.UpcGetSetup() As String

Returns the setup and configuration values of the PPSC.

Public Property Get TM.UpcGetProgram(ByVal progNum As Integer) As String

Returns the program values (Steady State and Transient) of the requested program.

Public Property Get TM.UpcGetkFactors() As String

Returns the kFactors calibration data of the PPSC.

Public Property Get TM.UpcGetProgZoCal() As String

Returns the ProgZo calibration data of the PPSC.

Public Property Get TM.UpcGetMeter(ByVal meterType As Integer, ByVal Refresh As Boolean, Data As Variant, dateTime As Variant, Optional ByVal queryUPCForm As Boolean = True, Optional ByVal meterTemplate As String = "") As Boolean

Returns values for the requested meter type in "data". The available meter types are 0 - VIF, 1 - Volt Harmonic % Fund, 2 - Amp Harmonic % Fund, 3 - Volt Harmonic Abs, 4 - Amp Harmonic Abs, 5 - Waveforms. If the requested measurement type is not supported by your PPSC, this function returns false. If "Refresh" is true, metering is initiated and new values are returned in "data", otherwise the last measured values are returned. "dateTime" is the time when the returned metered values were originally measured. If "queryUPCForm" is true, VIF metering first reads the present PPSC output form then measures according to that form, otherwise is uses the last output form. "meterTemplate" is a sting of 30 "1"s and "0"s corresponding to 30 possible VIF measurement types. A "1" in that position requests that value be measured. The 30 metered types are described below:

| VIF Measurement | String Index (Phase A, B, C) |
|-----------------|------------------------------|
| Vrms(L-N) | 1, 2, 3 |
| Vrms(L-L) | 4, 5, 6 |
| Irms | 7, 8, 9 |
| Ipeak | 10, 11, 12 |
| Icrest | 13, 14, 15 |
| KW | 16, 17, 18 |
| KVA | 19, 20, 21 |
| PF | 22, 23, 24 |
| Frequency | 25, 26, 27 |
| Degrees | 28, 29, 30 |

For example, setting "meterTemplate" to "1110001110000000000000000000" would measure Vrms(L-N) and Irms for all phases. Note that the fewer the requested values, the faster the measurement. Trailing "0"s are optional. To maximize speed of repeated measurements, set "queryUPCForm" true for the first measurement then false for subsequent measurements.

**Public Function TM.UpcGetWaveform(ByVal wf As Integer, title As Variant, source As Variant, _
dateTime As Variant, comments As Variant, crc As Variant, maxVrms As Variant, _
rmsFactor As Variant, dcOffset As Variant, data As Variant) As Boolean**

Returns waveform values of waveform "wf". "data" is set to an array of 1024 values ranging from -100 to +100 percent. The waveform values

are shown in the [Waveform Editor](#) window.

**Public Function TM.UpcSetWaveform(ByVal wf As Integer, title As Variant, source As Variant, _
dateTime As Variant, comments As Variant, data As Variant) As Boolean**

Sets the values for waveform "wf". "data" is an array of 1024 values ranging from -100 to +100 percent. The waveform values are shown in the [Waveform Editor](#) window.

For maximum performance and to reduce memory usage, it's best to set "source" to TM.UpcWaveformNoDatabase to prevent the waveform from being added to the waveform reference database. It's also recommended you restore any waveforms you change back to a sine wave. To restore a waveform to a sine wave, use TM.UpcGetWaveform(1, ...) to read waveform 1 (it's always a sine wave) then use TM.UpcSetWaveform to reset it.

Note: TM.UpcSetWaveform disables the output.

Public Function TM.UpcGetEvents() As String

Returns a string of event tokens currently showing the [Event Status Panel](#) . The tokens (description) are "CAPTURE" (probe capture), "ERR" (Error), "PON" (power on), "SHUTDOWN" (power source shutdown), "URQ" (user request), "IPROT" (current protect), "VPROT" (voltage protect), "NR" (remote interface not responding) and "BSY" (remote interface busy).

Public Sub TM.UpcClearEvents()

Resets all events in the [Event Status Panel](#) .

Rich Textbox Objects

Scripts have access to three rich textbox objects. These are standard Visual Basic RichTextBox controls. Refer to the Microsoft documentation for the available properties and methods. These controls allow you to create and manipulate formatted text and graphics. You can access these controls using TM.RtfProgress, TM.RtfResults and TM.RtfTemp. The contents of TM.RtfProgress are shown in the step result tab and test report when the script completes. Use RtfTemp for a scratch pad but keep in mind that the contents may be changed by other test manager objects. RtfResults allows you to dynamically update the step result tab (like the [Meter step](#) does during data logging) while the script is running. You should only update RtfResults if TM.StepResultSelected returns True for your script step. To initialize the contents of a rich textbox, use TM.RtfTemp.TextRTF = TM.ReportRtfClear.

User Interface Object

This section defines the available methods and properties when building a custom user interface with the TM.RunUserInput function described above. Refer to the script samples provided with PPSC Manager for additional information. User Interface objects begin with "UI". The user interface can contain the following controls:

| Control Name | Description |
|--------------|--------------------------------------|
| Label | Microsoft Visual Basic Label |
| Frame | Microsoft Visual Basic Frame |
| Button | Microsoft Visual Basic CommandButton |
| staStatus | Microsoft Visual Basic StatusBar |
| Text | Microsoft Visual Basic TextBox |
| Rtf | Microsoft Visual Basic RichTextBox |
| SButton | National Instruments CWButton |
| Graph | National Instruments CWGraph |
| Number | National Instruments CWNumEdit |
| List | Microsoft Visual Basic ListBox |
| Img | Microsoft Visual Basic Image |
| Pict | Microsoft Visual Basic PictureBox |
| Combo | Microsoft Visual Basic ComboBox |
| Check | Microsoft Visual Basic CheckBox |
| ProgStatus | Microsoft Visual Basic ProgressBar |

Initially, a single instance of each control is available but not visible. With the exception of "staStatus", these controls are actually arrays allowing you to add additional controls using the **AddControl** method described below. Even though all control properties and methods are available to your script, the UI object uses the control "Tag" property to track control events so do not modify this property in your code. To access a particular control index, property or method, for example, your script would use UI.Button(0).visible = true to change the "visible" property of Button control index 0. Review the manufacturer's documentation for specific control properties and methods.

The staStatus control inherits panels from the PPSC Manager [status panel](#) plus you can add your own panels.

Public Sub UI.AddControl(baseControl As Variant)

Adds a new "baseControl" to the user interface window. "baseControl" can be any of the control names shown above except staStatus.

Public Property Get UI.Events() As String

Returns a series of [name,value] pairs of events for visible enabled controls in the user interface window since the last time this property was read. The data pairs consist of the control name with index, event name and optional value. Repeatedly read UI.Events to monitor and respond to user input.

Public Property Get UI.Data() As String

If a "parameter" string was supplied to the **TM.RunUserInput** function, this property returns [name,value] data pairs for all user input items.

Public Property Get UI.Result() As String

Returns either TM.RunCodeDone, TM.RunCodeStop or TM.RunCodeFailed corresponding to the button pressed by the user.

Public Sub UI.Form_Resize()

Forces items on the user interface window to resize.

Public Property Get UI.Visible() As Boolean

Returns true if the user interface window is visible. The user interface windows changes to invisible after the user presses the "Pass", "Stop" or "Fail" button or presses the close box.

Public Property Get UI.UserTop() As Long

Returns the top coordinate of the user interface area.

Public Property Get UI.UserLeft() As Long

Returns the left coordinate of the user interface area.

Public Property Get UI.UserWidth() As Long

Returns the width of the user interface area.

Public Property Get UI.UserHeight() As Long

Returns the bottom coordinate of the user interface area.

Note: User controls should be positioned within the area defined by **UserTop**, **UserLeft**, **UserWidth** and **UserHeight**.

File Dialog Object

Scripts have access to the File Dialog object. The File Dialog object begins with "FD" and is based on the Visual Basic CommonDialog control. Refer to the Microsoft documentation for the available properties and methods.

Steady State

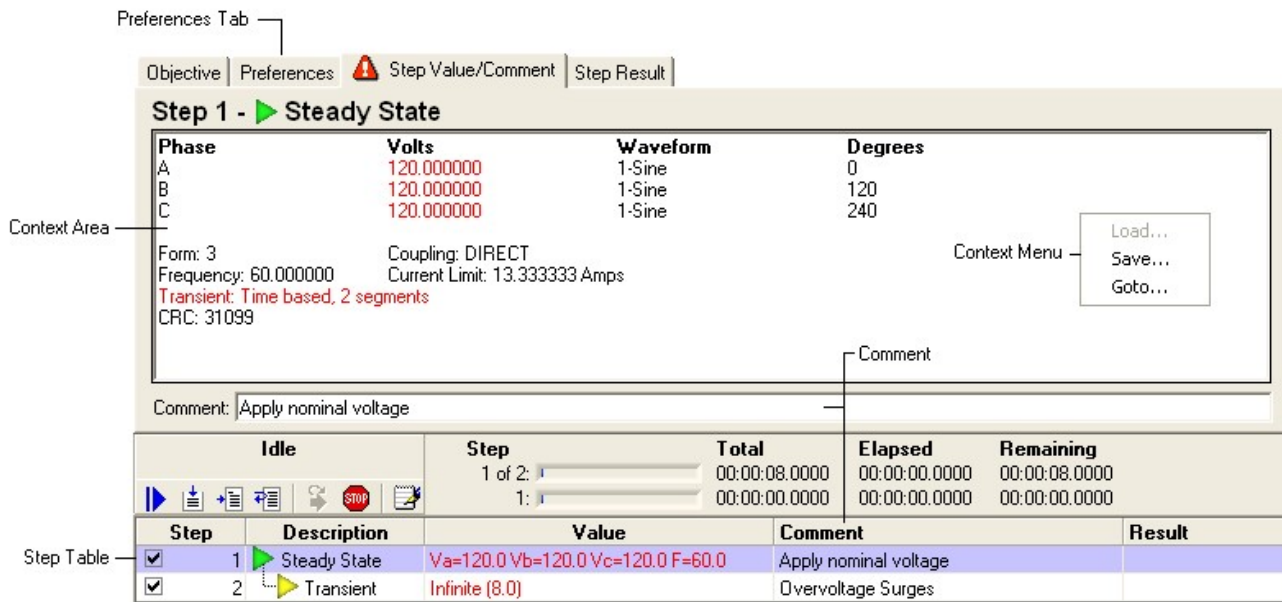
The Steady State step allows the test sequence to set the power source output voltage, frequency, phase, waveform, output form, coupling and current limit.

Use **Import...** in the [step table](#) context menu to import output sequence files into the step table. Output sequences contain steady state and optional transient values. These appear as two separate rows in the **Step Table** linked together. Clicking on the steady state step shows the values in the **Context Area**. Red text indicates values outside the limits defined in the [Preferences tab](#) or values not supported by your power source (i.e. Form or Coupling). Click the Preferences tab to view and edit the limits. Note that the limits apply to all Steady State and Transient steps in the test sequence. You can delete the transient step if you only want the steady state values to be used in the test.

The test sequence will not run steps that contain invalid values. When running a steady state step, the test sequence stores the output sequence in one of the programs you specified in the program list in the Preferences tab. It then executes the steady values and enables the output.

To edit the steady state values, double click the steady state step in the step table. The [output sequence](#) window will appear allowing you to make changes. Click the Save button in the output sequence window toolbar to save the changes to the test sequence. Test sequences store the actual contents of the output sequence you imported. This means changes to the Steady State or Transient steps in the test sequence do not affect the original output sequence file.

The **Context Menu** allows you to save the steady state values to a Rich Text (*.rtf) or Plain Text (*.txt) file. The text you enter in the **Comment** box automatically appears in the step table and test report.



Timer

The Timer step inserts a delay in the test sequence. The Timer step design window is shown below.

The screenshot shows the 'Step Value/Comment' tab in the Test Manager. The main area is titled 'Step 1 - Timer'. It features a 'Time Controls' section with three input fields for 'HOURS', 'MIN', and 'SECONDS', currently set to 0, 2, and 30 respectively. Below this is a 'Comment' text box containing 'Allow UUT to settle'. A 'Run Toolbar' is visible with a 'Stop Button' highlighted. At the bottom, a 'Step Table' displays the following data:

| Step | Description | Value | Comment | Result |
|------|-------------|------------|---------------------|--------|
| 1 | Timer | 0000:02:30 | Allow UUT to settle | |

Use the **Time Controls** to enter the desired delay time. The **SECONDS** value can be entered in SS.SSSS format. The time value is also shown in the value column of the step table. When a test sequence runs a Timer step, the progress/time indicators update. Pressing the **Stop Button** in the **Run Toolbar** stops the test with "Stopped" results. When the Timer step is allowed to complete, the test sequence proceeds with the next step.

The text you enter in the **Comment** box automatically appears in the step table and test report.

Transient

The Transient step allows a test sequence to vary the power source output voltage, frequency and waveform at precisely defined intervals.

Use New->Transient in the [step table](#) context menu to add a transient step to the step table. Transients are defined in output sequences. Refer to the [Steady State](#) step for instructions on importing output sequences into a test sequence.

Output sequences contain steady state and optional transient values. These appear as two separate rows in the **Step Table** linked together. Selecting the transient step shows the values in the **Context Area**. Red text indicates values outside the limits defined in the **Preferences** tab or values not supported by your power source. Click the [Preferences tab](#) to view and edit the limits. Note that the limits apply to all Steady State and Transient steps in the test sequence. You can delete the transient step if you only want the steady state values to be used in the test.

The test sequence will not run steps that contain invalid values. When running a transient step, the test sequence stores the output sequence in one of the programs you specified in the **program list** in the Preferences tab. It then enables the output then triggers the transient. When the transient completes, the power source returns to the steady state values. Pressing the **Stop Button** disables the output, stops the transient then return the power source to the steady state values. Since running a transient step is simply triggering the transient portion of the output sequence, you can add as many transient steps as you want. You can also add other step types (Meter, User Prompt, Timer, etc) between the steady state and transient steps.

To edit the transient values, double click the steady state or transient step in the step table. The [output sequence](#) window will appear allowing you to make changes. Click the Save button in the output sequence window toolbar to save the changes to the test sequence. Test sequences store the actual contents of the output sequence you imported. This means changes to the Steady State or Transient steps in the test sequence do not affect the original output sequence file.

The **Context Menu** allows you to save the transient values to a Rich Text (*.rtf) or Plain Text (*.txt) file. The text you enter in the **Comment** box automatically appears in the step table and test report.

The time estimate in the progress/time indicator and step table value column is based on the transient time.



Infinite Transient

The output sequence window allows you to specify an infinite number of events for a transient. Since the total transient time is the event time multiplied by the number of events, this means the total transient time is infinite. Infinite transients are useful if you need to precisely vary the power source output over an extended period of time. However, using an infinite transient in a test sequence would prevent the test from proceeding past the transient. The only way to cancel it is to press the stop button in the Run Toolbar.

The transient step allows you to override an infinite transient by specifying an optional **Min Time** and **Max Time** you want the transient to run. Shown below is an infinite transient step with a min and max time limit. The time values are in HH:MM:SS.SSSS format. The estimate shown in the progress/time indicator and step table value column is based on the max time.



When an infinite transient is running, the Transient Prompt window appears as shown below.



The window uses the comment text for the **Transient Prompt Message** and shows the transient progress. Stopping a transient before the min time is reached will stop the test. You must press the **Pass** button before the max time is reached, otherwise the test will stop. If you only enter a max time limit, the transient step will pass when Max Time is reached and the test will proceed to the next step.

The title bar of the window shows the step number and test sequence file name. If the test sequence is part of a test plan, the test plan step number and file name are shown first.



User Input

The User Input step allows the test sequence to ask the user to enter one or more values. Shown below is the User Input design window.

The screenshot shows the 'User Input' design window with the following components:

- Tabs:** Objective, Preferences, Step Value/Comment, Step Result
- Title Bar:** Step 1 - User Input
- Preamble:** Enter values for the following items:
- Input Table:**

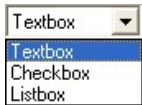
| # | Prompt | Type | Initial Value | Report Field |
|---|------------|----------|---------------|--------------|
| 1 | Customer | Textbox | | CUSTOMER |
| 2 | Repair | Checkbox | Off | REPAIR |
| 3 | Technician | Listbox | Dan | TECHNICIAN |
- Test Report Template:** Report Template: Certificate
- Comment:** Get Info
- Run Toolbar:** Includes buttons for Run, Stop, and other controls.
- Step Table:**

| Step | Description | Value | Comment | Result |
|------|-------------|------------------------------|----------|--------|
| 1 | User Input | Technician, Customer, Repair | Get Info | |

The **Preamble** is the message displayed at the top of the User Input window (shown below) to provide instructions to the user. The input table contains the items you want the user to supply when the step runs. To add or delete items (rows), right-click in the step column (#) and the input table context menu appears as shown below. New rows are added after the row you clicked the mouse. To add a row at the beginning, right-click the table header. To add a row at the end, right-click the last row. To rearrange rows, click the row in the step column (#) and drag it to the new position.

| |
|------------|
| Add |
| Delete DEL |
| Import |
| Export |


The **Prompt** column is the title or brief description of the input row. The **Type** column shows the input type. Clicking the type column for a particular row displays the Input Type menu.



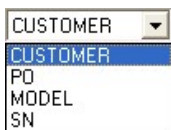
There are three different input types. **TextBox** is a simple text entry value. **CheckBox** is an On/Off value and **ListBox** is a menu that lets the user select from a list of choices. The **Initial Value** column lets you specify the initial value (TextBox text, CheckBox state and ListBox selection) that is shown when the user input step runs. To create a list for a ListBox, enter the text for the first item then press the Enter key. Repeat these steps for each additional item, then select the desired item you want as the initial choice. To remove an item from the list, first select the item then press the Delete key. You can also use the Delete key to remove the initial value for a TextBox item.

Note: A comma (",") character in a TextBox or ListBox will be replaced with a space. Always use "." for a numeric decimal separator.

Report Field

When a test sequence runs, the test report file is updated with the results. Test reports are based on template files created by MS Word. The template file used by the test report window is shown in the design window (top of this page) below the input table next to the report icon . Clicking this icon activates the test report window. Refer to the [Test Report](#) topic for more information on creating and selecting test report templates.

If the template file contains form fields, clicking the **Report Field** column in the input table displays a menu that allows you to select the form field to store the information input by the user. Items in **red** mean that field is **Undefined** in the selected template file. Either the wrong template file is selected or the file was changed and this field no longer exists. To remove a form field for a row, click the report column for that row then press the Delete key.

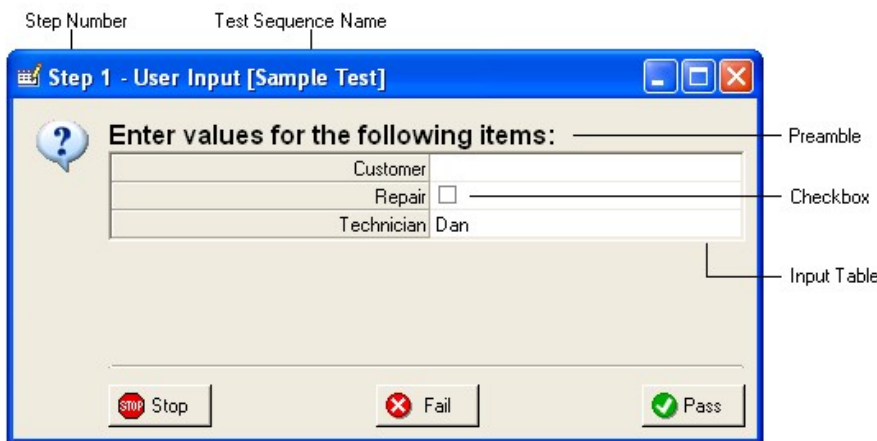


Comment

The text you enter in the **Comment** box automatically appears in the step table and test report.

User Input Window

When the test sequence runs a user input step, the user input window appears as shown below.



The **Preamble** and **Input Table** show the values from the design window. The input table is automatically filled in with initial values (including items and selection for the ListBox) if specified. Clicking a **Checkbox** toggles the checkbox state. Note that the Report Field column is not shown. This is because the value input by the user is automatically stored in the report field (if any) specified in the design window.

After the user enters the values, pressing the **Pass** button causes the test sequence to proceed with the next step. Pressing the **Fail** button stops the test with "Failed" results. Pressing the **Stop** button (similar to pressing the Stop button in the Run Toolbar) stops the test with "Stopped" results. In all three cases, the values entered by the user are stored in the test report.

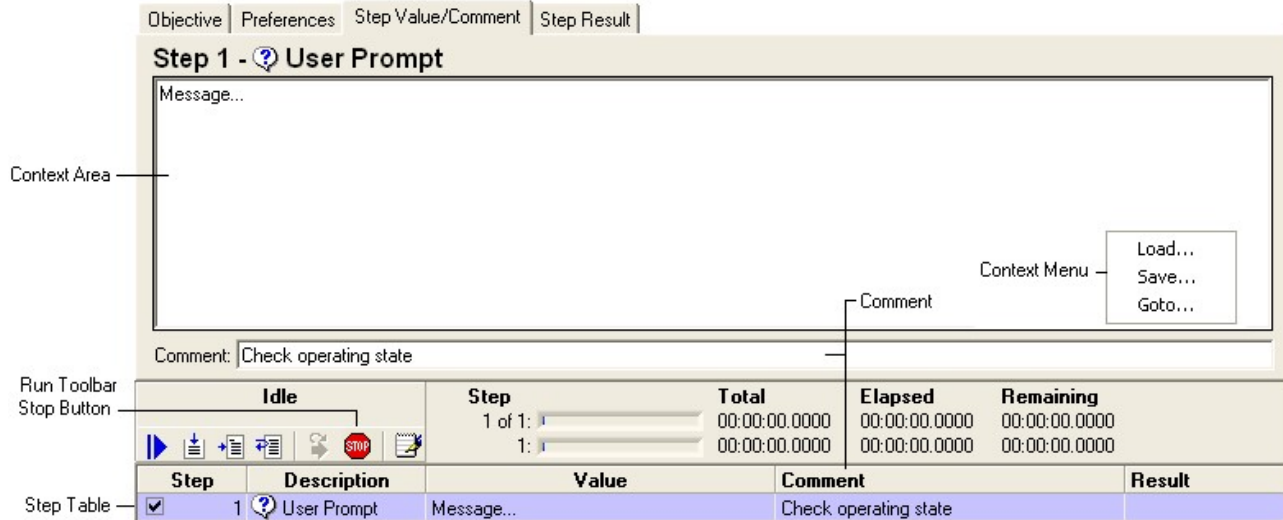
Note: A comma (",") character entered in a TextBox will be replaced with a space. Always use "." for a numeric decimal separator.

The title bar of the window shows the step number and test sequence file name. If the test sequence is part of a test plan, the test plan step number and file name are shown first.



User Prompt

The User Prompt step allows the test sequence to ask the user to perform some task such as verifying UUT operation or changing the test configuration. Shown below is the User Prompt design window.

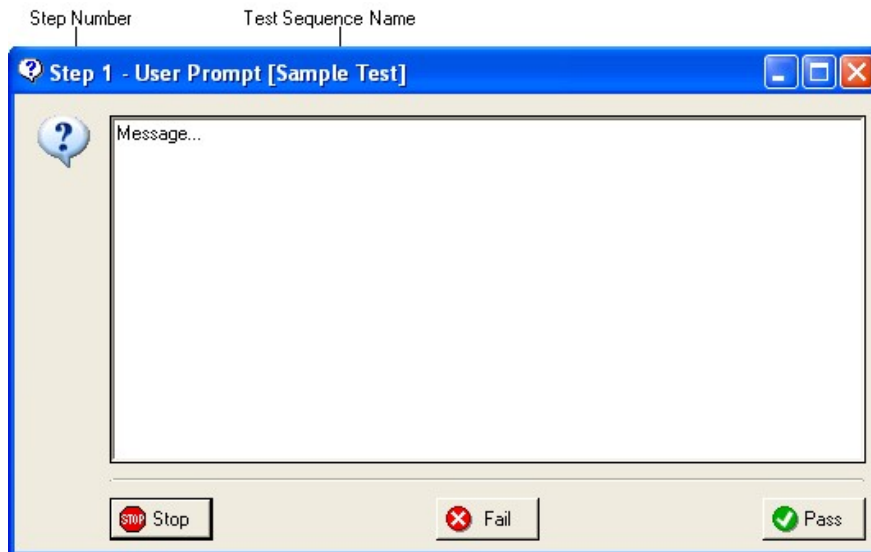


The **context area** contains the message text displayed to the user when the step runs. You can type directly into the context area or copy and paste text or graphics from another application. Right-clicking the context area displays the **Context Menu**. You can **Load** or **Save** text from a Rich Text (*.rtf) or Plain Text (*.txt) file. **Goto...** shows the current cursor location and allows you to position the cursor to a particular line and column.

The text you enter in the **Comment** box automatically appears in the step table and test report.

User Prompt Window

When the test sequence runs a user prompt step, the user prompt window appears as shown below.



Pressing the **Pass** button causes the test sequence to proceed with the next step. Pressing the **Fail** button stops the test with "Failed" results. Pressing the **Stop** button (similar to pressing the Stop button in the Run Toolbar) stops the test with "Stopped" results.

The title bar of the window shows the step number and test sequence file name. If the test sequence is part of a test plan, the test plan step number and file name are shown first.



VISA

The VISA step allows the test sequence to perform generic instrument control and monitoring. It's primarily designed for use with instruments that support message based communication using the SCPI standard. The VISA step design window is shown below.

Objective | Preferences | Step Value/Comment | Step Result | Instrument Response

Step 1 - VISA

| Resource | Value | Read/Write | Value |
|-------------------|-------|---------------------|-------|
| Interface | GPIB | Timeout (msec) | 5000 |
| GPIB Board | | Termination Char | 10 |
| Primary Address | 1 | Send END (Write) | Yes |
| Secondary Address | | Suppress END (Read) | No |
| | | Command | *IDN? |
| | | Response | Read |

Comment: Get Device ID and Serial Number

| Idle | Step | Total | Elapsed | Remaining |
|------|---------|---------------|---------------|---------------|
| | 1 of 1: | 00:00:00.0000 | 00:00:00.0000 | 00:00:00.0000 |
| | 1: | 00:00:00.0000 | 00:00:00.0000 | 00:00:00.0000 |

| Step | Description | Value | Comment | Result |
|-------------------------------------|-------------|---------------------|---------------------------------|--------|
| <input checked="" type="checkbox"/> | 1 VISA | GPIB::1::INSTR *IDN | Get Device ID and Serial Number | |

The **Resource Table** defines the interface settings used to connect to the instrument. The items shown in the resource table vary depending on the interface type you select. Clicking the "Interface" value column displays the Interface Menu.



The Interface menu lets you select from a list of hardware interfaces. You can use Measurement & Automation Explorer (MAX) available from National Instruments to view, test and configure the installed hardware and software interfaces on your PC. Note that some items in the resource table are optional and can be left blank.

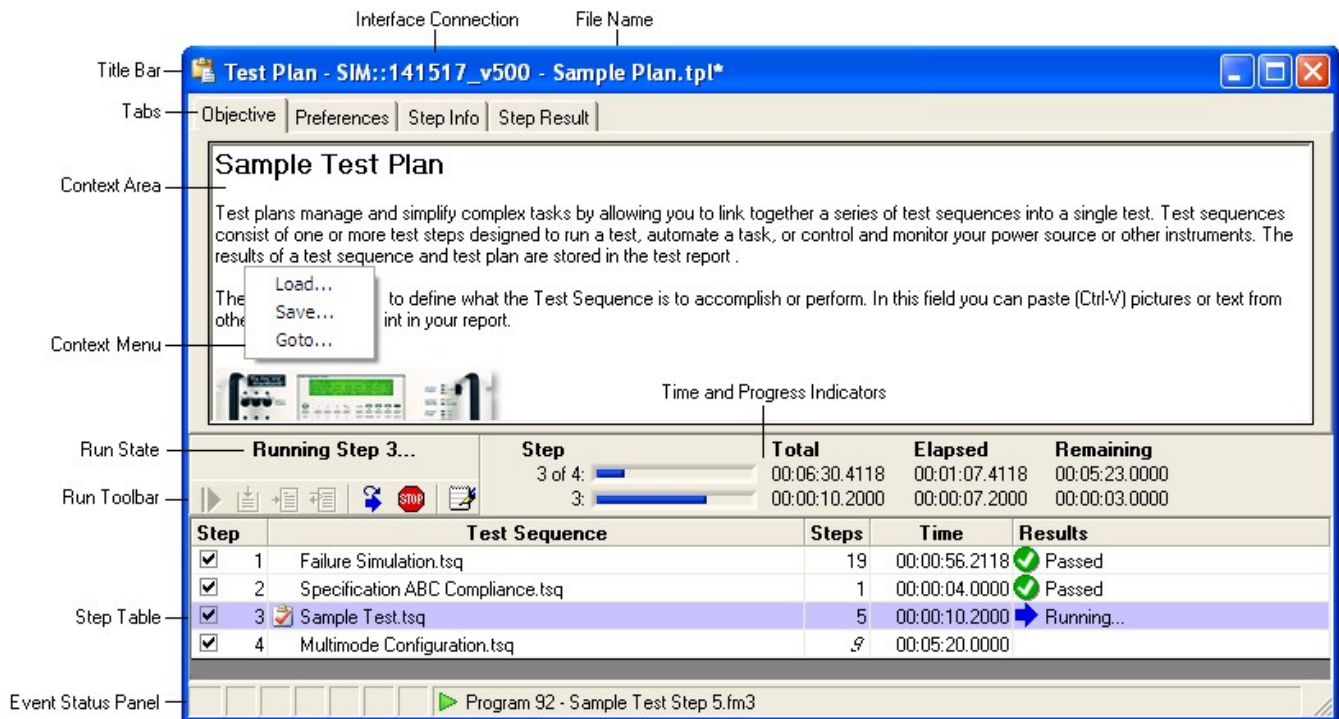
The **Read/Write Table** defines the communication settings to use with the instrument. The "Timeout (msec)" value is the maximum time the VISA step will wait for the instrument to complete the command or provide the response. The "Command" value is the command to send to the instrument. If the instrument command generates a response, choose "Read" for the response otherwise choose "None". The response is shown in the **Step Result** tab and included in the test report.

The text you enter in the **Comment** box automatically appears in the step table and test report.

Test Plan Window

Test plans manage and simplify complex tasks by allowing you to link together a series of [test sequences](#) into a single test. Test sequences consist of one or more test steps designed to run a test, automate a task, or control and monitor your power source or other instruments. The results of a test sequence and test plan are stored in the [test report](#).

When you open an existing test plan file or create a new one using the Test Manager button in the [PPSC Studio](#) window, the test plan window appears as shown below.



Title Bar

The title bar shows the interface used to connect to your PPSC and the test plan file name. An "*" at the end means the file is currently being edited and the changes have not been saved.

Objective Tab, Context Area and Context Menu

Selecting one of the tabs updates the **Context Area** with that item. In the above example, the **Objective** tab is selected. The objective is intended as a brief summary or description of the test plan and is automatically included in the test report. You can type directly into the context area or copy and paste text or graphics from another application. Right-clicking the context area displays the **Context Menu**. You can **Load** or **Save** the objective from a Rich Text (*.rtf) or Plain Text (*.txt) file. **Goto...** shows the current cursor location and allows you to position the cursor to a particular line and column.

Preferences Tab

The **Preferences** tab shown below, displays general settings and file information for the test plan.



You can protect a test plan from inadvertent changes by unchecking the **Allow Edit** checkbox. For additional security, you can assign a **Password**. Once a password is assigned, you will be prompted to enter it in order to allow editing. The **File Info** section shows the full path of the test plan database file and the last time it was updated.

The **Report Template** shows which [template](#) is used by all test sequences in this test plan. This is useful if the [test sequences](#) update form fields in the report or you want the test plan to always use a particular template. If this item is **red**, that template file is missing from the Templates folder (typically "C:\Program Files\PPSC Manager\Test Reports\Templates" or "C:\Pacific Power Source\PPSC Manager\Test Reports\Templates"). Pressing the **Load** button initializes the report with that template (if it's not already loaded). Clicking in the report template text box displays a drop-down list of template files installed on your computer that you can select. The "Manual" selection means the test sequences use whatever template file is currently loaded. An "*" means the test report has been updated and changes have not yet been saved. Note: The test plan report template overrides the report templates specified in the test sequences.

Step Info and Step Result Tabs

These tabs relate to the step selected in the step table. The Step Info tab is shown below.

Step Info

Step 1 - Failure Simulation.tsq

File Path: C:\Visual Basic Projects\UPC Settings\Test Manager\Failure Simulation.tsq
 Last Updated: 07/04/2007 18:01:38
 Total Steps: 19 Disabled Steps: 0 Total Time: 00:00:56.2118

The Step Info tab shows the full path of the test sequence database file and the last time it was updated. Test plans only contain references to test sequence files, not the actual file contents. Test plans maintain "relative" path relationships with test sequence files. This allows the test plan and test sequence files to be moved to a different location or PC, as long as the files retain the same location relative to each other.

The **Step Result** tab shows the result icon and title (Passed, Failed, Stopped, Skipped), date/time the step completed and the elapsed time the step completed from the beginning of the test. If a step fails, the results also include the error description.








Run State

The Run State section above the Run Toolbar shows the current status of the test. The various run states are shown below.

| | |
|--------------------------|--|
| Idle | No test or steps have completed or are currently running. |
| Running Step n... | Step "n" is currently running. |
| Stopped | The test was stopped. The results column in the step table shows which step was stopped. A test is stopped by pressing the Stop button in the run toolbar or the Stop button in a User Prompt , User Input or Transient Prompt dialog box. |
| Failed | The test failed. The results column in the step table shows which step failed. Click in the results column for that step to view additional information. |
| Done | The test or selected step(s) have successfully completed. |

Run Toolbar

The table below describes the buttons in the Run Toolbar. Some items (like **Run Step**) require one or more selected rows in the step table. Running a step runs the entire test sequence for that step. To run an individual step in a test sequence, open the test sequence file (double-click it in the test plan step table), then use the run toolbar in the [test sequence window](#).

-  **Start** - Clears the test report then runs the entire test starting from step 1 (regardless of which step is currently selected).
-  **Continue** - Resumes the test starting with the currently selected row (step). The test continues to the last step.
-  **Run Step** - Runs the selected step(s) then pauses. Run Step is convenient for testing and troubleshooting.
-  **Run To Next** - Runs the selected step. When the step completes, the test pauses with the next row selected. Run To Next allows you to "single step" through a test sequence.
-  **Show Running Step** - When a test is running, pressing this button selects and shows the currently running step, scrolling the step table if necessary.
-  **Stop** - Stops the test and disables the power source output.
-  **Show Report** - Shows the [test report](#) window

Running a test using **Start** first initializes the test report then appends the test data to the report after each step completes. This creates a clean test report each time the test is run. Running a test using the other controls does not first clear the test report, making it easier to troubleshoot (single step etc) a test.

Time and Progress Indicators

The upper time and progress indicator shows the values for the entire test (all enabled steps) and the lower one shows the values of the selected step(s). The total time values update as step rows are selected making it easy to see when that step begins relative to the start of the test, even if a test is not running. The total time values take into account if step rows are not enabled (step checkbox not checked). Time and progress indicators are updated as the test runs. Step times are estimates based on the test sequence and system performance. Time values are shown in HH:MM:SS.SSSS format. The actual elapsed time of each step is recorded in the test report.

Step Table

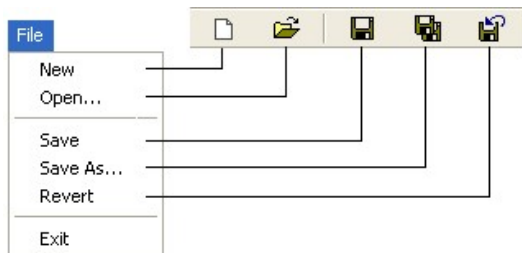
Refer to the [Step Table](#) topic for more information.

Event Status Panel

Refer to the [Event Status Panel](#) section for more information on these items.


File Menu and Toolbar

The file menu and MDI toolbar (shown below) allow you to create a **New** test plan, **Open** an existing file, **Save** or **Save As...** (to a different file) or **Revert** the test plan to the last saved version. The Save and Revert items are only enabled if the test plan has been edited but not yet saved (the file name in the title bar shows an "*" at the end).



Test Plan Step Table

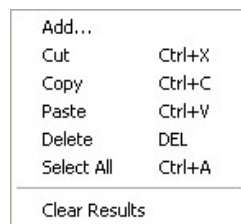
The step table shown below appears at the bottom of the [Test Plan window](#). The steps in the table are links to test sequence files stored in the Test Manager folder (Typically "C:\Program Files\PPSC Manager\Test Manager" or "C:\Pacific Power Source\PPSC Manager\Test Manager"). Double-clicking one of the test sequence files in the table opens the [test sequence window](#), allowing you to view or edit the values.

| Step | Test Sequence | Steps | Time | Results |
|---------------------------------------|---|-------|---------------|---------|
| <input checked="" type="checkbox"/> 1 | Failure Simulation.tsq | 19 | 00:00:56.2118 | |
| <input checked="" type="checkbox"/> 2 | Specification ABC Compliance.tsq | 1 | 00:00:04.0000 | |
| <input checked="" type="checkbox"/> 3 |  Sample Test.tsq | 5 | 00:00:10.2000 | |
| <input checked="" type="checkbox"/> 4 | Multimode Configuration.tsq | 9 | 00:05:20.0000 | |

File Status Icon

Adding or Removing Steps

If you right-click in the step table, the step context menu appears as shown below.



The menu items apply to the currently selected step(s). New steps are added or pasted after the selected step. To add a step at the beginning, first click the table header. To add a step at the end, first select the last step or click the blank area at the bottom of the table. The items in the step context menu are described below.

- Add** Displays a file open dialog box. The test sequence file you select is added to the table.
- Cut** Copies the selected steps to the clipboard and then deletes them from the table.
- Copy** Copies the selected steps to the clipboard.
- Paste** Pastes the clipboard after the selected step.
- Delete** Deletes selected steps.
- Select All** Selects all steps.
- Clear Results** Clears the results column of the selected steps.

Step Table Columns

The columns in the step table are described below.

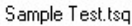
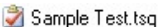

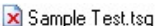

- Step** Step enable checkbox and step number. Steps that aren't checked are skipped when the test sequence runs. Unchecking a step is a convenient way to temporarily disable a step while troubleshooting or reconfiguring a test.
- Test Sequence** Shows the **File Status Icon** and test sequence file name. Refer to the test sequence file status section below for

more information.

| | |
|---------------|---|
| Steps | The total number of steps in the test sequence. Numbers in <i>italic</i> mean the test sequence contains one or more disabled steps. |
| Time | The time estimate to run the test sequence. |
| Result | Shows the results state (Pass, Fail, Stopped, Skipped) the last time this step was run. It also shows if a step is currently running. Clicking in the results column for a particular step automatically selects the Step Result tab in the test plan window, providing additional information. |

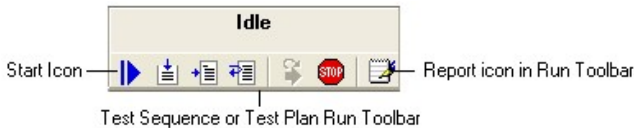
Test Sequence File Status

The test sequence file status is shown in the **Test Sequence** column of the step table. The table below shows the status of various conditions.

| | |
|---|---|
|  | The test sequence file exists but is currently not loaded. |
|  | The test sequence file is currently loaded. Test sequence files are automatically loaded when they are run or opened (double-click). |
|  | The test sequence file is loaded and currently being edited (*). |
|  | The test sequence file is missing. Use the Step Info tab in the main test plan window to view the file path the test plan expects. |
|  | The test sequence contains invalid values or values not supported by your power source. Double-click the file to view or edit the values (opens test sequence window). Note that the test plan only checks for invalid or unsupported values when the test sequence loads or runs. |

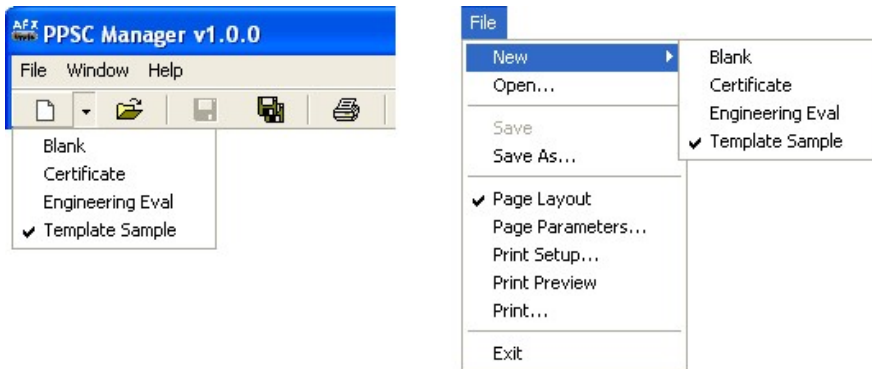
Test Report

The Test Report window allows you to view and print test reports created by a test sequence or test plan. To access the test report window, click the **Report icon** in the **Run Toolbar** in the [Test Plan](#) or [Test Sequence](#) window.

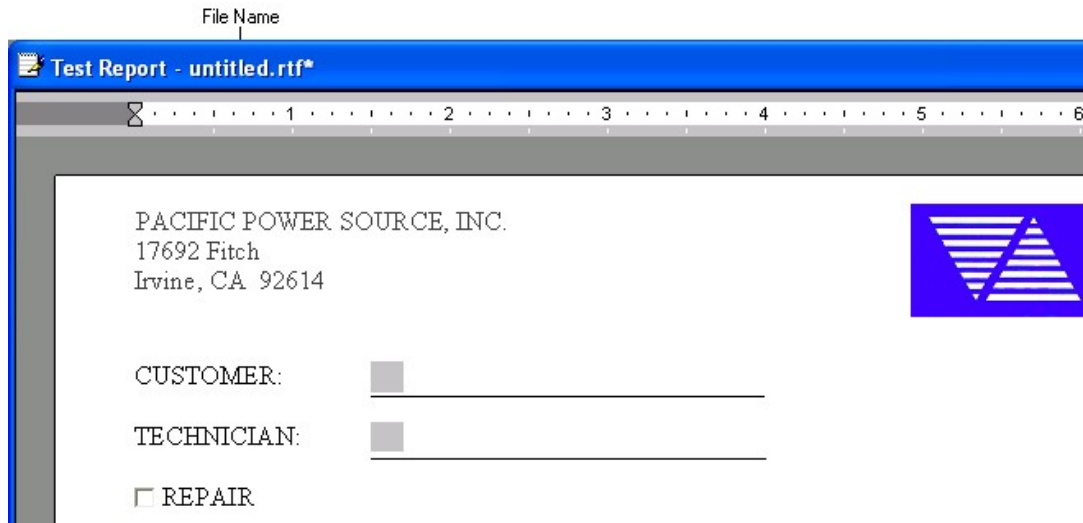


Toolbar and File Menu

The top of the test report window includes a File menu and toolbar as shown below.



The **New** item allows you select one of the template files stored in the Test Report template folder (typically "C:\Program Files\PPSC Manager\Test Reports\Templates" or "C:\Pacific Power Source\PPSC Manager\Test Reports\Templates"). You can use MS Word to create RTF files to use as test report templates. Template files can be blank or contain introductory text, graphics, form fields, page/paragraph/character formatting, page header and footer (page numbering, date etc). Selecting a new template file or pressing the **New** button creates a new test report based on that template file. The form field names you assign in MS Word (field bookmark) are the form fields that are available to the [User Input](#) step. A sample test report initialized from a template file is shown below.



The **Open** item in the File menu and toolbar allows you to open an existing test report to view or print. The **Page Layout** and **Print** items allow you to configure the page properties for view and printing. The **Save** item is enabled after the test has run allowing you to save it to a file. **Save As** is used to save a new test report for the first time or save an existing report to a different file.

Test Results

Running a test sequence or test plan appends the results of each step at the end of test report. Running a test sequence from the beginning (using the **Start icon** in the **Run Toolbar**) initializes the test report from the selected template file then adds the test sequence Objective and Preferences. This creates a clean report each time the test sequence is run. Running a test sequence using the other controls does not clear the test report or add the Objective or Preferences, making it easier to troubleshoot (single step etc) a test.

After each step runs, the information about that step is appended to the test report as shown below. This information includes the **Title**, **Value**, **Comment**, **Result** and **Data** of each step.

Title — **Step 2** - **Meter [Sample Test]**
 Type: V, I, F, Power Form: 3 If Outside Limits: Fail Samples: 1 Interval: 1.0 sec

Value —

| Phase | Vrms | Irms |
|-------|-------------------------------|------------------|
| A | Yes < 120.500 > 119.500 | Yes <= 25.000 |
| B | Yes < 120.500 > 119.500 | Yes <= 25.000 |
| C | Yes < 120.500 > 119.500 | Yes <= 25.000 |

Comment — **Comment** Check Volts and Amps

Result — **Passed - 07/25/2007 14:51:18 [Elapsed Time HH:MM:SS = 00:00:01.9414]**

Data —

| Phase | Vrms(L-N) | Irms |
|-------|-----------|-------|
| A | 120.000 | 0.000 |
| B | 120.000 | 0.000 |
| C | 120.000 | 0.000 |

Title includes the enable checkbox, step number, icon, type and test sequence file name. **Value** and **Comment** are the test sequence information from the **Step Value/Comment** tab (design window). **Result** shows the result icon, title, date/time the step completed and the elapsed time the step completed from the beginning of the test. Note that not all steps produce data. The data also includes any errors that occurred running the step. **Result** and **Data** are also shown in the **Step Result** tab in the [test sequence window](#) .

Test Plan Step Title

When a test sequence is part of a test plan, the step **Title** in the test report shows both the test plan and test sequence step numbers and file names.

Test Plan Step Number Test Plan File Name

Step 1.2 - **Meter [Sample Plan] [Sample Test]**

Test Sequence Step Number Test Sequence File Name

Controlling Report Information

A [Script](#) can use the TM.StepReportFlags method to control the information added to the test report for any step. The default setting is to include all information (Title, Value, Comment, Result, and Data).

Introducing PPSC Control

The PPSC Control window allows you to directly control your PPSC through the remote interface. In addition, you can monitor the status of your power source and view metered values like output voltage, load current, waveforms and harmonics. [PPSC Studio](#) also allows you to access all items in the PPSC Control window.

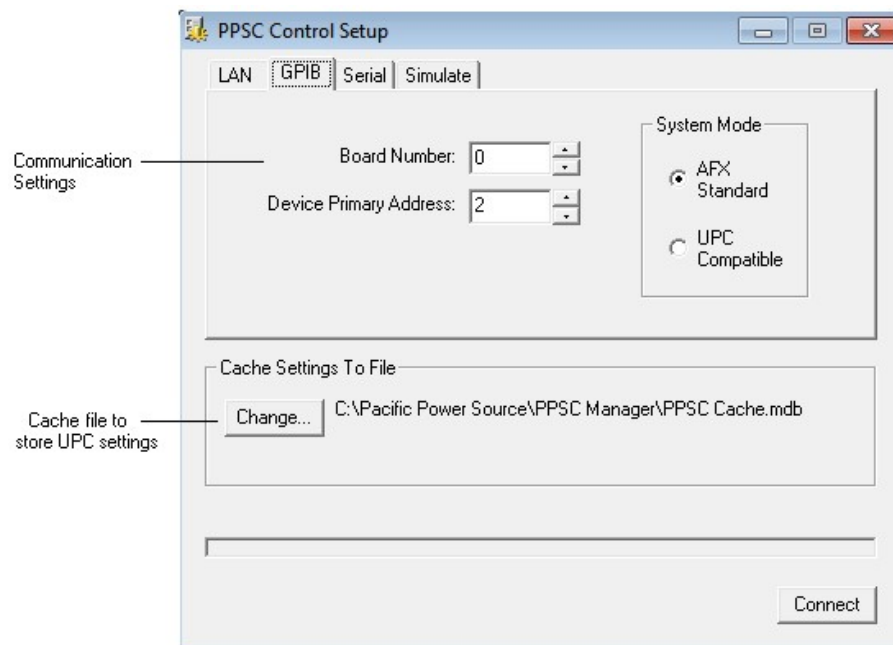
Note: Because PPSC Control allows you to make immediate changes to your power source, you should carefully consider the effects changing a particular setting (e.g. output voltage) may have. To minimize problems, you should instead use [PPSC Studio](#) to control your PPSC. PPSC Studio provides many safeguards and guides you into entering values that are appropriate for your power source.

Use the [PPSC Control Connection Setup](#) window to connect to your PPSC.

PPSC Control Connection Setup

Before PPSC Control can communicate with your PPSC, you must specify the interface connection. The steps below describe how to connect to your PPSC.

1. Press the **PPSC Control** icon in the [toolbar](#)
2. The **PPSC Control Setup** window appears as shown below. In this example, the **GPIB** interface tab was selected. Click on the tab corresponding to the interface connection of your PPSC then enter the appropriate communication settings. You can view or change the remote interface settings currently programmed in your PPSC by pressing **Fn 3,3** on the PPSC front panel.
3. Specify the cache file that will be created when controlling your PPSC. The default cache file name automatically assigned for you should be fine for most applications.
4. After you specify the appropriate connection settings, press the **Connect** button.

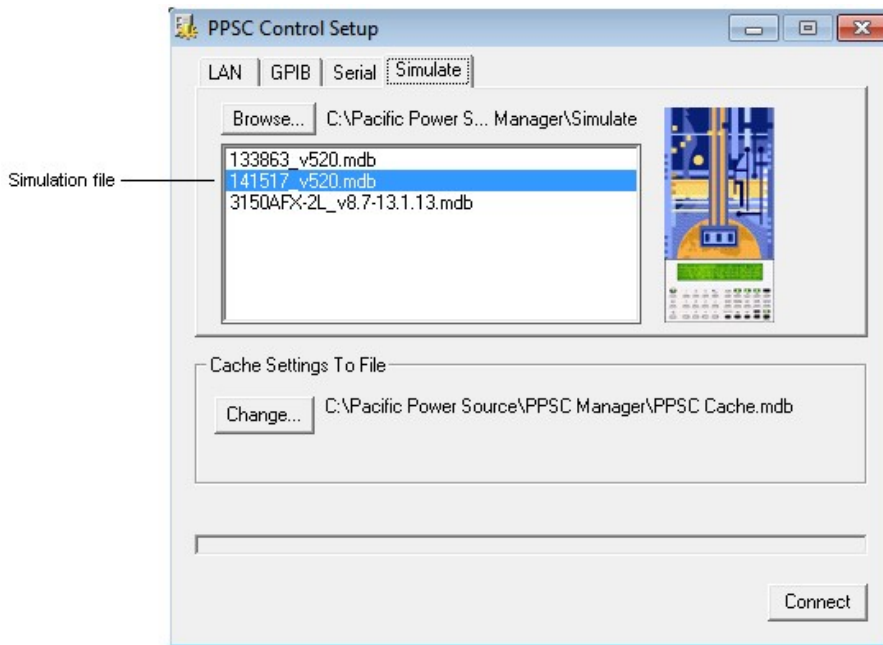


The progress of connecting is shown in the window. When the connection process completes, the [PPSC Control](#) window appears. Also a [PPSC Meter](#) window appears that allows you to view all PPSC measured values.

Simulation Mode

In addition to being able to connect to your PPSC using either a GPIB or Serial interface, you can connect to a virtual PPSC using a simulation file. Simulation files are nothing more than PPSC Settings files and can be created using the [Read PPSC Settings](#) icon in the toolbar. Simulation files should be stored in the "Simulate" folder located in the same directory as the PPSC Manager application (typically "C:\Program Files\PPSC Manager\Simulate" or "C:\Pacific Power Source\PPSC Manager\Simulate").

Simulation files are handy if you want to run your PPSC "off-line". You can then upload your changes to your PPSC using the [Write PPSC Settings](#) icon in the toolbar. Shown below is an example of the PPSC Control Setup window with the Simulate tab selected.



PPSC Control Window

After you connect to your PPSC using the [PPSC Control Setup](#) window, the title bar of the window shows the interface connection and the cache file name you specified. The PPSC Control window is similar to the [View/Edit PPSC Settings](#) window except changes you make immediately take affect. Another difference is there is now a [Control and Event Panel](#) at the bottom of the window. A series of **tabs** at the top of the window displays panels related to various PPSC settings.

Operation

The **PPSC Control** window automatically sends values as you update them, then immediately queries them to verify. Initially after connecting to your PPSC, none of the programs, waveforms or setup values are read. When you first select a panel (or item), the PPSC Control window notes that this view has not been queried, so it sends the necessary commands to your PPSC to read the values. These values are then stored in the **cache file** specified in the [Connection Setup](#) window. The cache file minimizes the communication activity with your PPSC, increasing the navigation speed of the views. The **PPSC Control** window uses the stored values in the cache file to display the items in the various panels. You can manually update the cache file by pressing the **Refresh** button located in the control panel at the bottom right of the window. This forces fresh values to be read from your PPSC. This normally isn't necessary unless you change a value using the PPSC front panel, causing PPSC Control to get out of sync.

Click in the list below for more information on the various panels in the PPSC Control window.

Info (shown below)

[Setup](#)

[Programs](#)

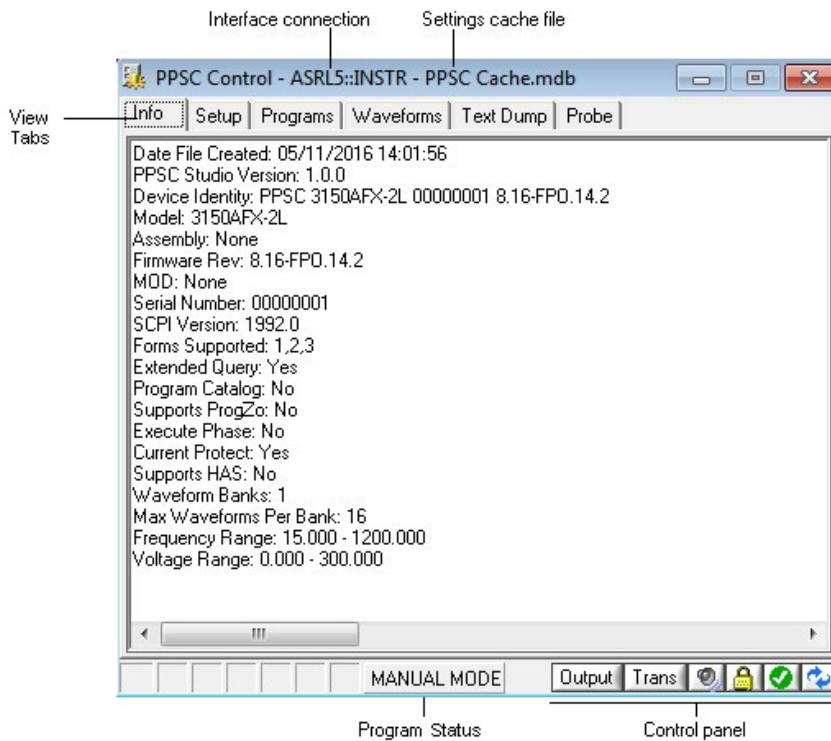
[Waveforms](#)

[Text Dump](#)

[Probe and Capture](#)

Info Panel

The **Info panel** is the initial tab selected after you connect to your PPSC. The Info panel shows basic information and capabilities about your PPSC. Some of the items like "ProgZo", "Execute Phase" and "Current Protect" are related to a particular firmware MOD or assembly. Firmware MODs are customer specific options that are installed at the factory. Some features are not supported by older firmware versions and are shown in **red**. Refer to the [Firmware Versions](#) section for information about features not supported by older firmware.



Refer to the [Control and Event Panels](#) section for more information on these items.

Setup Panel

The window below shows the [PPSC Control](#) window with the Setup tab selected. If certain items are grayed, it means your PPSC does not support that feature. Items shown in red indicate the firmware in your PPSC does not support querying that value. Refer to the [Firmware Versions](#) section for information about the defaults PPSC Manager substitutes for these values.



Refer to the [Control and Event Panels](#) section for more information on these items.

Programs Panel

The Programs panel in the [PPSC Control](#) window allows you to view or change any program stored in your PPSC including the Manual Mode

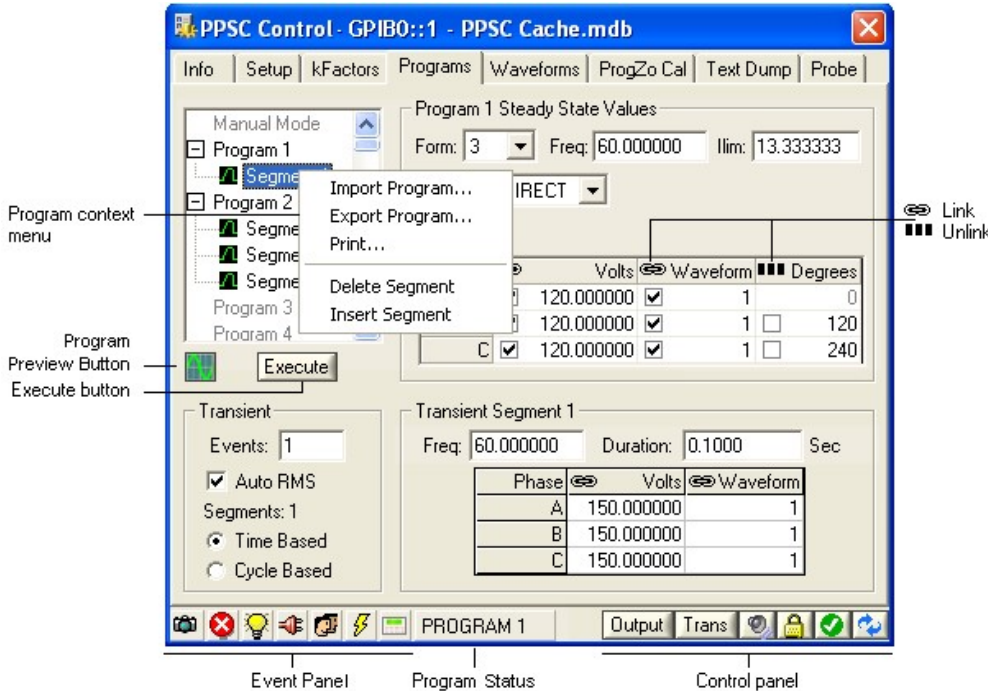
values. Select one of the programs in the list to view the steady state and transient values. If a particular program is not stored, the steady state and transient items do not appear when that program is selected. Stored programs are typically shown in black text and gray text means no program is stored at that location. With older versions the firmware, PPSC Control cannot determine in advance which programs are stored until you select it. Clicking the **Execute** button executes the selected program.

You can right-click a program in the list to display the **Program Context Menu**. This menu allows you to create or delete a program, import or export a program from a file, print text values of the program to your printer or add a transient.

When you right-click a transient segment, the program context menu also allows you to delete the selected segment or add a new one. The transient button in the Control panel at the bottom right of the window will trigger the transient. Note that you must first execute a program before triggering it's transient. Also, the Manual Mode program cannot contain a transient.

The **Link/Unlink** icon is available for certain columns in the tables. This allows you to set the values for all phases independently or as a group. To change **Link/Unlink**, click in the column header. You can also selectively link items using the row checkboxes.

The **Program Preview** button is described in the [Program Preview](#) section.



Refer to the [Control and Event Panels](#) section for more information on these items.

Waveforms Panel

This Waveforms panel in the [PPSC Control](#) window allows you to view or change waveforms in your PPSC. The thumbnail buttons on the left of the window select which waveform is displayed. If you right-click a button, a menu appears that allows you to import or export that waveform from a file or print the waveform. Note that the selected waveform is overwritten when you import a waveform. Also, waveform 1 (sine wave) is reserved so you cannot **Import** it.

If you right-click on the waveform graph, a menu appears that allows you to select the cursor and pan or zoom options. When **Cursor** is checked, a vertical line appears in the graph that tracks the mouse movement with annotation text showing the phase angle (degrees) and amplitude in percent.

The pan and zoom options control the mouse behavior when you click and drag the mouse over the waveform. The **Default** item restores the **Pan** and **Zoom** state to their normal values (100%, centered).



Refer to the [Control and Event Panels](#) section for more information on these items.

Text Dump Panel

The file format of the PPSC Control cache file is Microsoft Access Database (*.mdb). The Text Dump panel allows you to view the entire contents of the cache file in text format. Since you are viewing the contents of the cache file, only those items that have been refreshed will be shown.

The **Save** icon in the [toolbar](#) allows you to save the cache file to a text file (*.rtf). You can then open it in a word processor. Use the **Print** icon in the [toolbar](#) to print the contents of the Text Dump panel.



Refer to the [Control and Event Panels](#) section for more information on these items.

Probe and Capture Panel

The **Probe** tab in the [PPSC Control](#) window allows you to send commands and queries to your PPSC. To probe your PPSC:

1. Click on the **Probe** tab in the PPSC Control window.
2. The **Probe panel** appears as shown below.
3. Select an existing command or query from the **Command/Query Strings** drop-down control. You can add a new item to the list by typing in the string and pressing <Enter>. To remove a string, select that item then press the <Delete> key. Refer to the PPSC Operation Manual for a complete list of all commands and queries.
4. Once you have selected or entered the desired command or query string, press the **Command** or **Query** button. Make sure you press the correct button based on whether the string is a command or query otherwise you will get an error (most likely a timeout).
5. The results of a query are saved in **Received String**. The elapsed time the command or query took is also shown.

Command/Query Capture

You can also use the Probe panel to capture commands and queries sent by PPSC Manager as you activate the various controls and buttons in the other panels (like **Programs** or **Setup**). Simply click the **Capture Control** to activate capturing. A small capture icon appears in the lower left of the event panel. You can then select other panels to access controls and enter values. These commands and queries are saved in the Probe panel and are stored in the **Capture Results** section. The **Red** text is the command/query and the **Blue** text is the response.

Results Context Menu

When you right-click on the Query or Capture Results, a menu appears allowing you to clear the results or save it to a text file.

Import/Export Context Menu

When you right-click on "Send String:", an Import/Export menu appears. Use this to load or store the command query strings to or from a file.




Control and Event Panels


The Control and Event panels are located at the bottom of the [PPSC Control](#) window as shown below:





Control Panel


The **Control Panel** is at the bottom right of the PPSC Control window. The purpose of these buttons are described below:


 This shows that the output power is OFF. Pressing this button turns the output power ON.


 This shows that the output power is ON. Pressing this button turns the output power OFF.


 This shows that the steady state program values are executing. Pressing this button triggers the transient portion of the program currently executing. If the program does not contain a transient, pressing this button will cause an error.


 This shows a transient is executing. Pressing this button stops the transient and resumes steady state operation.


 This shows a Ramp is executing. Pressing this button stops the Ramp and resumes steady state operation.

 Pressing this button beeps the built-in PPSC speaker.

 This shows that **Local Lockout** is in **Lockout** mode. This prevents you from using the PPSC keyboard or viewing V/I meter data on the LCD. Pressing this button changes the state to **Local** mode as described below.


 This shows that **Local Lockout** is in **Local** mode. This allows you to use the PPSC keyboard and LCD. Note that if you change values using the PPSC keyboard, you should refresh the view in the PPSC Control window that contains that setting. Pressing this button changes the state to **Lockout** mode as described above.


 Pressing this button queries your PPSC and updates the event panel status and state of the buttons in the Control panel.


 Pressing this button queries your PPSC and refreshes the items in the current panel. If the current panel is **Programs** or **Waveforms**, then the selected program or waveform is queried and the view updated.


Event Panel


The **Event Panel** is at the bottom left of the [PPSC Control](#) window. Except for the **Capture** icon, these icons are normally updated as you change settings or after you execute a program or you press the **Status** button in the Control panel. Later versions of PPSC firmware poll the status of your PPSC and automatically update these icons. These icons indicate a particular event occurred and they remain latched until you clear them by clicking on that icon.


 This icon means that Command/Query [capture mode](#) is on. Click this icon or press the "Probe" tab to view the commands and queries that have been sent to the PPSC or to turn Capture mode off.


 This icon means an error occurred. A message box also appears describing the error. This event is automatically cleared when you close the message box.


 This icon means a power-on event has occurred with your PPSC. You should normally disconnect (close) PPSC Manager first before turning on/off you PPSC. This event can alert you that one or more settings may have been changed and that you should refresh the affected views.

 This icon means the power source has shut down due to an output overload condition.

 This icon means the PPSC was operating in the **Local** mode and someone pressed the Local/Remote key on the PPSC front panel. This event can alert you that one or more settings may have been changed and that you should refresh the affected views.

 This icon means the PPSC output was turned off because the output current or voltage exceeded the programmed threshold.

 This icon means the remote interface is unavailable because your PPSC is not in the V/I Display mode. Press the "Clear" or "Display" buttons on your PPSC keyboard to return to the V/I Display screen.

 This icon means the remote interface is not responding. This can be because your PPSC is turned off or the interface cable is disconnected.


Program Status

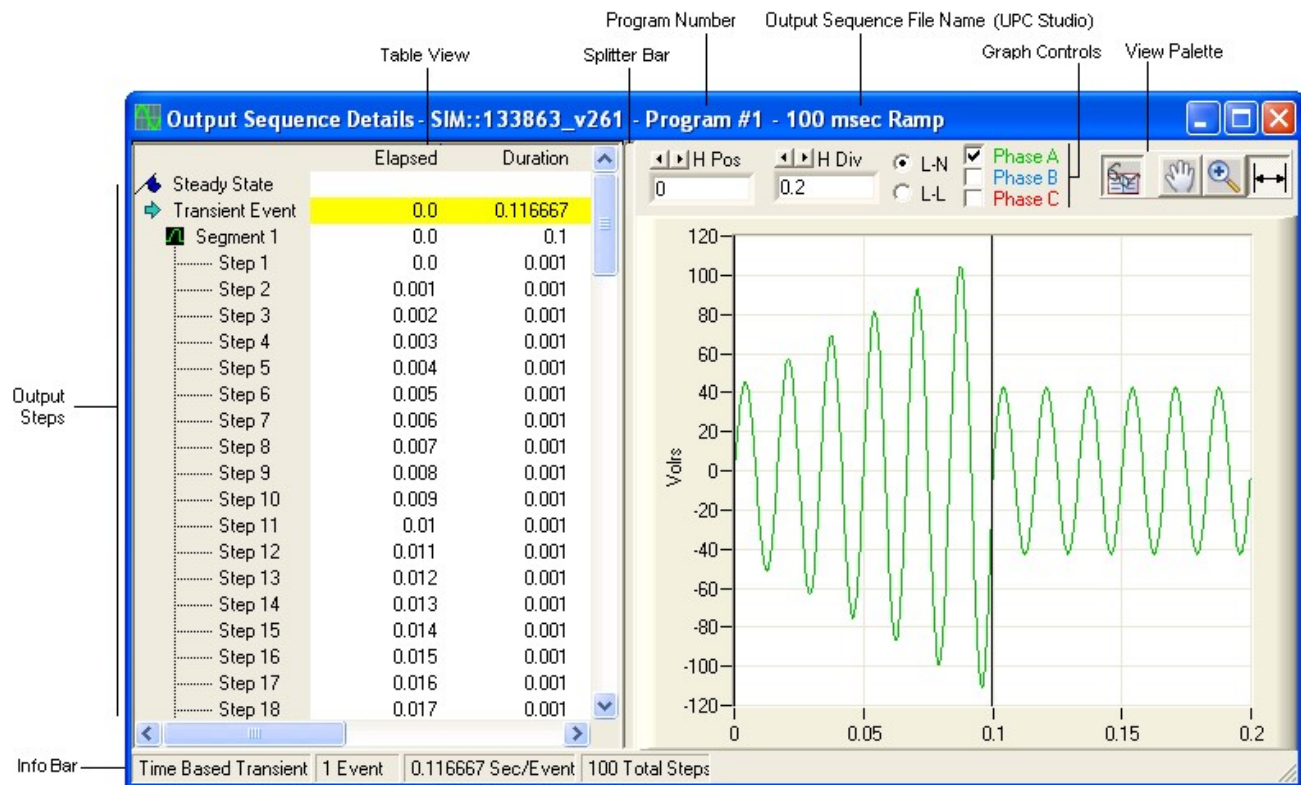
The currently executing program is shown at the bottom of the window. This information is normally updated after you execute a program in the Programs panel.

Note: Program status is not supported by older versions of the [firmware](#) .

Program Preview

The **Program Preview** window allows you to view a simulation of the actual waveforms generated by your PPSC. To preview a program:

1. [Open a settings file](#) or connect to your PPSC using [PPSC Control](#) or [PPSC Studio](#) .
2. Click on the [Programs panel](#) to view the available programs then select the program you want to view. For PPSC Studio, open an output sequence or program in the [Output Sequence Browser](#) .
3. Press the **Program Preview** button  . For PPSC Studio, click the **Details** button in the [Output Sequence](#) window.
4. The **Program Preview** window will appear as shown below:



View Palette



This button turns the Table View On or Off



When this button is depressed, the graph pans horizontally when you click and drag the mouse in the graph view.



When this button is depressed, the graph zooms-in horizontally (magnifies) when you click in the graph view. If you press and hold the shift key, the graph zooms-out (reduces) when you click the mouse in the graph view.



When this button is depressed, the cursors are positioned to that step or segment. The corresponding row in the table view is also highlighted.

Splitter Bar

The Splitter Bar allows you to adjust the relative sizes of the table and graph views. To use the Splitter Bar, position the mouse anywhere on the bar and click and drag the bar to the desired position. The splitter bar is not available if the table view is turned off.

Table View

The table view is displayed when the Table View icon is pressed in the View Palette. The left half of the window shows a table containing the items related to that program. The table columns show the elapsed time (running time), the duration of that item, and the output waveform frequency and voltage.

Steady State

The Steady State program values in the table are always shown in the first row of the table view. Steady state values always begin and end with the Phase A positive zero crossing. If the program does not contain a transient then the next row again shows the steady state values. This provides a cursor reference point in the graph at the Phase A zero crossing.

Transient Event

If the program contains a transient, then the next row in the table summarizes a single transient event. Note that programs can contain an infinite number of transient events. Since multiple transient events are simply repeats, only the first event is shown. The "Transient Pedestal" output signal from your PPSC (J5-3) is active for the duration shown by the **Transient Event** row.

Segments

Segments describe the program transient. The segments listed in the table are the same segments show in the [Programs panel](#) .

Steps

In order to smoothly perform the desired voltage or frequency change specified in a segment, the PPSC firmware breaks each segment into discrete steps. There can be up to 100 steps in a segment. The detailed voltage and frequency values the PPSC firmware calculates for each step is shown in separate rows in the table.

Graph View and Controls

The right half of the window shows a graphical representation of the **Output Steps** . The graph is a simulation of the actual PPSC waveforms created by the selected program.

Graph Cursors

Each time you click on a row in the table view, the cursors are automatically positioned in the graph relating to the start and end time of that row. Similarly, when you click on an arbitrary place in the graph, the row relating to that item is automatically highlighted in the table view.

Graph HPos and HDiv

These controls allow you to pan and zoom the time axis of the graph. The values are in seconds. The **HPos** (Horizontal Position) can be positive or negative. Negative time values always refer to the steady state portion of the program.

L-N and L-L

These controls allow you to view the waveforms as Line-Neutral or Line-Line.

Navigation

In addition to using the mouse, you can use the arrow keys to navigate through the table rows. The arrow keys also change the cursors in the graph and scroll the graph view as necessary.

Phase Checkboxes

These checkboxes allow you to show or hide a particular phase.

Info Bar

The **Info Bar** shown at the bottom of the **Program Preview** window shows details related to the selection.

Printing and Exporting

You can print the graph or export the output steps to a file. Right click the mouse in the table or graph and a context menu appears.

Updating Values

Anytime you change values in the [Programs panel](#) or [Output Sequence](#) window , the **Program Preview** window is automatically updated.

Printing

Once you connect to your PPSC, you can press the **Print** icon in the [toolbar](#) to print the contents of the PPSC Control window. The entire contents of the cache file will be printed including graphs for the waveforms. Since you are printing the contents of the cache file, only those items that have been refreshed will be printed. The [Programs](#) and [Waveforms](#) panels also allow you to print a selected program or waveform.

Saving

The file format of the PPSC Control cache file is Microsoft Access Database (*.mdb). The **Save** icon in the [toolbar](#) allows you to save the cache file to a text file (*.rtf). You can then open it in a word processor. The [Programs](#) and [Waveforms](#) panels also allow you to save (export) a selected program or waveform.

PPSC Meter V/I Display

The **PPSC Meter** window is shown below. This window is automatically displayed after connecting to your PPSC using either [PPSC Studio](#) or [PPSC Control](#). The type of information displayed in the PPSC Meter window depends on the Toolbar Display button selected. The date and time the last measurement was completed is shown in the title bar of the window.

V/I Display

The first time the PPSC Meter window is opened, the default view is the V/I Display and metered values are automatically updated. Subsequently, you must click the **Refresh** button to update the values. The format of the V/I Display Table depends on the power source output Form currently executing.

Labels in the image:

- V/I Display Button
- V/I Display Menu
- Measurement date and time
- Refresh button
- Measurement Templates
- V/I Display Table

| Function | Phase A | Phase B | Phase C |
|-----------|---------|---------|---------|
| Vrms | 120.171 | 120.171 | 120.171 |
| Vrms(L-L) | 204.133 | 204.133 | 204.133 |
| Irms | 6.468 | 6.468 | 6.468 |
| Ipeak | 9.173 | 11.187 | 6.480 |
| Icrest | 1.416 | 1.727 | 1.002 |
| KW | 0.780 | 0.779 | 0.777 |
| KVA | 0.780 | 0.779 | 0.777 |
| PF | 1.000 | 1.000 | 1.000 |
| Frequency | 60.000 | 60.000 | 60.000 |
| Degrees | 0 | 120 | 240 |

Refresh and Toolbar Display Buttons

The various buttons in the toolbar are described below:



This queries your PPSC for the meter values specified by the selected toolbar button as described below. It then updates the values shown in the window.



This button selects the volt/amp metered values shown above. These values also include the output power, power factor and frequency.

V/I Display Menu and Measurement Templates

The V/I Display button must be pressed before you can access the V/I Display Menu. This menu allows you to start/stop data logging and select **measurement templates**. Measurement templates are files that define which measurements are made during [data logging](#) or when refreshing the V/I Display Table. These files are located in the Templates folder (typically "C:\Program Files\PPSC Manager\Meter Data\Templates" or "C:\Pacific Power Source\PPSC Manager\Meter Data\Templates"). You can edit or create these files. Shown below is a sample template file opened in Microsoft Excel:

| | A | B | C | D |
|----|--|---------|---------|---------|
| 1 | # Pacific Power Source VI Meter Template | | | |
| 2 | # "1" = Measure 0 = Skip" | | | |
| 3 | | | | |
| 4 | Function | Phase A | Phase B | Phase C |
| 5 | Vrms (L - N) | 1 | 1 | 1 |
| 6 | Vrms (L - L) | 0 | 0 | 0 |
| 7 | Irms | 1 | 1 | 1 |
| 8 | Ipeak | 0 | 0 | 0 |
| 9 | Icrest | 0 | 0 | 0 |
| 10 | KW | 0 | 0 | 0 |
| 11 | KVA | 0 | 0 | 0 |
| 12 | PF | 0 | 0 | 0 |
| 13 | Frequency | 0 | 0 | 0 |
| 14 | Degrees | 0 | 0 | 0 |

Rows 4-13 correspond to the rows and columns in the V/I Display Table. Only cells with a "1" will be measured as shown below:

| Function | Phase A | Phase B | Phase C |
|-----------|---------|---------|---------|
| Vrms(L-N) | 120.603 | 120.465 | 120.219 |
| Vrms(L-L) | | | |
| Irms | 6.484 | 6.482 | 6.472 |
| Ipeak | | | |
| Icrest | | | |
| KW | | | |
| KVA | | | |
| PF | | | |
| Frequency | | | |
| Degrees | | | |

Measurement Template Notes:

- Template file names must use a *.csv extension. Only template files stored in the ...\\Meter Data\\Templates folder appear in the menu. The name shown is the file name without the extension. Files you copy or create automatically appear in the menu the next time you click it.
- The actual rows and columns displayed in the V/I Display Table depend on the output Form.
- The Phase B and C columns in the template file are ignored (not measured) for Form 1 and 2.
- For Form 1, the Vrms(L-L) row is not displayed. The Vrms(L-N) template file row controls the Form 1 V/I Display Table Vrms value.
- For Form 2, the Vrms(L-N) row is not displayed. The Vrms(L-L) template file row controls the Form 2 V/I Display Table Vrms value.
- The fewer the measured values, the faster the measurement speed (this mostly affects data logging).
- For the **Frequency** row, the Phase A template file cell controls all phases shown in the V/I Display Table.

File Menu

The **File** menu allows you to export, import or print measurements in the **PPSC Meter** window.

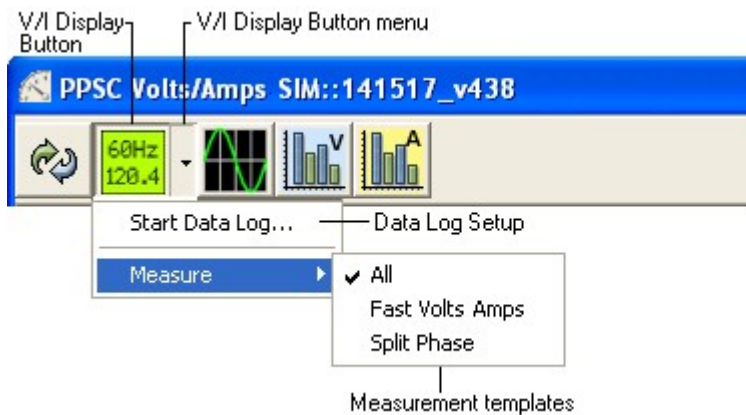


Export allows you to save the measured values presently shown in the window. **Import** allows you to view a previously saved (exported) measurement. The data format of the file is *.csv (Microsoft Excel). The date and time shown in the title bar of the window is the time the measurement was originally taken.

Data Log

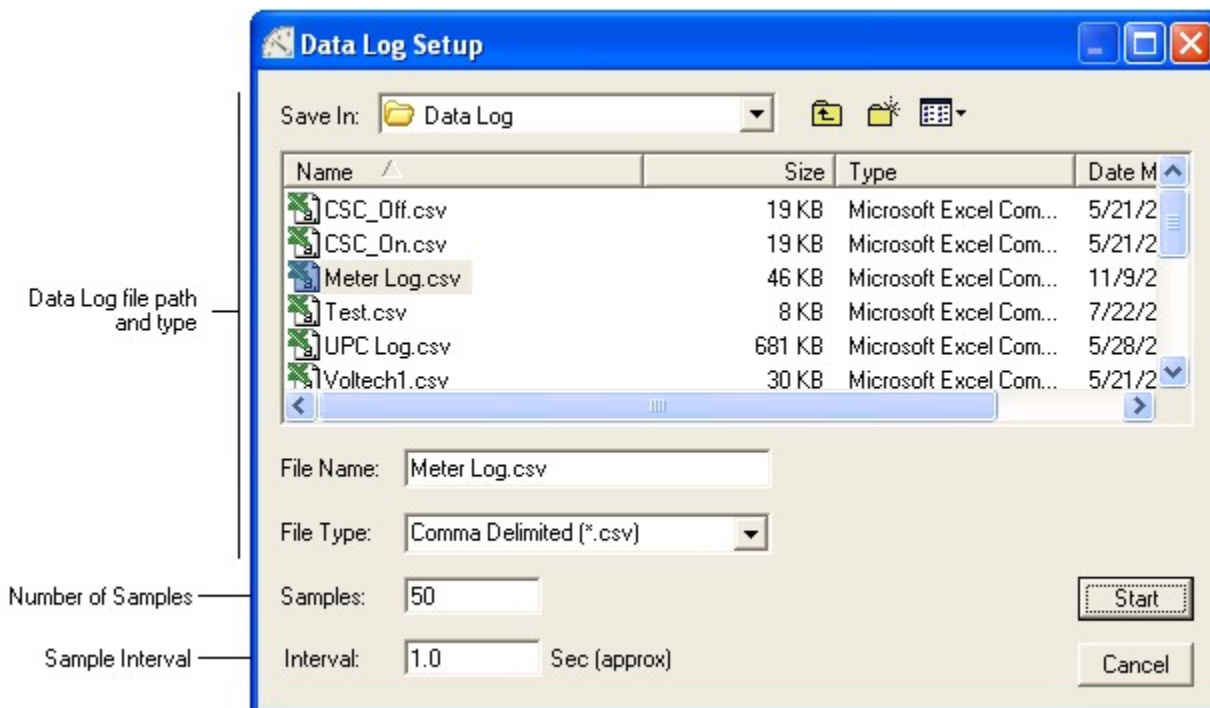
The [PPSC Meter window](#) allows you to log measurement results to a file. To start data logging:


1) Open the PPSC Meter window and click on the V/I Display button menu as shown below. Note that the V/I Display button must be pressed before you can access the menu.



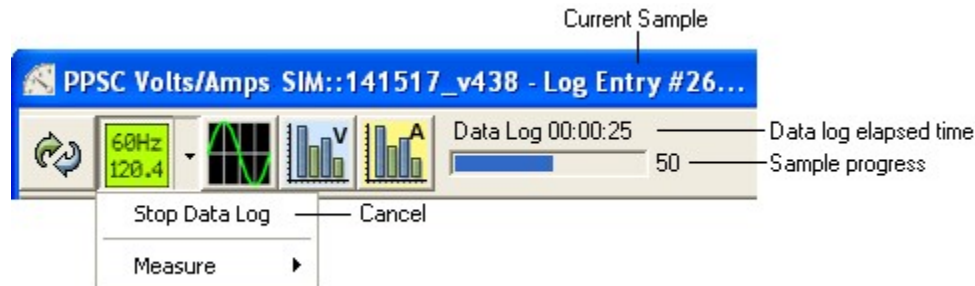
2) Specify the desired measurement template then select **Start Data Log...** Refer to the [measurement templates](#) section for more information.

3) The **Data Log Setup** window appears as shown below:



Specify the file name, number of samples and sample interval. For *.csv files, keep in mind the maximum number of samples supported by Excel is 65532. A warning icon  is displayed if the value you enter is greater. Sample intervals below 1 second default to "MIN". The minimum time is based on your PPSC configuration, template file, and remote interface communication speed. After you enter the desired values, press **Start**.

4) During data logging, the V/I Meter window updates as each sample is taken. The display also shows the entry number, elapsed time and progress of the data log as shown below:



You can cancel data logging by choosing **Stop Data Log** from the V/I Display button menu.

Notes:

- The data log file includes a date time stamp and the precise elapsed time for each sample.
- The [measurement template file](#) determines which values are measured and stored in the data log file.
- The time accuracy of the data log interval is approximate and depends on the Windows operating system and other running applications.
- Data logging pauses when another PPSC Manager window is activated and resumes when the PPSC Meter window is reactivated.
- The maximum number of samples is 2,147,483,647 but may be less depending on available disk space. Each entry in the data log file takes around 200 bytes.

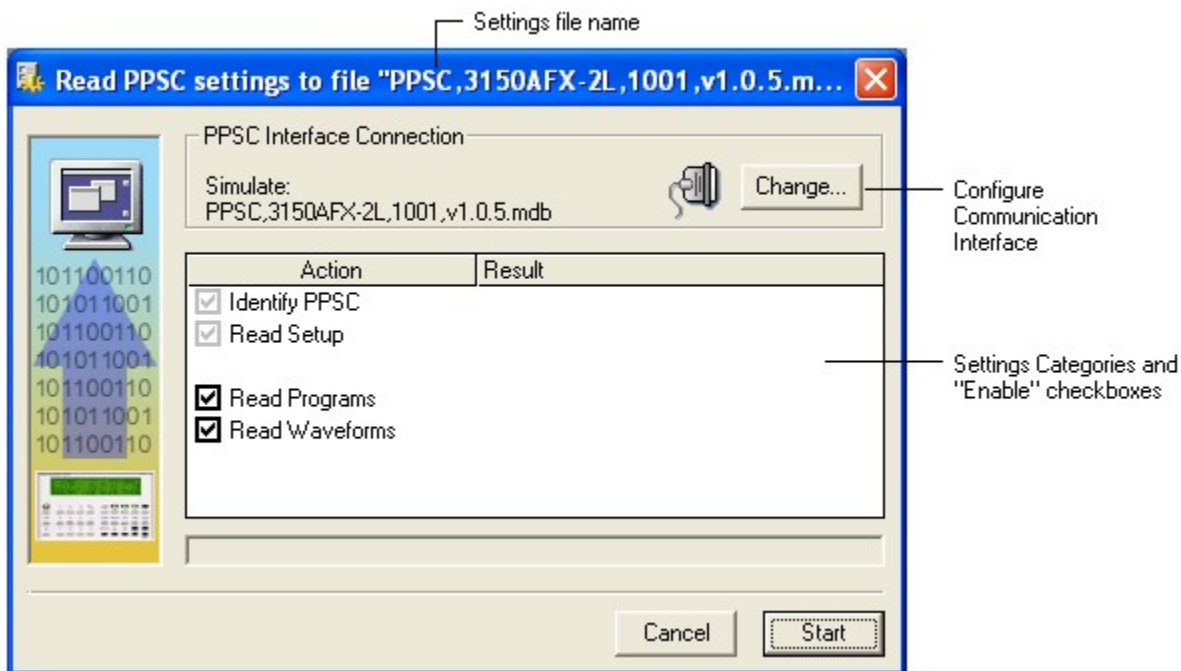
Reading PPSC Settings

The Read PPSC Settings window stores all the values in your PPSC to a file on your PC. This is a convenient way to "back up" your PPSC. The settings file you create can also be used to update other PPSCs.

Note: If you intend to create settings files to be used with other PPSCs, you should **uncheck** the "Read kFactors" check box. That way, these values will not be saved in the file so they can't then accidentally be sent when writing the file to another PPSC.

To read settings from your PPSC and save them to a file on your PC, perform the following steps:

1. Press the **Read Settings From PPSC** icon in the [toolbar](#)
2. A dialog box will appear asking you for the name of the file you want to create. The default name is "PPSC Settings" but it helps to enter a name that better describes your particular PPSC. After you specify the name of the file, press **Save**.
3. The **Read PPSC Settings** window appears as shown below. The name of the settings file you specified is shown in the title bar of the window.
4. Press the **Change** button. The [PPSC Interface Connection](#) window will appear. Enter the interface (Serial or GPIB) and settings used by your PPSC then press **OK**. You can view the communication settings of your PPSC on the built-in LCD display by pressing Fn 3,3.
5. The **Read PPSC Settings** window shows a list of items with checkboxes that show the various settings categories that will be read. You should normally check all items, but unchecking an item may assist [troubleshooting](#) a particular problem. Some items are checked and dimmed meaning that item is mandatory.
6. Press the **Start** button. The progress of reading PPSC settings is shown in the window.
7. When all items have completed, you will be asked if you want to view the settings that were just created. You can choose **Yes** to view it now (read-only) or you can later use the **Open** icon in the [toolbar](#) to open the file in Edit mode so you can make changes.




Writing PPSC Settings

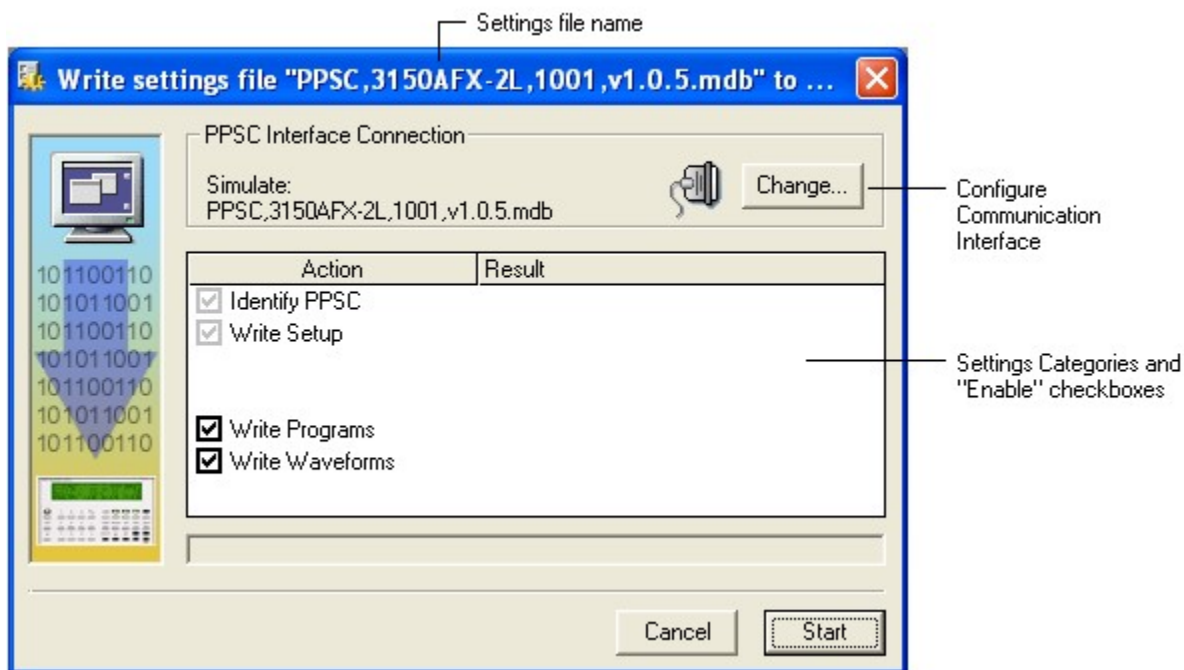
Warning: This operation overwrites settings stored in your PPSC.

The Write PPSC Settings window sends values from a settings file on your PC to your PPSC. This is a convenient way to "restore" your PPSC or update other PPSCs.

Note: If the settings file you intend to write was created by a different PPSC, you should **uncheck** the "Write kFactors" check box. Otherwise, the calibration of your PPSC will be affected.

To write a settings file to your PPSC, perform the following steps:

1. Press the **Write Settings To PPSC** icon in the [toolbar](#)
 2. A dialog box will appear asking you for the name of the file you want to write. Select the desired file then press **Open**.
 3. The Write **PPSC Settings window** appears as shown below. The name of the settings file you selected is shown in the title bar of the window.
 4. Press the **Change** button. The [PPSC Interface Connection](#) window will appear. Enter the interface (Serial or GPIB) and settings used by your PPSC then press **OK**. You can view the communication settings of your PPSC on the built-in LCD display by pressing Fn 3,3.
 5. The **Write PPSC Settings** window shows a list of items with checkboxes that show the various settings categories that will be written. You can optionally uncheck one or more items to skip writing those settings. If Write kFactors is checked, calibration values in your PPSC will be updated. Make sure the kFactors in this settings file are correct for this PPSC. Otherwise you will be forced to recalibrate your PPSC. Refer to the PPSC Programmable Controller Operation Manual for instructions on calibration.  The Hardware Configuration row sends the Transformer Ratio, Amps Volts Ratio, Current Transformer Location (Primary/Secondary) and Number of Amplifiers. These values define the hardware configuration of your power source. Carefully check your power source documentation and hardware to verify that these values are correct.
1. Press the **Start** button. The progress of writing PPSC settings is shown in the window.



Reading/Writing PPSC Settings Interface Connection

You access the **PPSC Interface Connection** window from either the [Write PPSC Settings](#) or [Read PPSC Settings](#) windows. If your PPSC is connected to a serial port, press the **Serial** tab and the window appears as shown below:

The screenshot shows the 'PPSC Interface Connection' dialog box with the 'Serial' tab selected. The settings are as follows:

- COM Port: 4
- Baud: 38400
- Parity: None
- Flow Control: None
- EOS: CR/LF

Buttons for 'Cancel' and 'OK' are visible at the bottom.

The Baud Rate, Parity and EOS should match the values in your PPSC. Press Fn 3,3 on the PPSC front panel to view these PPSC communication settings. The **Flow Control** item shown above should be set to "None". Once you have entered the desired values, press **OK**. The tab (Serial or GPIB) you last selected prior to pressing OK is the interface that PPSC Manager will use.

If your PPSC is connected to a LAN network, press the **LAN** tab and the window appears as shown below:

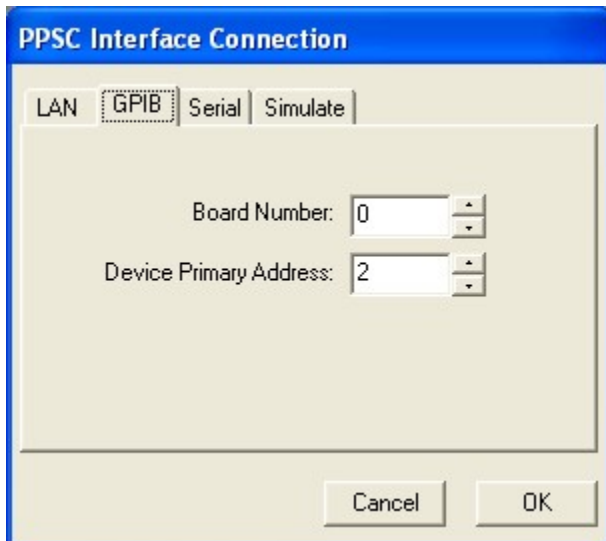
The screenshot shows the 'PPSC Interface Connection' dialog box with the 'LAN' tab selected. The settings are as follows:

- LAN Connection:
 - VXI-11 LAN/LXI
 - Raw Socket Port No. 5025
- IP Address: 192.168.14.155

Buttons for 'Cancel' and 'OK' are visible at the bottom.

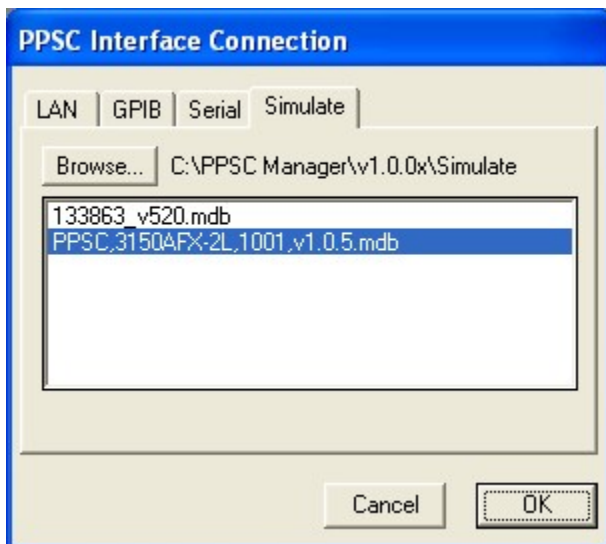
The IP address is required to connect to the power source. Enter the desired IP address in the window above then press **OK**. The tab (Serial or LAN or GPIB) you last selected prior to pressing OK is the interface that PPSC Manager will use.

If your PPSC is connected to a GPIB port, press the **GPIB** tab and the window appears as shown below:



The Board Number is assigned by your system to the GPIB card installed in your PC. The Device Primary Address is the GPIB address of your PPSC. You can view the GPIB address by pressing Fn 3,3 on the PPSC front panel. Enter the desired values in the window above then press **OK**. The tab (Serial or GPIB) you last selected prior to pressing OK is the interface that PPSC Manager will use.

You can also connect to a simulated PPSC. The simulation mode allows you to operate a virtual PPSC. The simulation mode is also a convenient way edit/view PPSC settings offline. Press the **Simulate** tab and the window appears as shown below.



The list shows the available simulation files located in the folder path shown next to **Browse...** Simulation files are actually settings files that are created when using [Read Settings From PPSC](#).

You can verify the available [system resources](#) (serial ports and GPIB interfaces) installed on your PC by pressing the **About** icon in the [toolbar](#).

Opening a PPSC Settings File

There are two ways to open a PPSC settings file - the View method and the Edit method. The View method allows you to view all settings in the file but does not allow you to change them. Opening a file with the View method protects the file from accidental changes. The Edit method allows you to both view and change values. To view or edit a PPSC settings file:

1. Press the **Open** icon in the [toolbar](#). A dialog box will appear asking you for the name of the file you want to open. The default method of opening a file is the Edit method. Check the "Open as read-only" checkbox if you want to open the file using the View method (read-only).

2. Select the desired file then press **Open** .
3. The **PPSC Settings** window appears as shown below with the Info panel selected. The name of the settings file you opened is shown in the title bar of the window. The PPSC Settings window allows you select various categories by clicking on that tab. Note that all control items are dimmed (disabled) for the View method. To change values, close the window then open the file using the Edit method or use the [PPSC Control](#) window.

Click in the list below for more information on the panels in the PPSC Settings window:

Info (shown below)

[Setup](#)

[Programs](#)

[Waveforms](#)

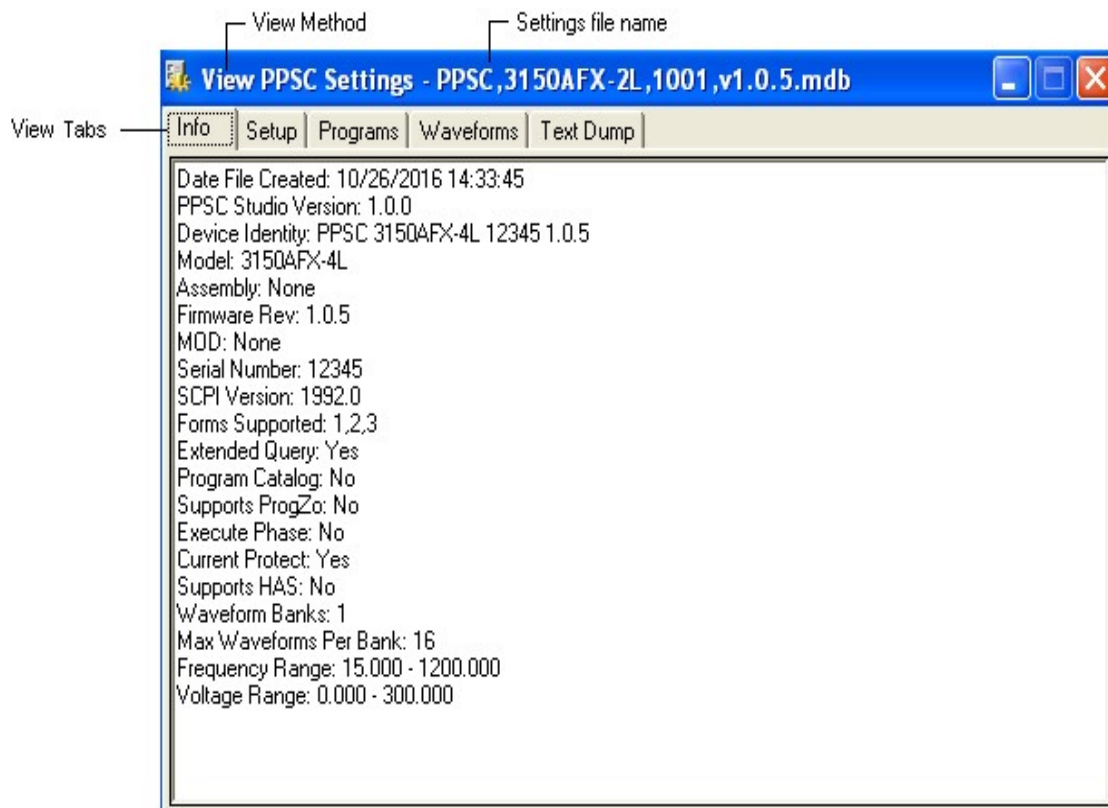
[Text Dump](#)

Editing Values

As mentioned earlier, you can change values in the PPSC settings file when it's opened using the Edit method. However, you should carefully consider the allowable range a particular setting (e.g. output voltage) can have. These values depend on your particular power source model and firmware options installed in your PPSC. To minimize editing errors, you should instead use [PPSC Studio](#) to make your changes. PPSC Studio provides many safeguards and guides you into entering values that are appropriate for your power source.

Info Panel

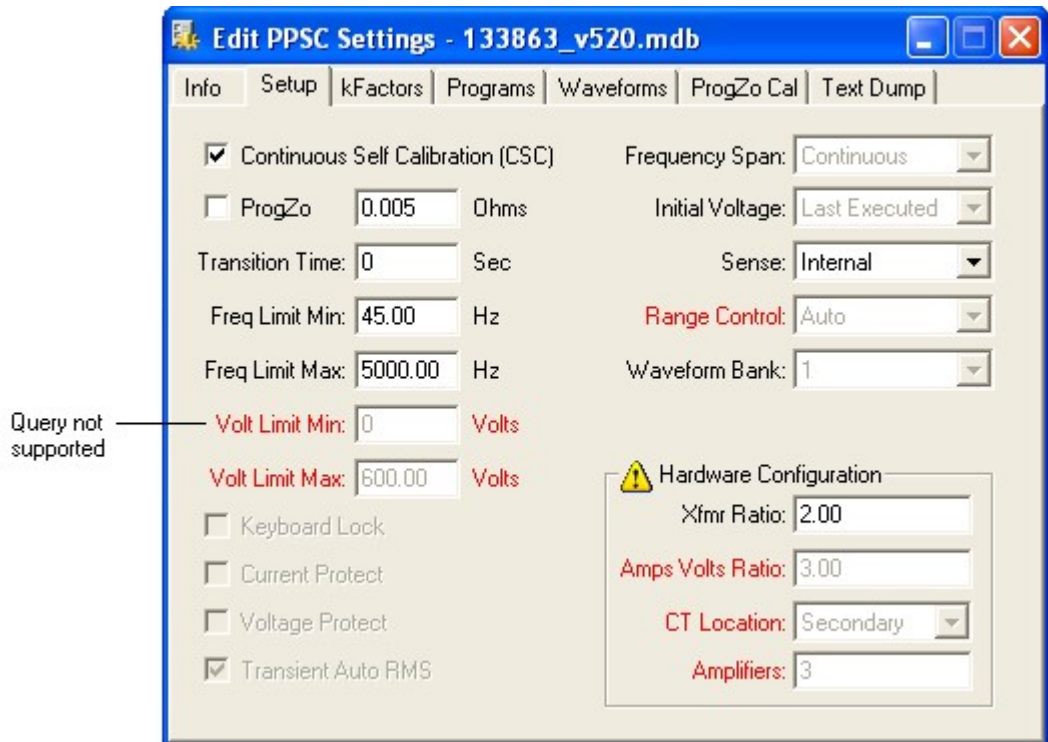
The Info panel is the default panel displayed after opening a settings file. The Info panel shows basic information and capabilities about your PPSC. Some of the items like "ProgZo", "Execute Phase" and "Current Protect" are related to a particular firmware MOD or assembly. Firmware MODs are customer specific options that are installed at the factory. Some features are not supported by older firmware versions and are shown in **red** . Refer to the [Firmware Versions](#) section for information about features not supported by older firmware.



Setup Panel

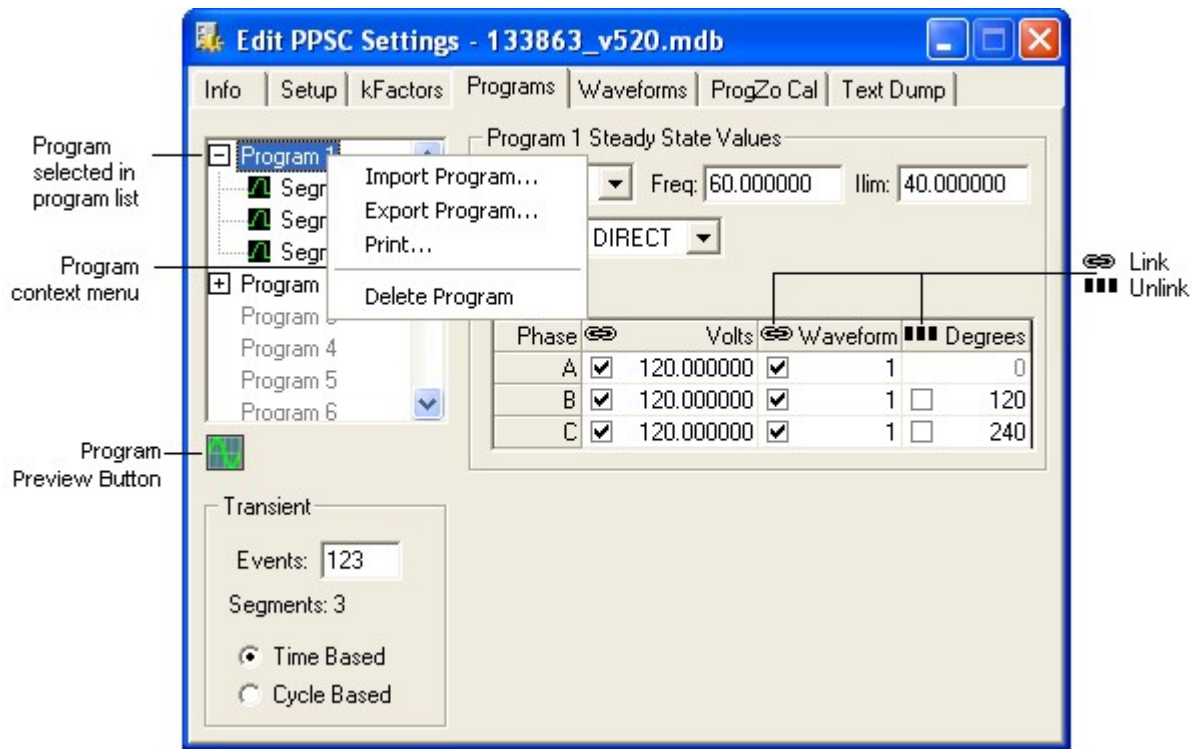
The setup panel below is shown with the PPSC [settings file opened](#) using the Edit method. If opened using the View method , all items in the panel would be disabled (grayed). If selected items are grayed, it means your PPSC does not

support that feature. Items shown in red indicate the firmware in your PPSC does not support querying that value. Refer to the [Firmware Versions](#) section for information about the defaults PPSC Manager substitutes for these values.



Programs Panel

The Programs panel below is shown with the PPSC [settings file opened](#) using the Edit method. This window shows the settings for the program selected in the list.



Program Context Menu

All 99 programs are shown with stored programs in black text and empty (unused) programs in gray text. When you right-click a program, the **Program Context Menu** appears. The Program Context Menu allows you to save (Export) the selected program to a file. You can also print the selected program. If you are using the Edit method you can also read (Import) a program from a file. Note that the selected program is erased when you import a program.

Note: Importing or exporting a program includes all transient segments.

Program Preview Button

The **Program Preview** button allows you to [view a simulation](#) of the PPSC output waveforms of the selected program.

Link/Unlink and Row Checkboxes

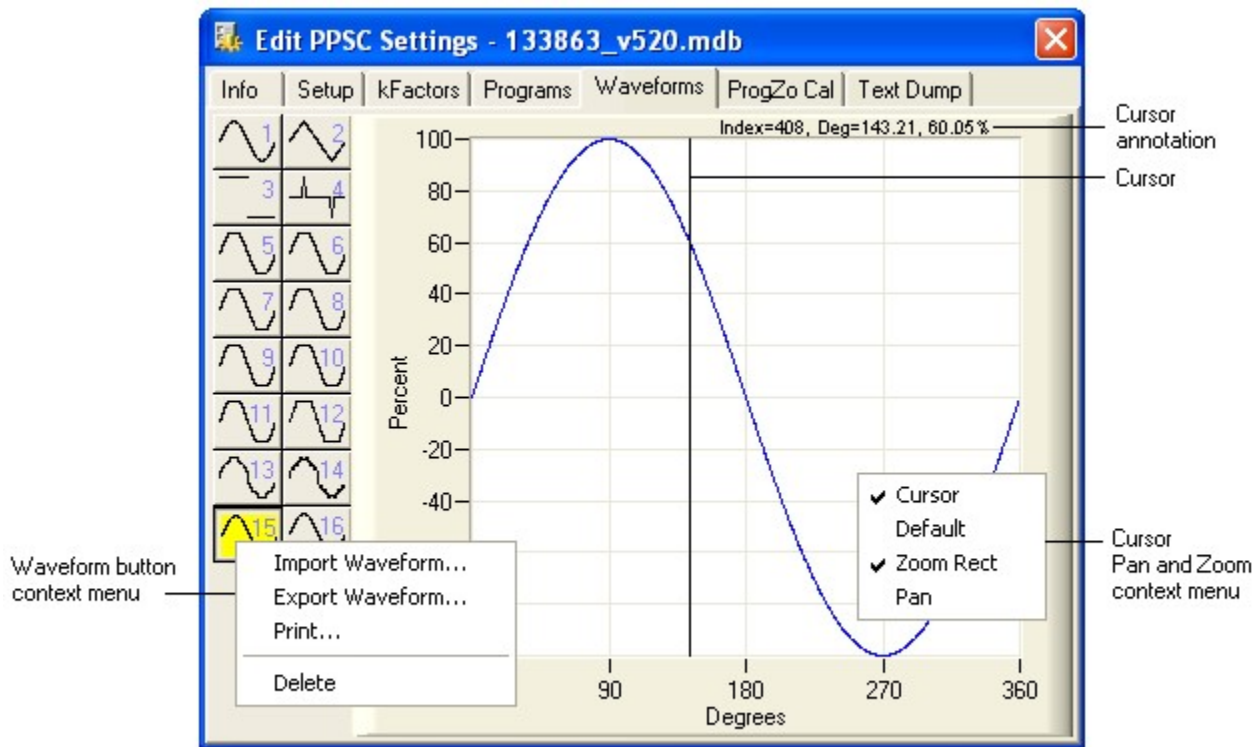
You can toggle the Link/Unlink state of a particular column by clicking on the **Link/Unlink** icon. When a column is linked, any change to one item in that column affect the other items. You can also selectively link items using the row checkboxes.

Waveforms Panel

This panel allows you to view the various waveforms in the PPSC [settings file you opened](#). The thumbnail buttons on the left of the window select which waveform is displayed. If you right-click on a button, a menu appears that allows you to save (**Export**) the selected waveform to a file. You can also print the selected waveform. If you opened the settings file using the Edit method (as shown in the example below), the menu also allows you to read (**Import**) a waveform from a file. Note that the selected waveform is overwritten when you import a waveform. The **Delete** item removes that waveform from the settings file. Waveform 1 (sine wave) is reserved so you cannot **Import** or **Delete** it.

If you right-click on the waveform graph, a menu appears that allows you to select the cursor and pan or zoom options. When **Cursor** is checked, a vertical line appears in the graph that tracks the mouse movement with annotation text showing the phase angle (degrees) and amplitude in percent.

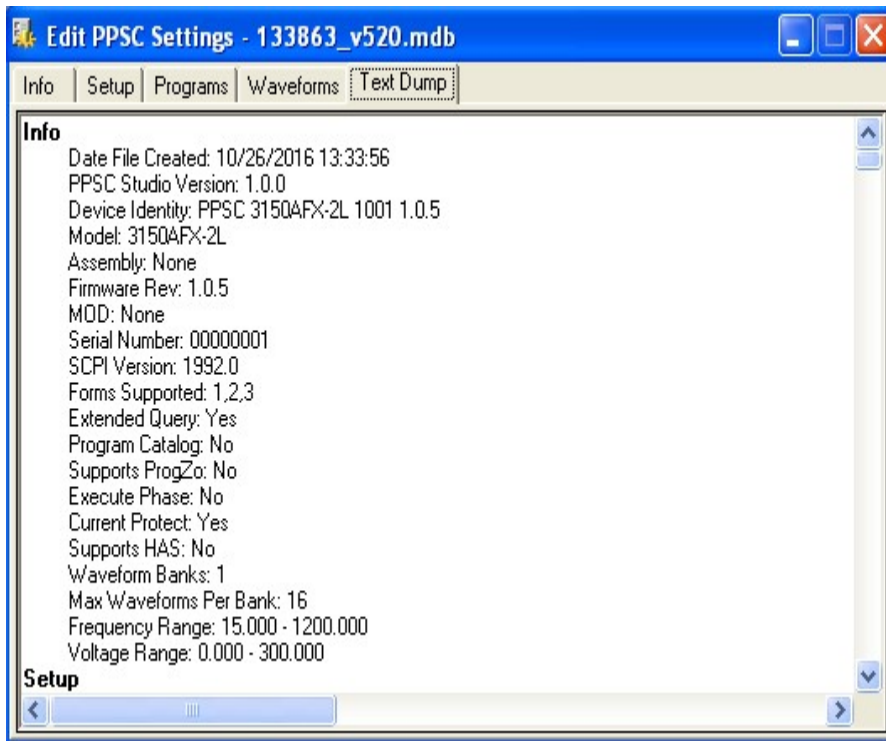
The pan and zoom options control the mouse behavior when you click and drag the mouse over the waveform. The **Default** item restores the **Pan** and **Zoom** state to their normal values (100%, centered).



Text Dump Panel

The file format of the PPSC settings file is Microsoft Access Database (*.mdb). The Text Dump panel allow you to view the entire contents of the PPSC settings file in text format.

The **Save** icon in the [toolbar](#) allows you to save the settings to a text file (*.rtf). You can then open it in a word processor. Use the **Print** icon in the [toolbar](#) to print the contents of the Text Dump panel.



Printing

Once you open a settings file, you can press the **Print** icon in the [toolbar](#) to print it. The entire contents of the settings file will be printed including graphs for the waveforms. The [Programs](#) and [Waveforms](#) panels also allow you to print a selected program or waveform.

Saving

The file format of the PPSC settings file is Microsoft Access Database (*.mdb). The **Save** icon in the [toolbar](#) allows you to save the settings to a text file (*.rtf). You can then open it in a word processor. The [Programs](#) and [Waveforms](#) panels also allow you to save (export) a selected program or waveform. You can also use the Windows Explorer to make a copy of a PPSC settings file.

Troubleshooting Guidelines

- Make sure the [necessary software](#) is installed on your PC
- Make sure your PPSC is in the "V/I METER:" display mode. The "V/I METER:" display mode allows your PPSC to communicate with your PC.
- Verify [system resources](#) .
- If you are having problems running the PPSC Manager Installer, try updating your operating system with the latest service pack.
- When reading or writing settings, check that the [communication settings](#) match your PPSC settings
- If PPSC Manager preferences become corrupted, press and hold the <Shift> key when opening PPSC Manager. PPSC Manager preferences include window position and sizes, communication settings, file paths and saved commands in the [Probe window](#) .
Set the Windows Display Properties DPI setting to 96 DPI (Normal size, 100% default). Other DPI settings may cause controls to not be aligned or sized properly.

Firmware Versions

The [View/Edit PPSC Settings](#) or [PPSC Control](#) window shows the firmware version in the **Info** tab. [PPSC Studio](#) also shows the firmware version in the status bar at the bottom of the window. You can also view the firmware version on the unit front panel by pressing "System" button, navigate to select "Unit Info" to view the unit information.

ing your operating system with the latest service pack.

When reading or writing settings, check that the [communication settings](#) match your PPSC settings

f PPSC Manager preferences become corrupted, press and hold the <Shift> key when opening PPSC Manager. PPSC Manager preferences include window position and sizes, communication settings, file paths and saved commands in the [Probe window](#) .

the Windows Display Properties DPI setting to 96 DPI (Normal size, 100% default). Other DPI settings may cause controls to not be aligned or sized properly.

System Resources

About window allows you to view the system resources like the available serial or GPIB interfaces. To view the About window, press the **About** icon in the [toolbar](#).



About window shows a list of system resources that are described below:

| Resource Name | Description |
|----------------------|--|
| Visa | Required software driver |
| ASRLn::INSTR | Serial COM port n |
| GPIBn::INTFC | GPIB interface board number = n |
| GPIBn:INSTR GPIB | GPIB Instrument device primary address = n |

When interfaces are listed, make sure [NI-VISA and NI-488.2 software](#) are installed.



You can also use Measurement & Automation Explorer (MAX) available from National Instruments to view the installed hardware and software on your PC. The **Devices and Interfaces** section will show the installed interface hardware and instruments and the **Software** section will show drivers and versions.