



# **CyFlex® HistoryPlot User Guide**

**Version 4**

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**Developed by TRP Laboratories**



## Version History

Version	Date	Revision Description
1	1/25/2019	Initial publication
2	8/23/2018	Format revisions
3	3/26/2020	Retrofit to new template
4	2/1/2024	Rebrand to TRP Laboratories

## Document Conventions

This document uses the following typographic and syntax conventions.

- Commands, command options, file names or any user-entered input appear in Courier type. Variables appear in Courier italic type.  
Example: Select the `cmdapp-relVersion-buildVersion.zip` file....
- User interface elements, such as field names, button names, menus, menu commands, and items in clickable dropdown lists, appear in Arial bold type.  
Example: **Type**: Click **Select Type** to display drop-down menu options.
- Cross-references are designated in Arial italics.  
Example: Refer to *Figure 1*...
- Click intra-document cross-references and page references to display the stated destination.  
Example: Refer to *Section 1 Overview on page 1*.  
The clickable cross-references in the preceding example are *1*, *Overview*, and *on page 1*.

## CyFlex Documentation

CyFlex documentation is available at <https://cyflex.com/>. View **Help & Docs** topics or use the **Search** facility to find topics of interest.

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## 1 Overview

HistoryPlot displays time-based graphs of selected variables from CyFlex® history data files. The program is one of a suite of CyFlex plotting applications, including Stripchart, LoggerPlot, and XYPlot that all work similarly.

HistoryPlot displays a column of rectangular *plot areas* in *graphs* that render *traces* of selected variables previously recorded by the CyFlex history program. A single HistoryPlot application may be configured into a stack of up to eight graphs with up to eight traces in each graph.

Each Graph has a *time axis* of selected duration, as well as left and optionally right Y axes with selectable ranges. These ranges may also be changed interactively with the mouse to pan or zoom in both time (X) and value (Y) directions.

Various configuration settings may be changed in a floating **Configuration Dialog**, save configurations, and later reload them as desired. The dialog enables change to a wide variety of plot attributes:

- CyFlex Variables to plot
- Variable colors, patterns, gridlines, axis scales and increments
- Label fonts and font sizes, etc.

Stored plot data may be exported to a CSV-formatted file for analysis and charting in a standalone spreadsheet.

HistoryPlot joins the other CyFlex plotting applications to deliver graphics at the test console – graphics that can help to assess the performance characteristics of the test article. It is based on the same graphics software and hardware as the CyFlex **Operator Display** and shares much of its display and user features with the other plotting applications.

### 1.1 Features

HistoryPlot provides a full complement of graphics functionality, including the following sets of features:

#### 1.1.1 HistoryPlot Uses

- Standalone application displays selected Graphs in a vertical stack.
- Application may be started from the CyFlex menu or from command line with optional configuration file.

#### 1.1.2 Plotting Capabilities

- Each HistoryPlot instance has 1-8 Graphs, each with 1-8 Traces of CyFlex Variable values versus time recorded in the selected history file; data sampling rate and resolution are already set in the history file.
- Assign a CyFlex Variable to a Trace from a list that is automatically populated with the Variable names in the history file.
- Drag mouse to “pan” (scroll) plot in X and Y directions.
- Drag mouse to “zoom” (magnify) plot in X and Y directions.



- Select the color, pattern, and thickness of a Trace and display a Legend of Traces by color on each Graph.
- Select a Trace to “auto range” – adjust the range of the Y axis assigned to it so that all of its data is displayed.
- Select the range, text label, color, and pattern for the Time axis, and the left and optional right Y Axes.
- Select the number of gridlines and tick marks of the Grid and their line color, pattern, and thickness .

### 1.1.3 Configuration Settings

- Configuration “specs” can be saved or loaded by filename.
- Add a trace, remove a trace, or copy/paste a trace in each graph.
- Plot attributes may be changed interactively: right-click anywhere in a window to launch the floating Configuration Dialog.
- Change attributes of the plot Traces for each Graph, including line color, pattern, and thickness.
- Change attributes of the gridlines for each Graph, including color, pattern, and thickness.
- Configuration changes may be “applied” (**Apply** button) on trial and then accepted (OK button) or canceled (**Cancel** button).
- Add a Trace, remove a Trace, or copy/paste a Trace in each Graph

### 1.1.4 Program Utilities

Any and all of these features may be employed from the Menu Bar, the Button Row, or the **Configuration Dialog**:

- Launch the Help browser with a persistent, expandable contents tree and help content with cross links.
- Hover the mouse over a window component to display its Tool Tip.
- Export the entire data buffer to a text file formatted for spreadsheets.

## 1.2 Requirements and Constraints

### 1.2.1 Requirements

- HistoryPlot operates as part of the CyFlex test automation system. CyFlex must be running on the test system to create the history data files that HistoryPlot requires for plotting.
- The system hardware must be sufficiently robust to execute the standard CyFlex operations.
- The test system must have graphics hardware adequate to support version 1.3 or later of the OpenGL cross-platform applications programming interface (API) for computer graphics and driver support.
- High-resolution monitors are recommended for display accuracy.

### 1.2.2 Constraints

The following constraints and limitations must be imposed on the HistoryPlot configuration and operation:

- **Variable types:** CyFlex Variables may be selected for plotting by name from the **Plot** tab of the **Configuration Dialog**.
  - All currently specified **Real**, **Integer**, and **Logical** Variables are displayed automatically in the **CyFlex Variable Names** pulldown list.
- **Number of graphs:** HistoryPlot supports up to eight graphs in its vertical “stack” format
  - The program ignores attempts to add more than eight graphs in the **Configuration Dialog**.
- **Number of traces per graph:** HistoryPlot supports up to eight traces, one for each CyFlex Variable selected in any one graph.
  - Together with the limit of eight graphs per program instance, you may select up to 64 traces at once.
  - The program ignores attempts to add more than eight traces in the **Plot** tab of the **Configuration Dialog**.
- **Data Storage:** HistoryPlot is limited to the data recorded in the selected logger file.
  - The **Export Data to CSV File** button in the top left margin of the Graph writes the entire contents of the current **Data Storage** buffer to a CSV file.

### 1.3 Terminology

The following terms are frequently mentioned in this document. They are described in *Table 1*.

*Table 1: Terminology*

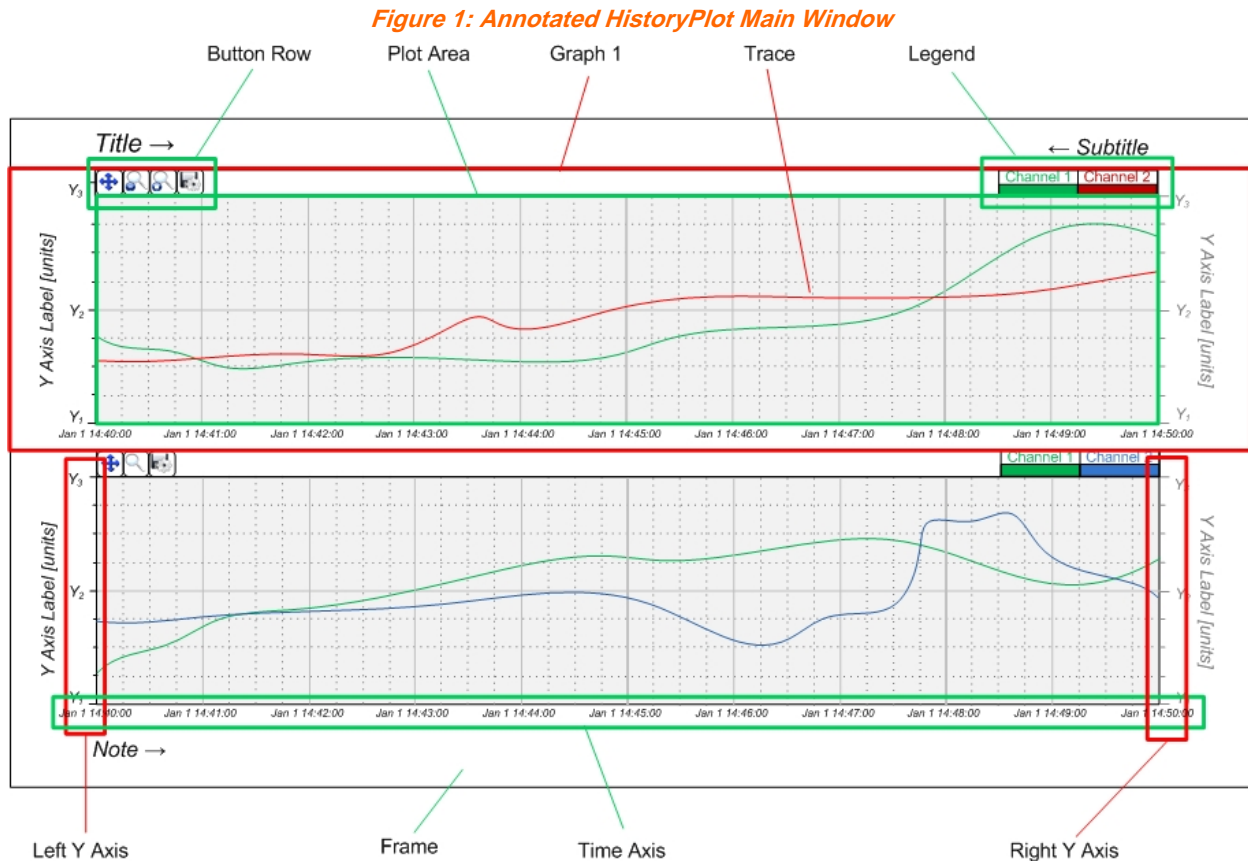
<b>Term</b>	<b>Description</b>
<b>Main Window</b>	The complete window that appears when the application starts.
<b>Configuration</b>	The plot settings that dictate the function and appearance of the <b>Main Window</b> and its Graphs. The settings may be changed in the <b>Configuration Dialog</b> and then saved to and loaded from a configuration file.
<b>Configuration Dialog</b>	A floating dialog window for configuring the various settings that manage the plot functionality and appearance.
<b>Graph</b>	The basic plot display panel that includes the graphical plots, axes, labels, and auxiliary buttons. The HistoryPlot window is comprised of a column of one or more Graphs, numbered from 1 at the top.
<b>Channel</b>	A CyFlex Variable selected for plotting by its numeric value, name, and units.
<b>Plot Area</b>	The primary rectangular portion of the graph that displays the plot of the selected CyFlex Variable channels, including the value traces, the gridlines and their labels, and the axis titles.
<b>Frame</b>	The border of the <b>Main Window</b> that includes the <b>Title</b> and <b>Subtitle</b> fields at the top and the <b>Note</b> field at the bottom.

<b>Term</b>	<b>Description</b>
<b>Trace</b>	The continuous plot of the numeric values over time for one channel, displayed in the <b>Plot Area</b> .
<b>Axes</b>	The horizontal / time scale ( <b>Time</b> ) and the vertical / value scale(s) ( <b>Y</b> ) at the perimeter of the <b>Plot Area</b> , including numeric value labels and gridlines.
<b>Time Axis</b>	The horizontal axis that displays the time over which the Channel values are plotted.
<b>Y Axes</b>	The vertical axes that display scales for selected Channels at the left edge ( <b>Left Y Axis</b> ) and optionally the right edge ( <b>Right Y Axis</b> ) of the <b>Plot Area</b> .
<b>Grid</b>	The set of horizontal and vertical lines in the <b>Plot Area</b> that give numeric reference to the traces.
<b>Button Row</b>	The horizontal row of active buttons above the top left corner of the <b>Plot Area</b> for <b>Pan</b> , <b>Zoom</b> , and <b>Export</b> .
<b>Legend</b>	The horizontal row of trace identifiers above the top right corner of the <b>Plot Area</b> to match CyFlex Variable names with trace colors.
<b>Data Window</b>	The panel in the <b>Plot</b> tab of the <b>Configuration</b> file to specify the time period for the history data available for plotting. The program reads history data for each channel chosen for the graph. Select the <b>Start</b> and <b>Stop</b> times for the period in either date/time (absolute) or time before current (relative), depending on the selected <b>Time Mode</b> .

## 2 Main Window Layout

The Main Window is the primary window for the application that is displayed on startup. Other “dialog” floating windows can be launched from it.

Figure 1 shows an annotated HistoryPlot Main window



### 2.1 Graph

The Main Window is composed of a vertical stack of one or more Graphs displayed as fixed rectangular panels. Each Graph is an independent instance of the basic HistoryPlot. Their vertical alignment allows them to align their Time Axes and scales. However, the Time Axis is displayed in each panel and they may have different durations if desired.

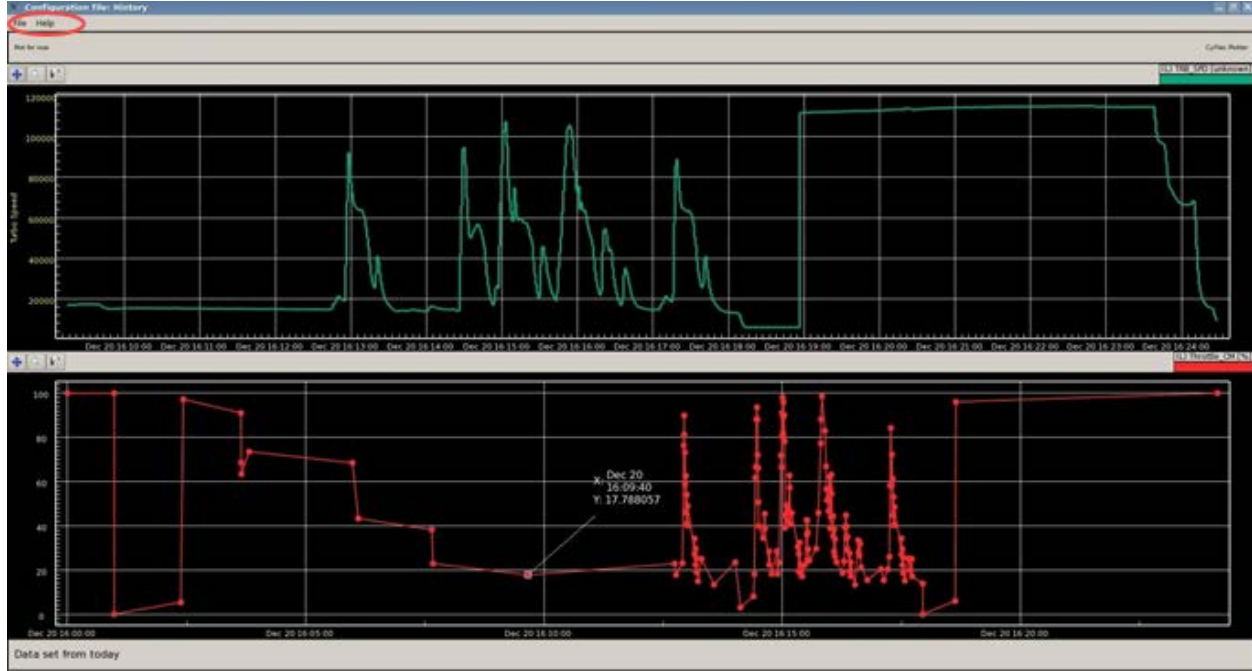
### 2.2 Plot Area

In each Graph there is a rectangular Plot Area in which the connected line Traces of the chosen CyFlex Variable are rendered across the horizontal Time Axis. It includes horizontal and vertical gridlines and tick marks for the axis scales.

### 2.3 Menus

The Main Window has standard pulldown menus in the top left window border for **File** and **Help**. The former provides data exporting, saving, and loading configuration settings, and exiting the program. The latter launches the **Help** dialog browser.

*Figure 2: Main Window Menus*



## 2.4 Button Row

Each graph has a row of action buttons at the top left edge of its Plot Area. Select the following:

- **Pan** to toggle start and stop panning.
- **Zoom** to start successive zoom in, then stepped zoom out or zoom reset, and stop zoom.
- **Export** to write **Data Storage** contents for this graph to a spreadsheet file.

## 2.5 Legend

Each graph has a row of Legend graphics at the top right edge of its Plot Area. Each Legend shows a CyFlex Variable name over the trace color selected for it.

## 2.6 Frame

The Main Window border area outside of the graphs forms a Frame that can display user-selected text for a **Title**, a **Subtitle**, and a **Note**.

## 3 Configuration Dialog Layout

The **Configuration Dialog** is a floating dialog window launched from the Main Window to select valid options for plotting attributes.

### 3.1 Configuration Dialog Functions

Change the data and display attributes at any time from the **Configuration Dialog**. Right-click anywhere in the Main Window to display the dialog. It is organized in three tabs:

#### 1. Plot

- Set the CyFlex Variables to plot by name, assign to the **Left** or **Right Y Axis**, and set the trace color, line type, and thickness.
- Display the duration of the history data file in days.
- Set the **Start** and **End** times for the plotted data, indicated in date / time (absolute) or time from most recent sample (relative).

#### 2. Axes

- Set the **Left** and **Right Y Axis** color, enable / disable auto range, minimum and maximum range, numbers of gridlines and tick marks, the axis label, and the gridlines color, line type, and thickness.
- Display the **Time Axis Range** and **Units**.
- Set the **Time Axis** number of gridlines and tick marks and the gridlines color, line type, and thickness.

#### 3. Frame

- Set the text and font for labels in the frame of the Main Window: **Plot Title** (top left), **Plot Subtitle** (top right), and **Note** (bottom left)
- Show / hide the trace Legend at top right of each graph.
- Change the background color of each graph.

The **Plot** and **Axes** tabs include an additional column of tabs along the left margin, one tab for each graph specified. The highlighted tab shows the number of the graph for the currently displayed plot attributes.

### 3.2 Graph Tabs

The dialog has a column of numbered Graph Tabs on its left margin, one tab for each graph specified, plus an **All** tab to display the attributes of all graphs at once.

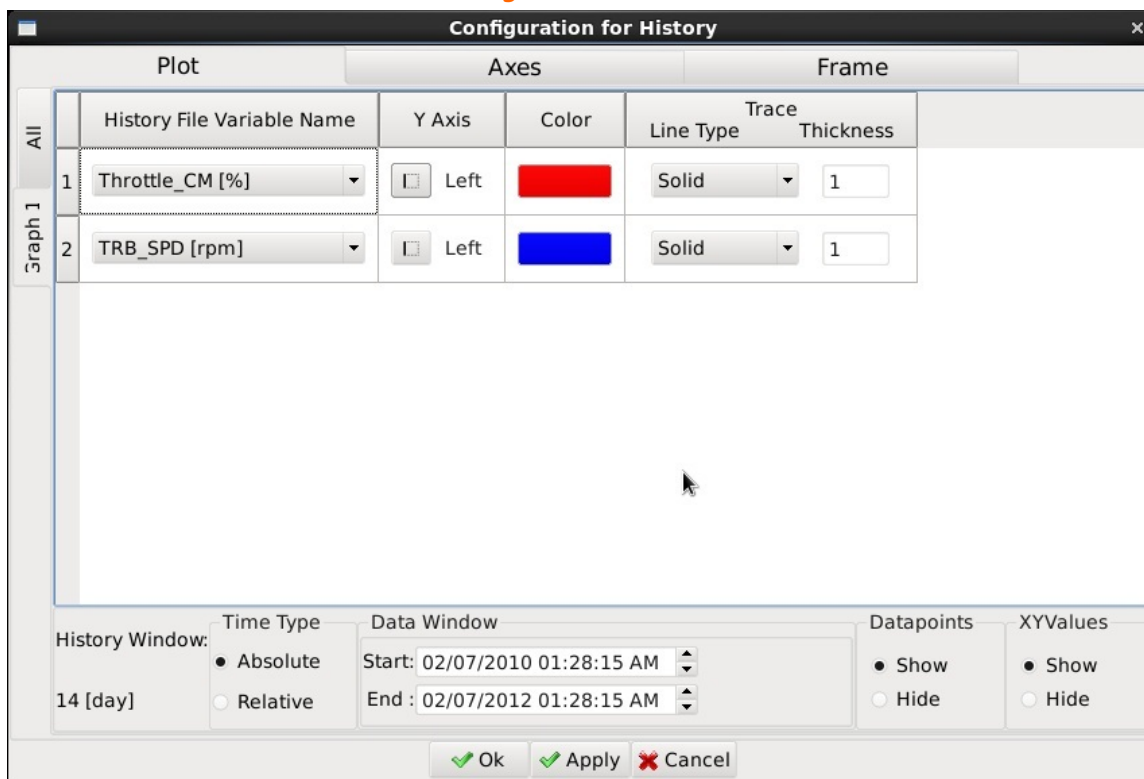
### 3.3 Feature Tabs

The dialog has a row of three Feature Tabs on its top margin:

#### 3.3.1 Plot Tab

The **Plot** tab is organized as a spreadsheet table.

*Figure 3: Plot Tab*



Plot		Y Axis	Color	Line Type	Trace Thickness
1	Throttle_CM [%]	<input type="checkbox"/> Left	Red	Solid	1
2	TRB_SPD [rpm]	<input type="checkbox"/> Left	Blue	Solid	1

History Window: Time Type: ☒ Absolute ☐ Relative  
 14 [day]  
 Data Window: Start: 02/07/2010 01:28:15 AM End: 02/07/2012 01:28:15 AM  
 Datapoints: ☒ Show ☐ Hide  
 XYValues: ☒ Show ☐ Hide

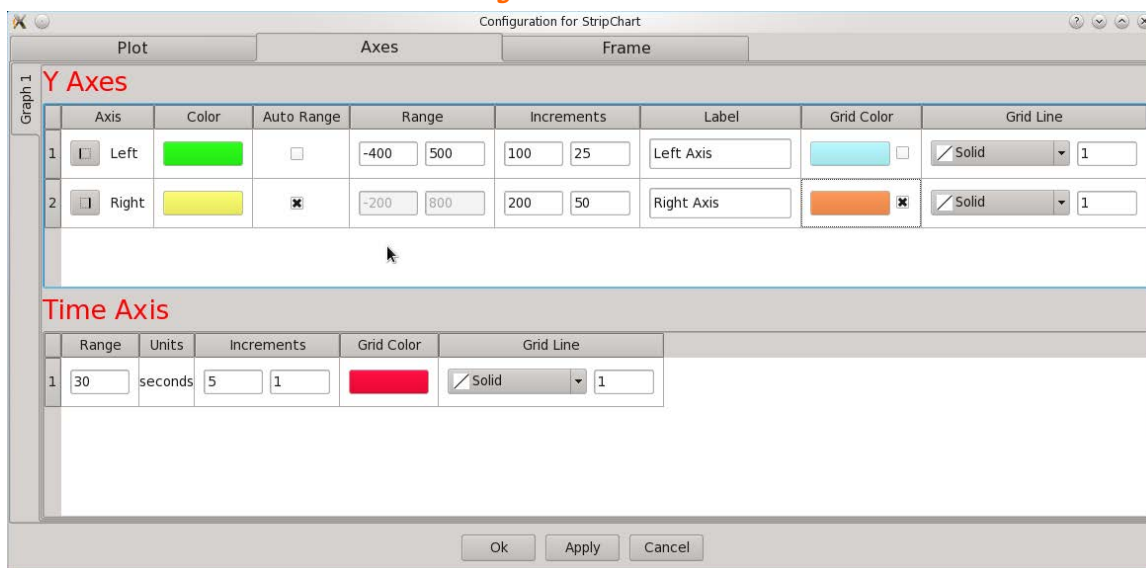
Ok Apply Cancel

- Each row describes a trace of one CyFlex Variable.
- Each column corresponds to a plot attribute: **Variable Name**, trace **Color**, left or right **Y axis**, etc.
- The lower panel shows history data duration and time selections.

### 3.3.2 Axes Tab

The **Axes** tab is organized as a spreadsheet table.

*Figure 4: Axes Tab*



**Y Axes**

	Axis	Color	Auto Range	Range	Increments	Label	Grid Color	Grid Line
1	<input type="checkbox"/> Left	<span style="background-color: green; color: black;"> </span>	<input type="checkbox"/>	-400 500	100 25	Left Axis	<span style="background-color: cyan; color: black;"> </span>	<input checked="" type="checkbox"/> Solid 1
2	<input checked="" type="checkbox"/> Right	<span style="background-color: yellow; color: black;"> </span>	<input checked="" type="checkbox"/>	-200 800	200 50	Right Axis	<span style="background-color: orange; color: black;"> </span>	<input checked="" type="checkbox"/> Solid 1

**Time Axis**

	Range	Units	Increments	Grid Color	Grid Line
1	30	seconds	5 1	<span style="background-color: red; color: black;"> </span>	<input checked="" type="checkbox"/> Solid 1

Ok Apply Cancel

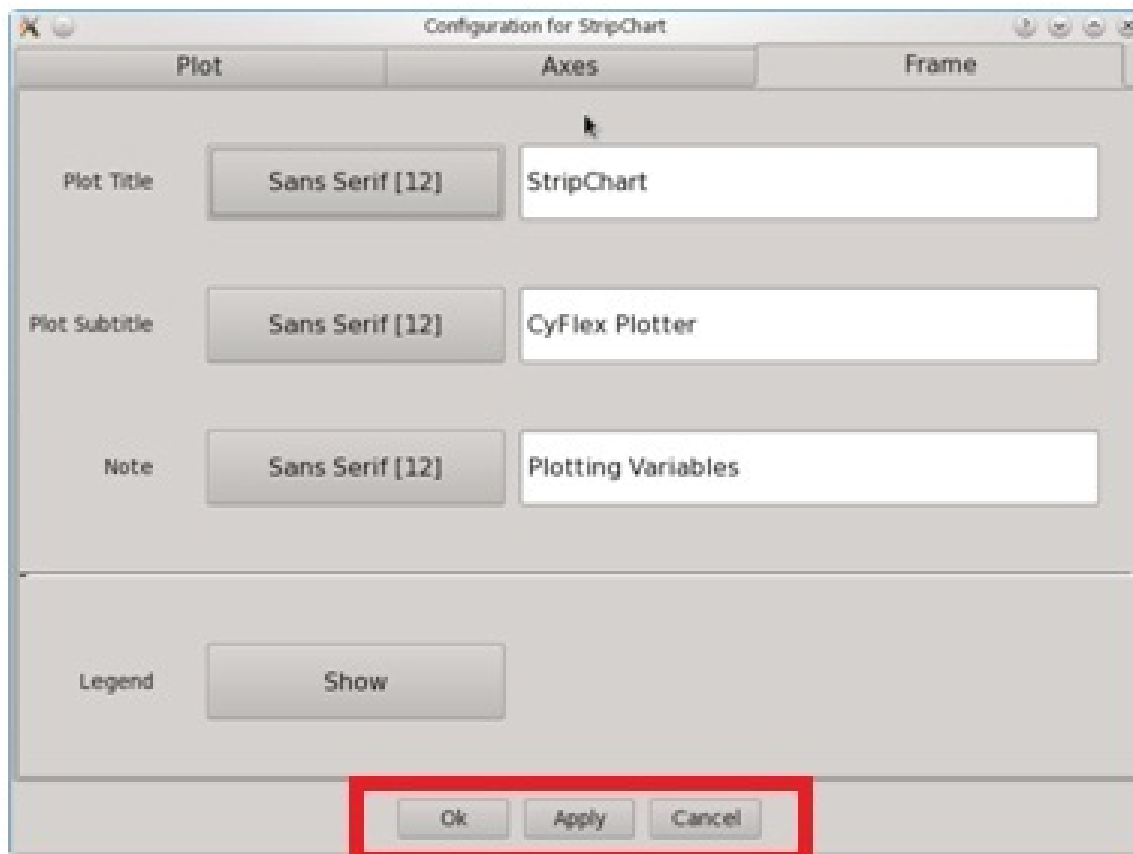
- The rows describe the vertical **Left** and **Right Y Axes** and the horizontal **Time Axis**.
- Each column corresponds to an axis attribute, such as range, color, and number of gridlines.



### 3.3.3 Frame Tab

The **Frame** tab displays fields to select the text and font of the **Plot Title**, **Plot Subtitle**, and **Note** in the frame of the Main Window, as well as **Show / Hide** the **Legend** and select the **Background Color** on all graphs.

*Figure 5: Frame Tab*



The dialog has a row of buttons on its bottom margin. Select one of the following:

- **OK** to accept the setting changes and close the dialog.
- **Apply** to apply the setting changes and keep the dialog open.
- **Cancel** to cancel the setting changes and close the dialog.

## 4 Using HistoryPlot

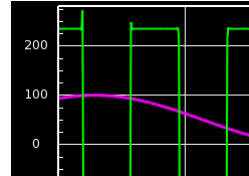
### 4.1 Starting and Stopping HistoryPlot

#### 4.1.1 Starting HistoryPlot

Use any of the following methods to start HistoryPlot:

- Select the HistoryPlot icon on the console monitor
- Enter `qthistoryplot` on the command line.
- Use a test mode in a General Purpose `gp_test` script:

```
@BACKGROUND_TASK
    AT_START "qthistoryplot"
```



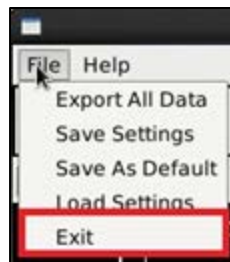
#### **Important:**

The program will use the default configuration at startup unless a different one is selected in the command line. Refer to *Section 4.9 Saving and Using Configurations* on page 28 for related information.

#### 4.1.2 Stopping HistoryPlot

1. Select **File -> Exit** from the Menu Bar to terminate HistoryPlot.

*Figure 6: Exiting HistoryPlot*



2. The program will prompt to save the current configuration to a file.
3. Upon file save, the program will stop and the Main Window will disappear.

### 4.2 Starting Data Plot

Select the channel Variables by name in the **Configuration Dialog** to display channel traces in HistoryPlot.

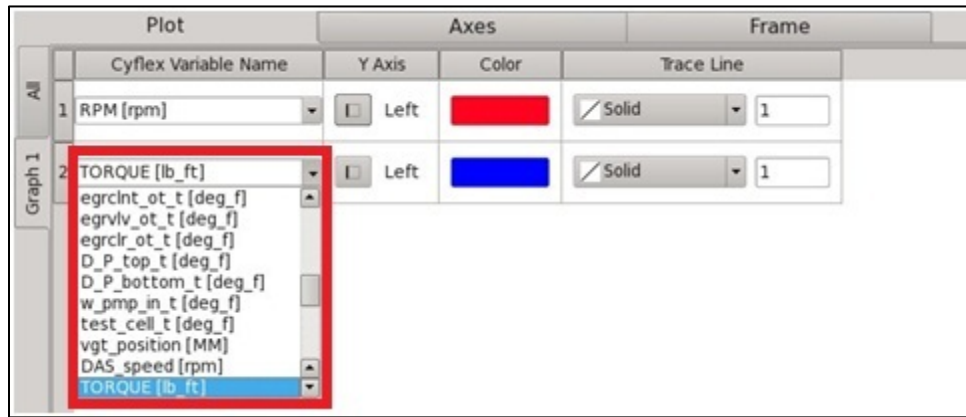
The program initially loads all of the logger data for the selected channels into Data Storage and displays it.

## 4.3 Plot Settings

### 4.3.1 Selecting CyFlex Variables to Plot

1. Right-click anywhere in the **Plot Area** to launch the **Configuration Dialog**.
2. Select the **Plot** tab in the **Configuration Dialog**.
3. Click in the **CyFlex Variable Name** field in the desired row. Each row displays the attributes of the Trace of one Variable.

Figure 7: Select CyFlex Variable to Plot



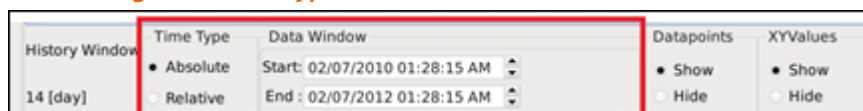
4. Select the **CyFlex Variable Name**:
  - a. Click in the **CyFlex Variable Name** field, scroll to your selection, and select it or  
Enter the first few characters of the desired **CyFlex Variable Name**. The resulting list will display matching choices to select.
  - b. The name of the selected CyFlex Variable to plot is displayed in the field along with its current units of measure in brackets.  
The list of **CyFlex Variable Names** includes all **Real**, **Integer**, and **Logical** Variables currently specified, sorted together alphabetically.
5. Click **OK** at the bottom of the **Configuration Dialog** to incorporate the change.

### 4.3.2 Setting the Time Range of the Data Plot

Specify the range of time for the data to plot. The method depends on the type of the timestamp recorded in the logger file:

1. Right-click anywhere in the **Plot Area** to launch the **Configuration Dialog**.
2. Select the **Plot** tab in the **Configuration Dialog**.
3. Select a **Time Type** to specify Start and End plot time types as in *Figure 8*.

Figure 8: Time Type/Start and End Time Selection



Select one of the following:

- **Absolute** to display times in full Date and Time timestamp, e.g. 07/04/2076 10:30:00 [mm/dd/year hh:mm:ss]
  - **Relative** to display times in days prior to the most recent sample, e.g. 5.7 [day]
4. Enter **Start** and **End** times in the **Data Window** panel as in *Figure 8* on page 12. The **Start** and **End** fields show the current start and end times for the data storage and plotting.

**@Note:**

Optionally select the most recent sample for the **End** time by checking the **Current** box.

5. Click **OK** at the bottom of the **Configuration Dialog** to incorporate the change.

#### 4.3.2.1 Time Axis Number Definition

Each vertical gridline on the **Time Axis** is labeled at its base to indicate either:

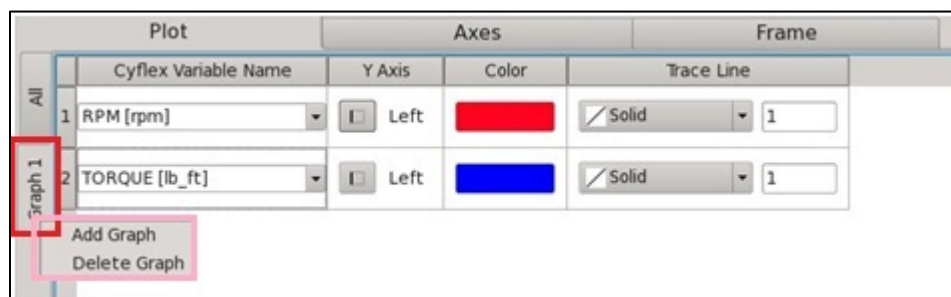
- The sample Date [Mon da] and Time [hh:mm:ss] if the **Time Type** is **Absolute** or
- The time [sec] from the first sample in the logger file if the **Time Type** is **Relative**

#### 4.3.3 Adding or Removing a Graph on the Main Window

Add or remove an entire graph from the vertical “stack” of graphs in the Main Window from the **Configuration Dialog**:

1. Right-click anywhere in the **Plot Area**.
2. Select the **Plot** tab in the **Configuration Dialog**.

*Figure 9: Plot Tab to Add or Remove a Graph*



3. Right-click on the bottom (highest number) graph tab in the column on the left margin.
4. Add or remove a graph:
  - a. Add a graph at the bottom:
    - i. Select **Add Graph** in the menu to display a new graph with default settings.
    - ii. Select the attributes for the new graph.
  - b. Remove a bottom graph:
    - Select **Delete Graph** in the menu to remove the bottom graph from the Main Window.

5. Click the **OK** button at the bottom of the **Configuration Dialog** to incorporate the change.

**❗ Important:**

A graph may be added only at the bottom. Only the bottom graph may be removed.

#### 4.3.4 Adding or Removing a Trace in a Graph

1. Right-click anywhere in the **Plot Area**.
2. Select the **Plot** tab in the **Configuration Dialog**.
3. Right-click the integer row # button immediately to the left of the **CyFlex Variable Name** field to show trace options.

*Figure 10: Plot Tab Trace Options*



4. Add or remove a trace:
  - a. Add a trace at the bottom:
    - i. Select **Add Row** in the menu to display a new trace row with default settings.
    - ii. Select the settings for the new trace in the row fields.
  - b. Remove a bottom trace:
    - o Select **Delete Row** in the menu to remove the row and its trace in the graph.
5. Click **OK** at the bottom of the **Configuration Dialog** to incorporate the change.

**❗ Important:**

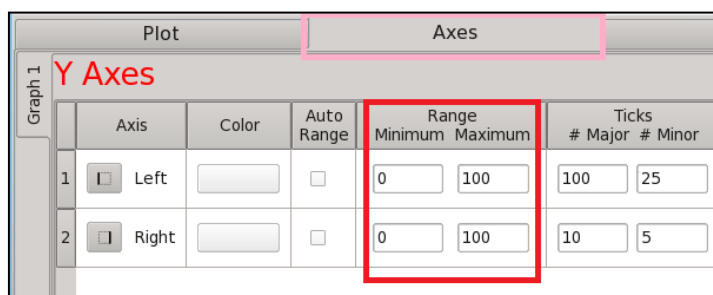
A trace row may be added only at the bottom. Only the bottom trace row may be removed.

### 4.3.5 Setting the Y Axis Range

Set or change the range of values for the Y Axes of the plot:

1. Right-click anywhere in the **Plot Area**.
2. Select the **Axes** tab in the **Configuration Dialog**. The **Y Axes** panel has one row each for the **Left** and **Right** axes.

*Figure 11: Axes Tab Y Axes Panel Range Settings*



Graph 1	Axis	Color	Auto Range	Range		Ticks	
				Minimum	Maximum	# Major	# Minor
1	<input type="checkbox"/> Left		<input type="checkbox"/>	0	100	100	25
2	<input type="checkbox"/> Right		<input type="checkbox"/>	0	100	10	5

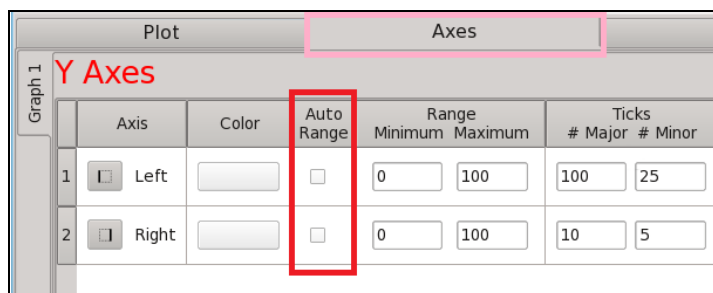
3. Click in the **Range Minimum** or **Maximum** field in the desired row as in *Figure 11* above.
4. Enter the numeric **Minimum** and **Maximum** values for the CyFlex Variable assigned to the Y Axis. The dialog will verify that the values are numeric and that the **Minimum** value is less than the **Maximum**.
5. Click **OK** at the bottom of the **Configuration Dialog** to incorporate the change.

### 4.3.6 Auto-Ranging the Y Axis

The program can automatically determine the optimum range for the Y Axis to ensure that all plotted values are visible and no clipping occurs:

1. Right-click anywhere in the **Plot Area**.
2. Select the **Axes** tab in the **Configuration Dialog**. The **Y Axes** panel has one row each for the **Left** and **Right** axes.

*Figure 12: Axes Tab Panel Y Axes Auto Range Settings*



Graph 1	Axis	Color	Auto Range	Range		Ticks	
				Minimum	Maximum	# Major	# Minor
1	<input type="checkbox"/> Left		<input type="checkbox"/>	0	100	100	25
2	<input type="checkbox"/> Right		<input type="checkbox"/>	0	100	10	5

3. Check the box in the **Auto Range** column for **Left** and/or **Right Axis** as in *Figure 12*.
4. Click **OK** at the bottom of the **Configuration Dialog** to incorporate the change.

The program will dynamically adjust the Y Axis range so that all of the data is displayed in the **Plot Area**.

When **Auto Range** is set, the **Range Minimum** and **Maximum** fields display the computed values but cannot be overwritten.

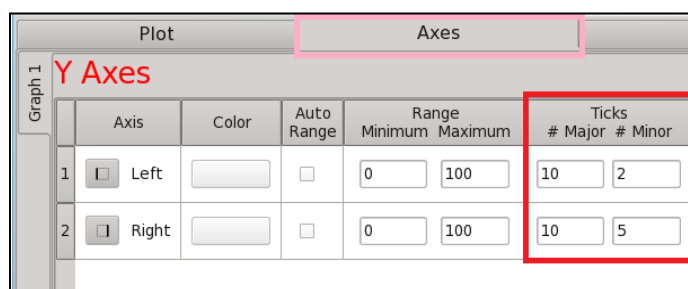
If both **Left** and **Right Y Axes** are displayed with **Auto Range**, then changing either one to a different gridline color is recommended.

### 4.3.7 Setting Gridlines and Tick Marks

Set or change the number of horizontal and vertical gridlines and tick marks:

1. Right-click anywhere in the **Plot Area**.
2. Select the **Axes** tab in the **Configuration Dialog**. The **Y Axes** panel has one row each for the **Left** and **Right** axes.

Figure 13: Axes Tab Y Axes Gridlines/Tick Mark Settings



Graph 1	Axis	Color	Auto Range	Range		Ticks	
				Minimum	Maximum	# Major	# Minor
1	<input type="checkbox"/> Left		<input type="checkbox"/>	0	100	10	2
2	<input type="checkbox"/> Right		<input type="checkbox"/>	0	100	10	5

3. Enter the integer number of horizontal gridlines to display in the **Ticks # Major** field in the desired row as in *Figure 13*. The dialog will verify that the value is a positive integer and will set gridlines at appropriate intervals.
4. Enter the integer number of Y Axis tick marks to display between each gridline in the **Ticks # Minor** field in the desired row as in *Figure 13*. The dialog will verify that the value is a positive integer and will set tick marks at appropriate intervals.
5. Click **OK** at the bottom of the **Configuration Dialog** to incorporate the change.



#### Notes:

For a Y Axis (its scale, labels, and gridlines) to be displayed, at least one Variable must be assigned to it in the Y Axis column in the **Plot** tab. Either Y Axis is optional and does not need to be assigned or displayed.

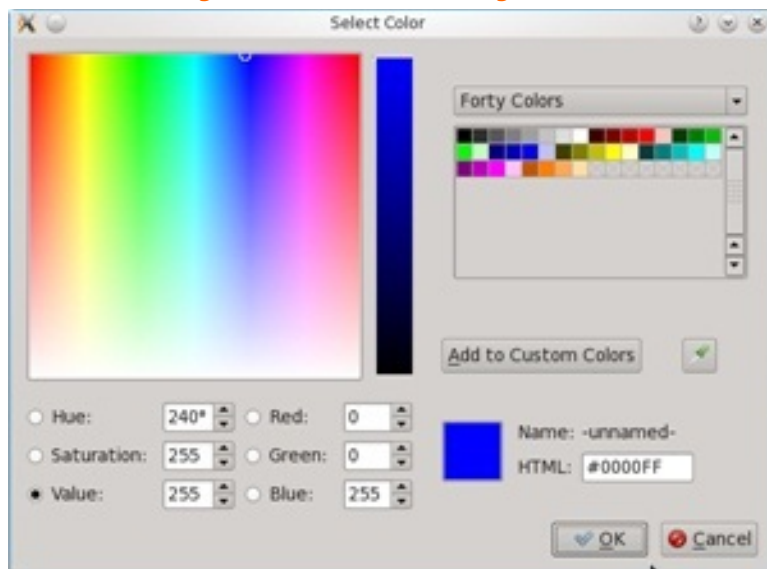
The requested number in **Ticks # Major** may not match the number of gridlines actually shown in the Main Window. The program computes the closest match so that the grid intervals are multiples of 1, 2, 5, or 10 times a power of 10. The corresponding grid is easy to interpolate as a result.

### 4.3.8 Changing Background Color of the Plot Area

Optionally change the background color of the **Plot Area** in the graph:

1. Right-click anywhere in the **Plot Area**.
2. Select the **Frame** tab in the **Configuration Dialog**.
3. Click the **Background Color** field to display the **Select Color** dialog as in Figure 14 on page 17.

Figure 14 Select Color Dialog



4. Select the background color:
  - a. Click in the color space.
  - b. Select from most recent choices
 or  
 adjust values in the **Hue** / **Saturation** / **Value** or **Red** / **Green** / **Blue** fields.
5. Click **OK** to incorporate the changes.

**Note:**

Changing the background color to white is recommended before capturing the Main Window image for printing.

#### 4.3.9 Viewing and Revising Configuration Changes in the Dialog

Change any of the plot attributes and see the effect when the Configuration Dialog is displayed:

1. Right-click anywhere in the **Plot Area**.
2. Change settings and then click the **Apply** button. Drag the dialog out of the view to see the results in the Main Window.
3. Keep or discard the changes:
  - a. To retain the changes, click **OK**. The dialog will close and the changes will be reflected in the Main Window.
  - b. To discard the changes, click **Cancel**. The dialog will close and none of the changes will be made in the Main Window.
4. Continue as desired by repeating steps 1 through 3.



## 4.4 Plot Manipulations

### 4.4.1 Pan-in the Graph

Use the mouse cursor to shift the current view in the **Plot Area** both horizontally (Time) and vertically (Variables).

1. To start Pan, click the **Pan Start** toggle button in the **Button Row** at top left in the graph.
2. Place the cursor in the **Plot Area** and drag it in any direction to “pan” or shift the image
3. To stop Pan, click the **Pan Stop** toggle button.



#### Notes:

- Hover the mouse over the **Button Row** to view a “tool tip” identifying any of the buttons.
- Pan remains in effect until clicking **Pan Stop**.
- As desired, launch the **Configuration Dialog** and change plot attributes during **Pan**.
- Pan and Zoom cannot be used together. Turn off one before starting the other.

### 4.4.2 Zoom in the Graph

Use the mouse cursor to magnify the current view in the **Plot Area** both horizontally (Time) and vertically (Variables) with the mouse cursor:

1. To start Zoom, click the **Zoom Start** toggle button in the **Button Row** at top left in the graph.

Figure 15: Zoom Start



2. Place the cursor in the **Plot Area** and drag it diagonally to “zoom in” or magnify the image to the rectangular area of interest.
3. To stop Zoom, click the **Zoom Stop** toggle button.



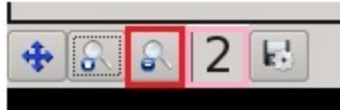
#### Notes:

- Zoom remains in effect until clicking **Zoom Stop**.
- You can zoom repeatedly until clicking the **Zoom Stop** button to stop. Zoom remains in effect until clicking **Zoom Stop**.
- Data are displayed in real-time during zoom and no data is lost.
- As desired, launch the **Configuration Dialog** and change plot attributes during Zoom.
- Pan and Zoom cannot be used together. Turn off one to enable the other.
- The Time and Y Axis labels will be updated and the number of gridlines maintained in all cases.

### 4.4.3 Zoom-In/Out the Graph

Zoom-In repeatedly for greater graph magnification. An integer step counter tracks the number of Zoom-In events in the current session.

Figure 16: Zoom In Button



1. If in Zoom mode, for each Zoom-In step, drag the cursor diagonally to the desired rectangular area.
2. Click the **Zoom Step Out** button each time to display each of the Zoom In steps in reverse, out to the original view. The counter will decrement for each step.

Figure 17: Zoom Step Out Button



3. Click the Zoom Reset button as in Figure 18 to display the original view.

Figure 18: Zoom Reset



• **Notes:**

- Hover the mouse over the **Button Row** to view a “tool tip” identifying any of the buttons.
- Zoom remains in effect during Zoom In, Zoom Step Out, and Zoom Reset, until clicking the **Zoom Start / Stop** button again

### 4.5 Working in the Plot Tab

Use the **Plot** tab in the **Configuration Dialog** to change the traces displayed in the Main Window. Add or remove traces and change the attributes of their display. If your HistoryPlot has more than one graph, select the one to change with the numbered **Graph** tabs at the left margin of the dialog,

Each row of the **Plot** tab indicates the current settings for one trace in the selected graph. Each cell in the row affects one of its display attributes. Change any of these attributes by selecting from the valid choices assigned to each one.

Figure 19: Cell Display Attributes

	Cyflex Variable Name	Y Axis	Color	Trace	
				Line Type	Thickness
1	pdv_rpm_01 [rpm]	<input type="checkbox"/> Left	<div style="background-color: red; width: 30px; height: 15px;"></div>	<input checked="" type="checkbox"/> Solid	1

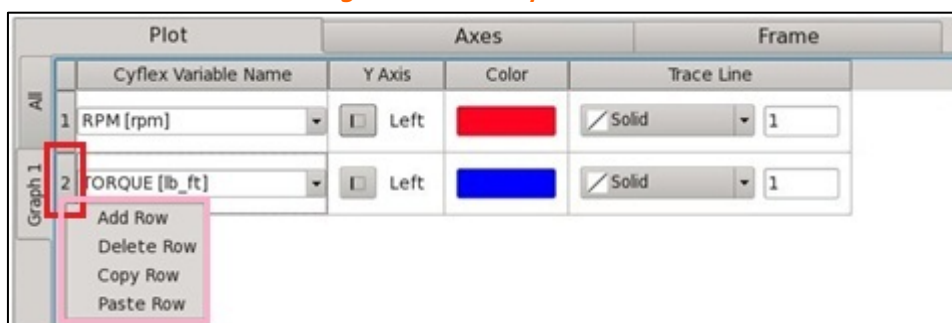
### 4.5.1 Trace Options

The following trace options apply to an entire row or trace:

- **Add**
- **Delete**
- **Copy**
- **Paste**

1. Right-click the integer # button immediately to the left of the X Variable Name field to display trace options as in *Figure 20* below.

*Figure 20: Trace Options*



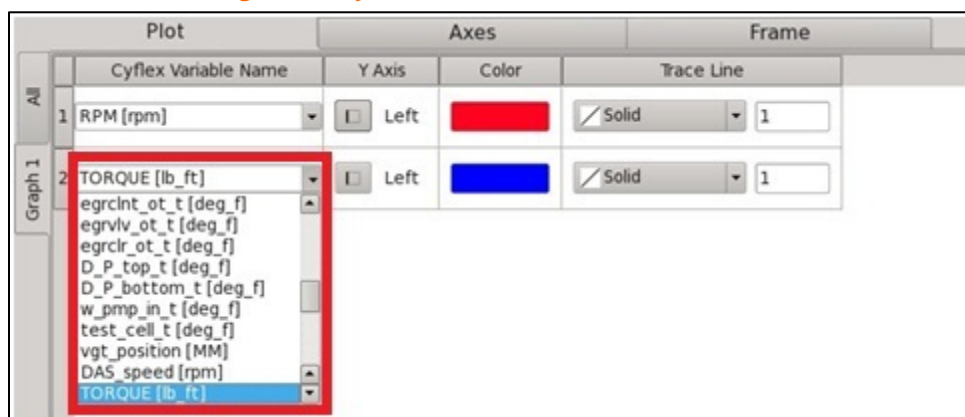
2. Select an option for that row:
  - **Add Row** to add a new below the current rows for a new trace with default values.
  - **Delete Row** to delete the row from the **Plot** tab and its trace from the graph.
  - **Copy Row** to copy the settings for the current row; use with **Add** and **Paste** to add a similar trace row.
  - **Paste Row** to paste the settings from the previously copied row in the added row; used after **Add** and **Copy**.

The sequence to copy a row to a new one is **Add**, **Copy**, and **Paste**. Then edit the settings for the new trace row.

### 4.5.2 CyFlex Variable Name

The **CyFlex Variable Name** is the name assigned in a specs file for the CyFlex Variable to plot.

*Figure 21: CyFlex Variables Name Pulldown List*



Select a **CyFlex Variable Name**:

1. Click and scroll in the pulldown list of valid **CyFlex Variables Names** to select one.
2. If you know the first few characters of the **CyFlex Variable Name**, click in the field and start to type the name. The pulldown list will appear, starting at the entered characters. Scroll in this filtered list and click your selection.
3. The current units of measure are appended in brackets to the Variable Name.

### 4.5.3 Y-Axis

Select to designate **Left** or **Right Y-Axis** for the trace.

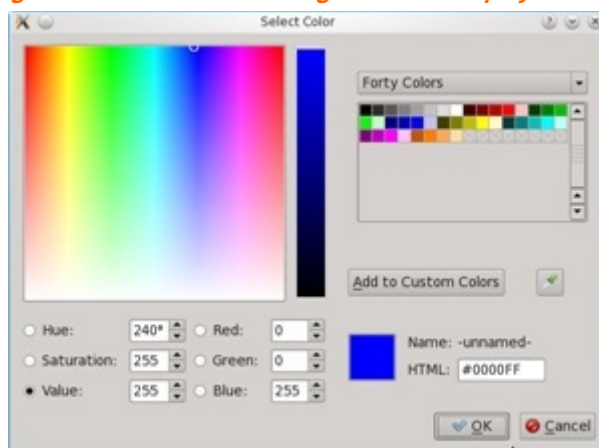
1. Click on the button to toggle between assigning the **Left** and **Right Y Axis** to the trace.
2. If all of the traces in a graph are assigned to the same **Y Axis**, then the other axis will not be displayed, including its scale, label, and gridlines. At least one of the traces must be assigned to an axis to display it.

### 4.5.4 Color

Select the color for the trace display.

1. Click the color field to open the **Select Color** dialog as in *Figure 22*.

*Figure 22: Select Color Dialog for Trace Display*



2. Choose the trace color:
  - a. Click in the color space.
  - b. Select from most recent choices
 or  
 adjust the numeric values in the **Hue** / **Saturation** / **Value** or **Red** / **Green** / **Blue** fields.
3. Click the **OK** button to incorporate the change.

### 4.5.5 Trace / Line Type

Select the pattern of the trace line.

Click in the pulldown list to choose one of the following pattern types for the trace line:

- **Solid**
- **Dashed**
- **Dot**
- **Dot Dash**

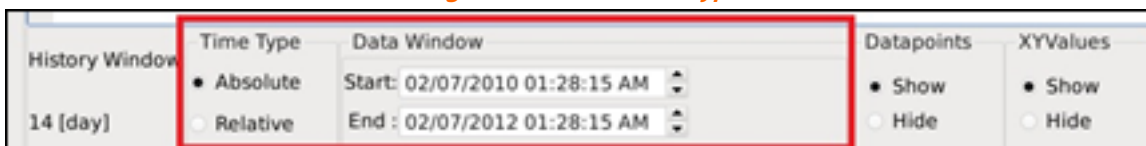
### 4.5.6 Trace / Thickness

Specify the thickness of the trace line. Enter an integer in the range **1** to **5**, where greater is thicker.

### 4.5.7 Time Type and Data Window

Select the format for the **Start** and **End** times in the **Data Window**.

*Figure 23: Select Time Type*



1. Select one of the following **Time Types**:
  - **Absolute** to display times in full Date and Time timestamp, e.g. 07/04/2076 10:30:00 [mm/dd/year hh:mm:ss].
  - **Relative** to display times in days prior to the most recent sample, e.g. 5.7 [day].
2. Select **Start** and **End** times for plotting under **Data Window**.
  - The default values indicate the time period covered in the current history file
  - If the **Time Type** is **Relative**, then you may choose the most recent sample for the **End** time by checking the **Current** box.

### 4.5.8 Datapoint Markers

Display or hide marker symbols  at the recorded datapoints in traces.

Select the **Show** or **Hide** toggle button.

The trace is composed of straight line segments between these datapoints.

### 4.5.9 XY Values

Display or hide a text display of X (Time) and Y values for the datapoint nearest to the cursor.

Select the **Show** or **Hide** toggle button.

A line segment from the cursor identifies the nearest datapoint.

## 4.6 Working in the Axes Tab

Use the **Axes** tab in the **Configuration Dialog** to change the axes displayed in the Main Window. Change the settings for either of the vertical **Left** and **Right Y Axes** and the horizontal **Time Axis**. If your HistoryPlot has more than one graph, select the one to change with the numbered graph tabs at the left margin of the dialog.

Each row of the **Axes** Tab indicates the current settings for one axis in the selected **Graph**. Each cell in the row affects one of its display attributes. Change any of these attributes by selecting from the valid choices assigned to each one.

### 4.6.1 Y Axes

Figure 24 shows the **Y Axes** portion of the **Axes** Tab.

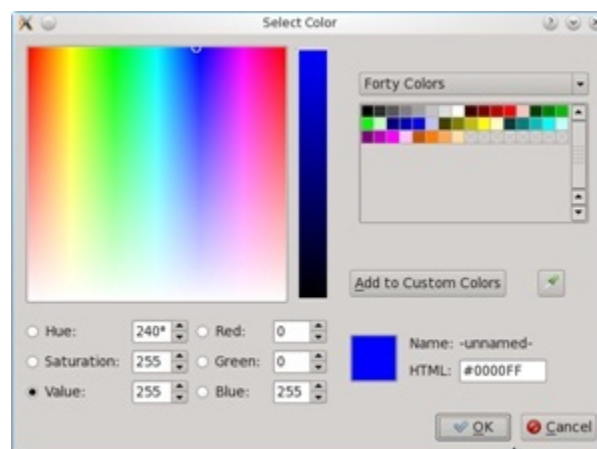
Figure 24: Y Axes Fields

Y Axes												
	Axis	Color	Auto Range	Range		Ticks		Label	Grid Color	Grid No Grid	Line Type	Grid Thickness
				Minimum	Maximum	# Major	# Minor					
1	<input type="checkbox"/> Left		<input type="checkbox"/>	0	100	10	5	RPM		<input type="checkbox"/>	<input checked="" type="checkbox"/> Solid	1
2	<input type="checkbox"/> Right		<input type="checkbox"/>	0	100	10	2	Torque		<input type="checkbox"/>	<input checked="" type="checkbox"/> Solid	1

Set the following in the **Y Axes** columns:

- **Axis:** identifies the **Left** or **Right** Y Axis for which the other fields in the row apply. These settings are disabled.
- **Color:** select the color for the Y Axis label and scale:
  - Click in the color field to display the **Select Color** dialog as in Figure 25.

Figure 25: Select Color Dialog for Axis Label and Scale



- Select from most recent choices  
or  
adjust the numeric values in the **Hue / Saturation / Value** or **Red / Green / Blue** fields.
- Click **OK** to incorporate the change.

- **Auto Range:** enable or disable auto ranging to dynamically adjust the Y Axis range so that all data is displayed in the **Plot Area**.
  - Check the box to start auto ranging and suspend the **Range Minimum** and **Maximum** fields.
  - Uncheck the box to stop auto ranging and activate the **Range Minimum** and **Maximum** fields.
- **Range / Minimum:** specify the minimum value for the Y Axis scale.  
Enter the numeric value for the minimum Y Axis scale when auto ranging is disabled.
- **Range / Maximum:** specify the maximum value for the Y Axis scale.  
Enter the numeric value for the maximum Y Axis scale when auto ranging is disabled.
- **Ticks / # Major:** specify the number of horizontal gridlines to display.  
Enter the integer number of horizontal gridlines to display in the **Plot Area**.
- **Ticks / # Minor:** specify the number of tick marks to display on the Y Axis scale.  
Enter the integer number of tick marks to display between each horizontal gridline on the Y axis scale.
- **Label:** specify the text label displayed next to the Y Axis scale.  
Enter descriptive text for the Y axis.
- **Grid / Color:** select the color of the horizontal gridlines:
  - a. Click in the color field to display the **Select Color** dialog.
  - b. Select from most recent choices  
or  
adjust the numeric values in the **Hue / Saturation / Value** or **Red / Green / Blue** fields.
  - c. Click **OK** to incorporate the change.
- **Grid / No Grid:** select whether to show or hide horizontal gridlines.
  - Check the box to display horizontal gridlines.
  - Uncheck the box to hide horizontal gridlines.
- **Grid / Line Type:** select the pattern of the gridlines. Click in the pulldown list to choose one of the following pattern types:
  - **Solid**
  - **Dashed**
  - **Dot**
  - **Dot Dash**
- **Grid / Thickness:** specify the thickness of the gridlines. Enter an integer in the range **1** to **5** where greater is thicker.

## 4.6.2 Time Axis

Figure 26 shows the **Time Axis** portion of the **Axes** Tab.

Figure 26: Time Axis Fields



	Range	Units	Increments	Grid Color	Grid Line
1	30	Seconds	5	1	Solid

Set the following in the **Time Axis** columns:

- **Range** and **Units** are the **Time Axis** time duration in unit type. These are computed from the entries in the **Data Window** in the Plot tab. Refer to *Section 4.5.7 Time Type and Data Window* on page 22.
- **Increments / Major**: enter the integer number of vertical gridlines to display in the **Plot Area**.
- **Increments / Minor**: enter the integer number of tick marks to display between each vertical gridline on the **Time Axis** scale.
- **Grid / Color**: select the color of the horizontal gridlines:
  - Click in the color field to display the **Select Color** dialog.
  - Select from most recent choices
  - or
  - adjust the numeric values in the **Hue / Saturation / Value** or **Red / Green / Blue** fields.
  - Click **OK** to incorporate the change.
- **Grid / Line Type**: select the pattern of the gridlines. Click in the pulldown list to choose one of the following pattern types:
  - **Solid**
  - **Dashed**
  - **Dot**
  - **Dot Dash**
- **Grid / Thickness**: specify the thickness of the gridlines. Enter an integer in the range **1** to **5** where greater is thicker.



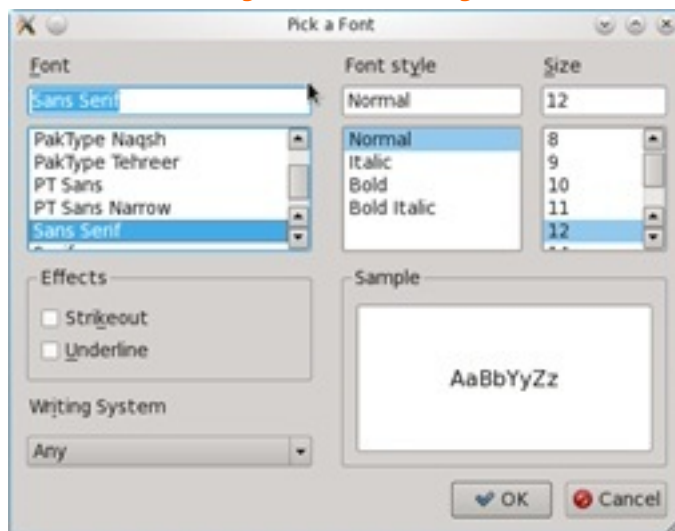
## 4.7 Working in the Frame Tab

### 4.7.1 Plot Title

Select **Plot Title** to change the text string that appears at top left in the frame of the Main Window:

1. Enter the literal text string for the **Plot Title**.
2. Click the **Font** button to display the **Font** dialog as in *Figure 27* below.

*Figure 27: Font Dialog*



3. Select the **Font**, **Font Style**, and **Size** of the text in the dialog, then click the **OK** button to incorporate changes.

### 4.7.2 Plot Subtitle

Select **Plot Subtitle** to change the text string that appears at top right in the frame of the Main Window:

1. Enter the literal text string for the **Plot Subtitle**.
2. Click the **Font** button to display the **Font** dialog.
3. Select the **Font**, **Font Style**, and **Size** of the text in the dialog, then click the **OK** button to incorporate changes.

### 4.7.3 Note

Select **Note** to change the text string that appears at bottom left in the frame of the Main Window:

1. Enter the literal text string for the **Note**.
2. Click the **Font** button to display the **Font** dialog.
3. Select the **Font**, **Font Style**, and **Size** of the text in the dialog, then click the **OK** button to incorporate changes.

#### 4.7.4 Legend

Select **Legend** and then select whether to **Show** or **Hide** the text that associates the trace colors with their CyFlex Variable names.

Click the **Show** or **Hide** toggle button to show or hide the **Legend** in each graph.

#### 4.7.5 Background Color

Change the background color of the **Plot Area** in each graph:

1. Click the **Background Color** field to open the **Select Color** dialog.
2. Choose the background color for all graphs:
  - a. Click in the color space.
  - b. Select from most recent choices
 or  
 adjust the numeric values in the **Hue / Saturation / Value** or **Red / Green / Blue** fields.
3. Click **OK** to select the color.
4. Click the **OK** button at the bottom of the **Configuration Dialog** to incorporate the changes.

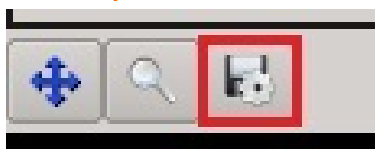
### 4.8 Saving Data

#### 4.8.1 Saving Collected Data to a File

To save all of the data currently stored and plotted in a graph to a spreadsheet ( .csv ) file:

1. Click the **Export Data to CSV File** button in the Button Row at top left in the graph.

*Figure 28: Export to CSV Button*



2. The program will display the **Save File As** dialog.
2. Enter a new filename in the **Name:** field or click one of the existing filenames to overwrite it.
3. Keep the default directory /tmp/ for the file or select another directory.
4. Click the **Save** button to save the data file.

#### 4.8.2 Saving and Printing Graphs

Save and print a graphical image of the HistoryPlot Main Window:

1. Pause and optionally pan in the graph to the desired view. Refer to *Section 4.4.1 Pan-in the Graph* on page 18.
2. Press the PrintSC key. The Linux **KSnapshot** dialog appears.
3. Select **Window Under Cursor** in the **Capture mode:** list.

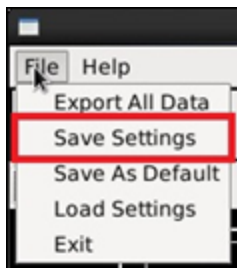
4. Click the **New Snapshot** button. The **KSnapshot** dialog disappears.
5. Click the Main Window. The **KSnapshot** dialog appears again
6. Click the **Save As** button. The **Save As - KSnapshot** file dialog appears.
7. Complete the **filename** and **directory** entries.
8. Click the **Save** button to save the image file.
9. Print the image directly from the file with any of the standard graphics programs provided in the **KMenu > graphics** list such as **KolourPaint** or **Kooka**.

## 4.9 Saving and Using Configurations

Save the current plot settings to either an existing configuration file or a new one from the **File** menu at top left in the Main Window:

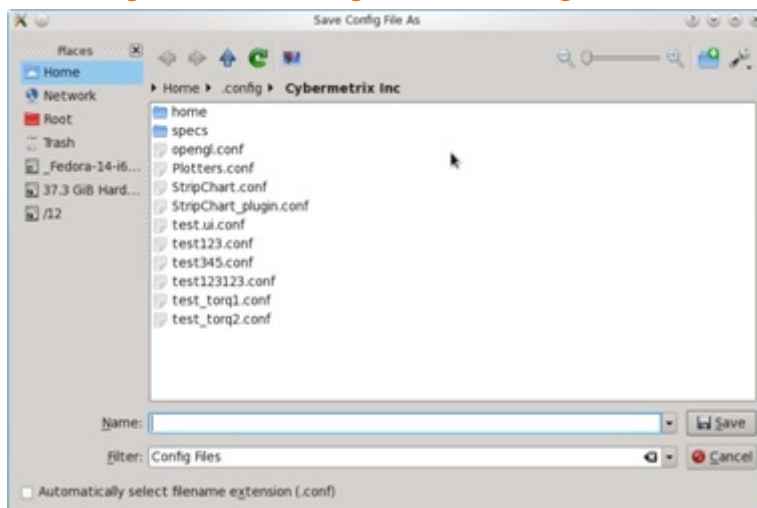
1. Click **File > Save Settings** as in *Figure 29*.

*Figure 29: Save Configuration Settings*



2. The program will display the **Save Config File As** dialog as in *Figure 30*.

*Figure 30: Save Configuration File Dialog*

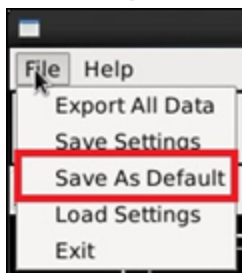


3. Enter a new filename in the **Name:** field or click one of the existing filenames to overwrite it.
4. Click the **Save** button at bottom right to incorporate the change.

To save the current plot settings as the default configuration, the one that is loaded automatically at startup:

- Click **File > Save Settings** as in *Figure 31*

*Figure 31: Save as Configuration Default*



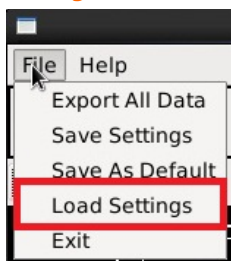
**Save As Default** is helpful by establishing a common starting point or to return to the current configuration easily in the future.

#### 4.9.1 Loading an Existing Configuration

Load plot settings in an existing configuration file from the **File** menu at top left in the Main Window:

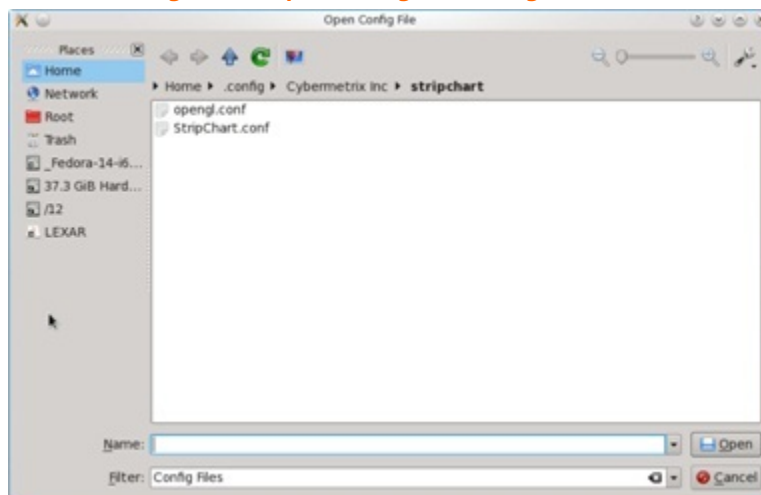
1. Click **File > Load Settings** as in *Figure 32*.

*Figure 32: Load Configuration File Settings*



2. The **Open Config File** dialog is displayed as in *Figure 33*.

*Figure 33: Open Config File Dialog*



3. Select one of the existing Configuration filenames as indicated by the `.conf` file extension.
4. Click the **Open** button at bottom right to load the settings.

#### 4.9.2 Loading a Configuration at Startup

Use the following command to select the Configuration file to load at program startup:

```
qthistoryplot -f [base filename]
```

where the *base filename* is the Configuration filename without the brackets and without the standard `.conf` extension.

This format assumes that the Configuration files are in their default directory:

```
/home/[username]/.config/Cybermetrix Inc/Historyplot/
```

The program will use its default configuration if no `-f` file option is used.