CyFlex® Stripchart User Guide

Version 4

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Developed by Transportation 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

The CyFlex® test automation system provides a general-purpose "stripchart" application that is the graphical analog of the legacy electromechanical stripchart recorders. It displays a column of rectangular Plot Areas that render real-time traces of selected CyFlex Variables. A single Stripchart application may be configured into a stack of up to 8 Graphs with up to 8 Traces in each Graph.

Each Graph has a scrolling 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.

Change the various configuration settings in a floating Configuration Dialog, save configurations, and later reload them as desired. The Dialog enables change to a wide variety of plot attributes:

- Which CyFlex Variables to plot
- 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.

Stripchart joins the toolbox of CyFlex applications that deliver graphics at the 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 **Operator Display** and the suite of CyFlex plot applications.

1.1 Features

Stripchart provides a full complement of graphics functionality, including the following sets of features. These features may be started from either the Menu Bar, the Button Row or the Configuration Dialog.

1.1.1   Stripchart Uses

- Standalone application displays selected Graphs in a vertical stack
- Application may be started from CyFlex menu or from command line with optional automatic start plotting and configuration file.
- Plug-in version may be embedded in CyFlex Operator Display

1.1.2   Plotting Capabilities

- Each instance has 1-8 Graphs, each with 1-8 real-time Traces of CyFlex Variable values versus time duration.
- Plot refresh may be specified in rate [Hz] or interval [msec] from 0.1 [Hz] to 50 [Hz].
- Data sampling may be specified independently in rate [Hz] or interval [msec] in the range specified for CyFlex Slow to Fast Channels, typically 1 [Hz] to 50 [Hz].
- Assign a CyFlex Variable to a real-time Trace from a list that automatically completes the name and appends its specified units.

- 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 for 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 major and minor increments of the Grid and its line color, pattern, and thickness.
- Pause and resume plotting without loss of data.
- Stop and restart plotting with the time reset to zero.

1.1.3   Configuration Settings

- Configuration "specs" can be saved or loaded by filename in the standalone Stripchart application.
- Plot attributes may be changed interactively: right-click anywhere in window to launch 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 and pattern.
- Configuration changes may be "applied" on trial and then accepted or canceled.
- Add a Trace, remove a Trace, or copy/paste a Trace in each Graph.

1.1.4   Program Utilities

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

1.2 Requirements and Constraints

1.2.1   Requirements

- Stripchart operates as part of the CyFlex test automation system. CyFlex must be running on the test system to create the CyFlex Variables that Stripchart 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 are in place when specifying the Stripchart program configuration and operation:

- **Variable types:** CyFlex Variables may be selected for plotting by name. Real and **Integer** Variables are currently supported and displayed automatically in the **CyFlex Variable Names** pulldown list on the **Plot** tab of the **Configuration Dialog**.

- **Number of Graphs:** Stripchart 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:** Stripchart supports up to eight Traces, one for each CyFlex Variable specified, 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**.

- **Sample Rates:** Stripchart enforces Data Sample Rates in the range 1 – 50 [Hz], covering the typical Slow to Fast Channel sample rates.
  - The program ignores attempts to enter values outside this range in the **Plot** tab of the **Configuration Dialog**.

- **Refresh Rates:** Stripchart enforces Display Refresh Rates in the range 0.1 – 50 [Hz], covering rates from very low computer utilization to refresh faster than any perceptible difference
  - The program ignores attempts to enter values outside this range in the **Plot** tab of the **Configuration Dialog**.

- **Data Storage** – Stripchart limits the total number of Data Samples per Trace to 360,000, the number of samples for a 10 [Hz] channel over an hour.
  - Once the Data Storage buffer is full, the program drops the oldest data as it adds the newest.

- o The actual clock time covered in the Data Storage clearly depends on the **Data Sample Rate**: high rates fill the buffer in less time than lower rates.
- o 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 file.

1.3 Terminology

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

Table 1: Terminology

Term	Description
Main Window	The complete window that appears when the application starts
Configuration	The plot settings that dictate the function and appearance of the **Main Window** and its **Graphs**. The settings may be changed in the **Configuration Dialog** and then saved to and loaded from a configuration file.
Configuration Dialog	A floating dialog window for configuring the various settings that manage the plot functionality.
Graph	The basic stripchart display panel that includes the graphical plots, axes, labels, and auxiliary buttons. The **Stripchart** window is comprised of a column of one or more Graphs, numbered with 1 at the top.
Channel	A CyFlex Variable selected for plotting by its numeric value, name, and units.
Plot Area	The primary rectangular portion of the Graph that displays the scrolling real-time plot of the selected CyFlex Variable Channels, including the value Traces and the gridlines.
	Figure 1: Plot Area
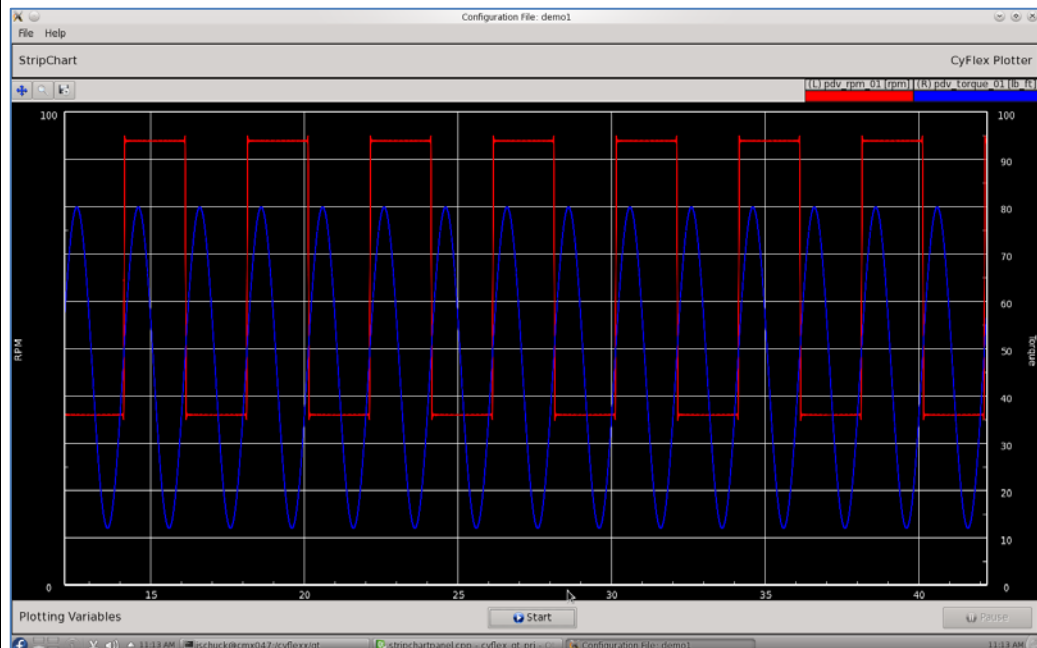
| Term	Description
Frame	The border of the **Main Window** that includes the **Title** and **Subtitle** fields at the top and the **Note** field and **Start/Stop** and **Pause/Resume** buttons at the bottom.
Trace	The continuous plot of the numeric values over time for one channel, displayed in the **Plot Area** as a horizontally scrolling line.
Axes	The horizontal / time scale (**Time**) and the vertical / value scale(s) (**Y**) at the perimeter of the **Plot Area**, including numeric value labels and major and minor tick marks.
Time Axis	The scrolling horizontal axis that displays time duration from the last Start.
Y Axes	The vertical axes that display scales for selected **Channels** at the left edge (**Left Y Axis**) and optionally the right edge (**Right Y Axis**) of the **Plot Area**.
Grid	The set of horizontal and vertical lines in the **Plot Area** that give numeric reference to the traces.
Button Row	The horizontal row of active buttons above the top left corner of the **Plot Area** for **Pan**, **Zoom**, and **Export**.
Legend	The horizontal row of trace identifiers above the top right corner of the **Plot Area** to match CyFlex Variable names with trace colors.
Data Sampling	The periodic acquisition of data from CyFlex shared memory of the current values for the specified Variables, expressed in either frequency [Hz] or interval [msec].
Display Refresh	The periodic refresh of the Graph and its Traces expressed in either frequency [Hz] or interval [msec].
Data Storage	Data collected for each Channel in a Graph since the last Start is stored in the program. It can be saved to a spreadsheet file from the **Main Window** menu by selecting **File -> Export All Data**.

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 2* shows an annotated Main Stripchart window.

<div align="center">*Figure 2: Annotated Main Stripchart Window*</div>
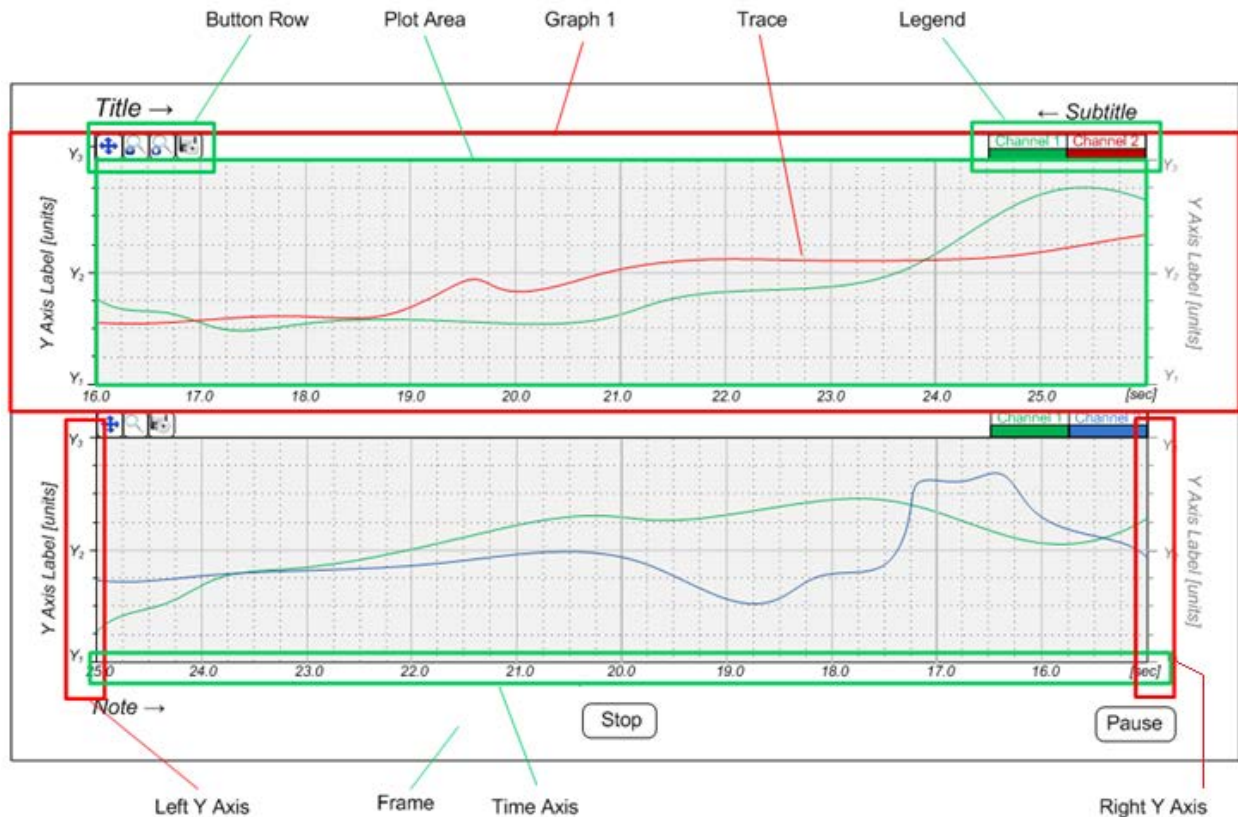
2.1 Graph

The Main Window is composed of a vertical stack of one or more Stripchart Graphs displayed as fixed rectangular panels. Each Graph is an independent instance of the basic real-time Stripchart. Their vertical alignment allows them to have the same **Time Axis** and scale. The **Time Axis** is displayed in each panel and they may have different durations if desired.

In each Graph there is a rectangular **Plot Area** in which the line Traces of the chosen CyFlex Variable values scroll with the horizontal **Time Axis**. It includes horizontal and vertical gridlines that match the major increments for the axis scales.

2.2 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 load configuration settings, and exiting the program. The latter launches the **Help** dialog browser.

2.3 Buttons

Each Stripchart Graph has a row of action buttons at the top left edge of its **Plot Area**:

- **Pan** toggles start and stop panning.
- **Zoom** starts successive zoom in and then stepped zoom out and stop zoom.
- **Export** writes **Data Suffer** contents for this Graph to a spreadsheet file.

2.4 Legend

Each Stripchart Graph has a row of Legend graphics at the top right edge of its **Plot Area**. Each Legend shows the CyFlex Variable name assigned to the color of a Trace in the **Plot Area**.

2.5 Frame

The Main Window area outside of the Graphs provides space for a Title, a Subtitle, and a Note. Buttons are also displayed at bottom right that:

- **Pause**
- **Resume and Start**
- **Stop plotting all Graphs at once**

3   Configuration Dialog Layout

The **Configuration Dialog** is a floating window launched from the Main Window that enables valid options for changing 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 bring up the dialog It is organized in three tabs:

1. **Plot**
   - Set the CyFlex Variables to plot by name, assign to the X or Y Axes, and set the trace color, line type, and thickness.
   - Set the rates [Hz] or intervals [msec] for screen refresh and Data Sample.
2. **Axes**
   - Set the **Left** and **Right Axis** color, enable/disable **Auto Range**, **Minimum** and **Maximum Range**, numbers of major (gridline) and minor ticks, axis label, and 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 **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.
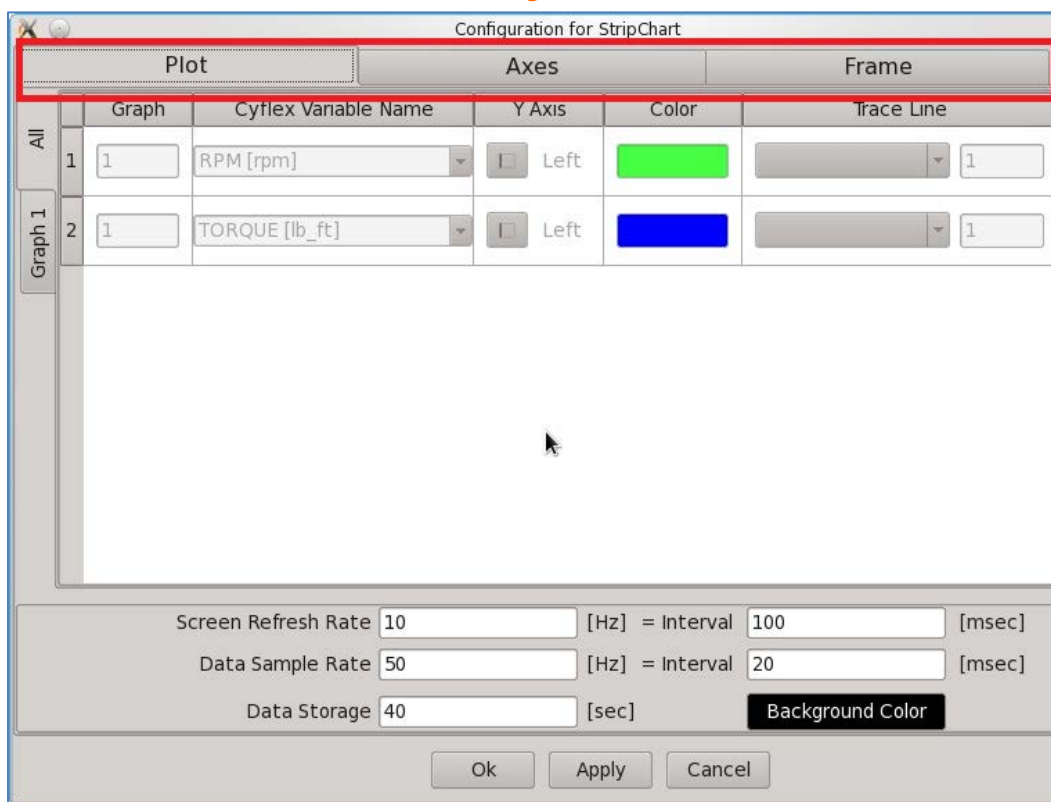
3.3 Feature Tabs

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.

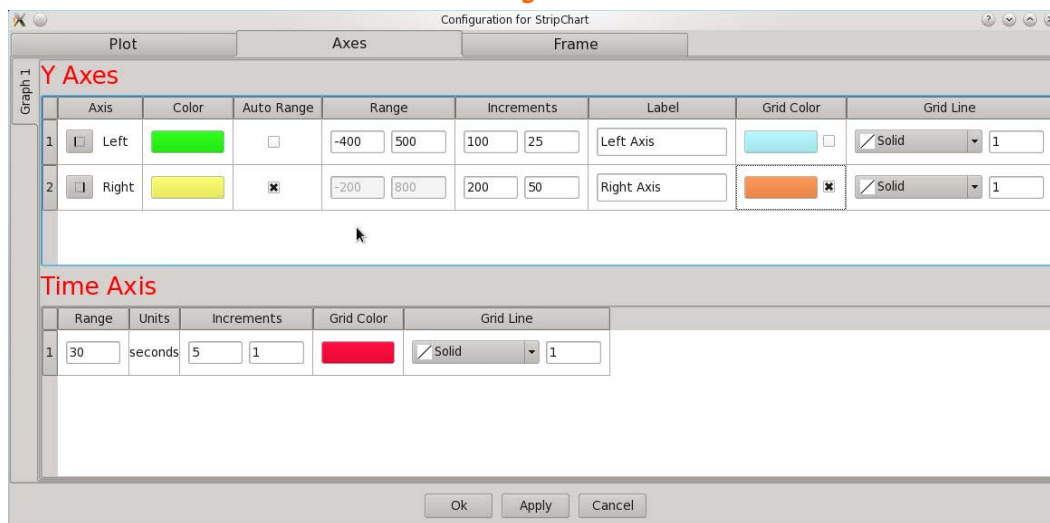*Figure 3: Plot Tab*

- Each row describes a Trace of one CyFlex Variable
- Each column corresponds to a plot attribute, such as **CyFlex Variable Name**, Trace **Color**, left or right **Y Axis**, etc.

3.3.2 Axes Tab

The **Axes** tab is organized as a spreadsheet. t with a row each for the vertical **Left** and **Right Y Axes** and a row for the horizontal **Time Axis** and each column setting an axis attribute, such as **Range**, **Color**, and major and minor increments.

Figure 4: Axes Tab

The tab includes rows for:

- o Each vertical **Left** and **Right Y Axes**
- o The horizontal **Time Axis**

Each column setting includes an axis attribute such as:

- o **Range**
- o **Color**
- o Major and minor increments

3.3.3 Frame Tab

The **Frame** tab displays fields for setting the text and font of the Frame in the Main Window.

Figure 5: Frame Tab
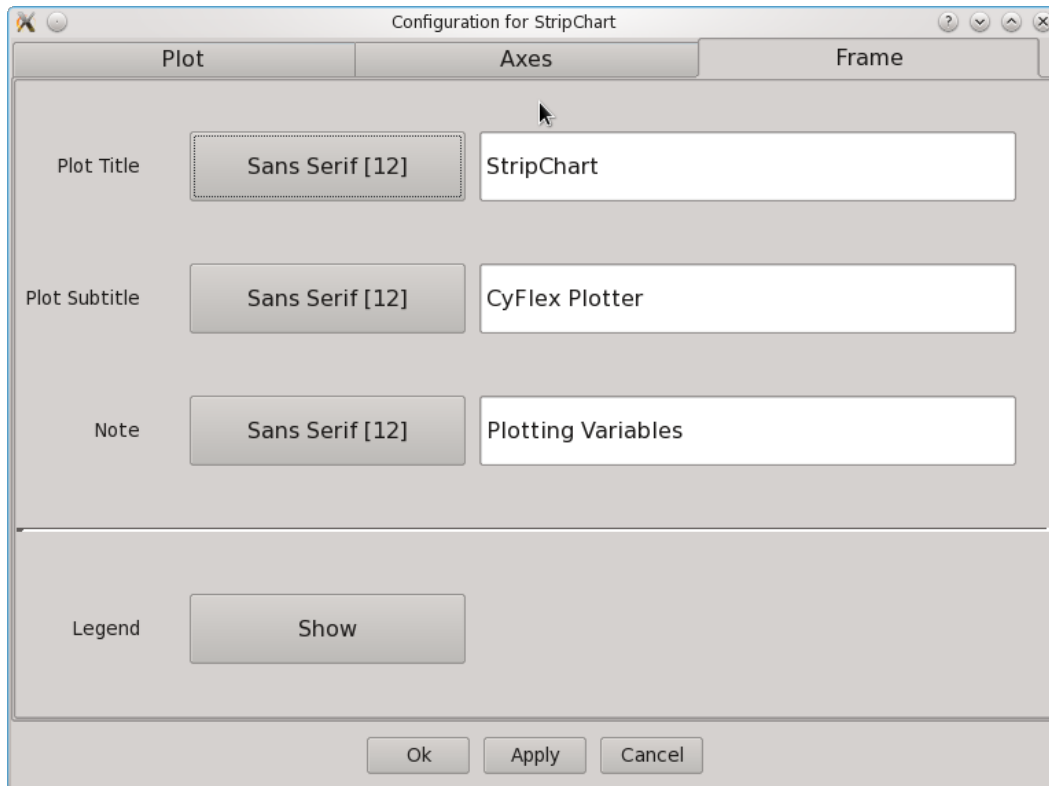
- Select text and font options for:
  - **Plot Title**
  - **Plot Subtitle**
  - **Note**
- Select whether to show / hide the **Legend** on all Graphs.

3.4 Buttons

Select the following buttons located in the bottom margin of the **Configuration Dialog** as needed:

- **OK** to accept the setting changes and close the Dialog.
- **Apply** to try the current settings.
- **Cancel** to cancel the setting changes and close the Dialog.

4 Using Stripchart

4.1 Starting and Stopping Stripchart

4.1.1 Starting Stripchart

Use any of the following methods to start Stripchart:

- Select the Stripchart icon on the console monitor

- Enter `qtstripchart` on the command line.

- Use a test mode in a General Purpose `gp_test script`:

```
@BACKGROUND_TASK
            AT_START "qtstripchart"
```

ⓘ *Important:*

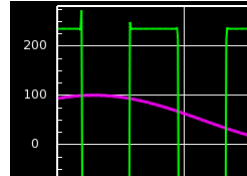The program will use the default configuration at startup unless a different one is selected in the command line. Refer to *Section 4.9 Saving and Using Configurations* on page 29 for related information.

4.1.2 Stopping Stripchart

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

Figure 6: Exiting Stripchart
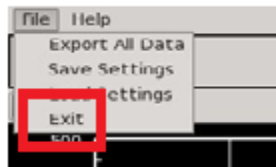
2. The program will prompt to save the current configuration to a file.

3. Upon file save, the program will stop and the Main Window will disappear.

4.2 Starting and Stopping Plot

Starting and stopping the plot will also start and stop Data Storage. Starting again will erase any stored data and restart Data Storage.

To keep the stored data and continue collecting it, use the **Pause** and **Resume** button sequence instead. Refer to *Section 4.2.3 Pausing* and *Resuming Data Plot on page 13*.

To stop the plot and save the stored data to a file, do so before clicking the **Start** button to restart the plot.

ⓘ *Important:*

Any sequence of **Stop** and then **Start** will erase all currently stored data.

4.2.1   Starting Data Plot

1. Click the **Start** button in the middle of the bottom frame to begin plotting data in real-time.
2. Data storage also starts.
3. The button label will change to **Stop**.

4.2.2   Stopping Data Plot

1. Click the **Stop** button in the middle of the bottom frame to stop plotting data.
2. Data storage also stops.
3. The button label will change to **Start**.

4.2.3   Pausing and Resuming Data Plot

To pause:

1. Click the **Pause** button at the right end of the bottom frame.
2. Data storage will continue up to the capacity specified in the **Data Storage** field under the **Plot** tab of the **Configuration Dialog**.
3. The button label will change to **Resume**.

To resume:

1. Click the **Resume** button at the right end of the bottom frame.
2. The plot will display the data during the pause and **Data Storage** has not been interrupted.
3. The button label will change to **Pause**.

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 dialog.

Figure 7: Plot Tab to Select CyFlex Variables
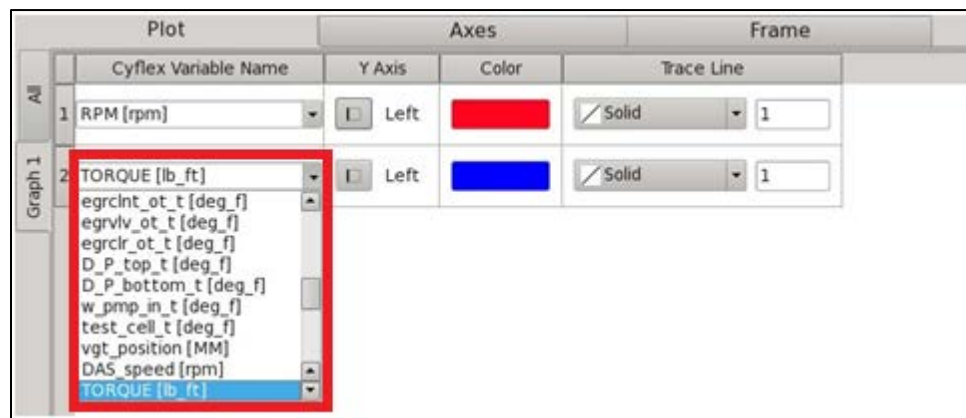
3. Click on the desired row in the **CyFlex Variable Name** field as in *Figure 7*. Each row displays the attributes of the Trace of a Variable.

---

4. Enter the Variable Name:

    a. Click the name when the full name appears in the **CyFlex Variable Name** list

       or

       Enter the first few characters of the desired **CyFlex Variable Name**. The resulting list will display matching choices to select.

       or

       Click the down arrow at the end of the **CyFlex Variable Name** field, scroll to and click the desired selection.

    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 both Real and Integer Variables sorted together alphabetically.

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

4.3.2 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 8: Plot Tab to Add or Remove a Graph
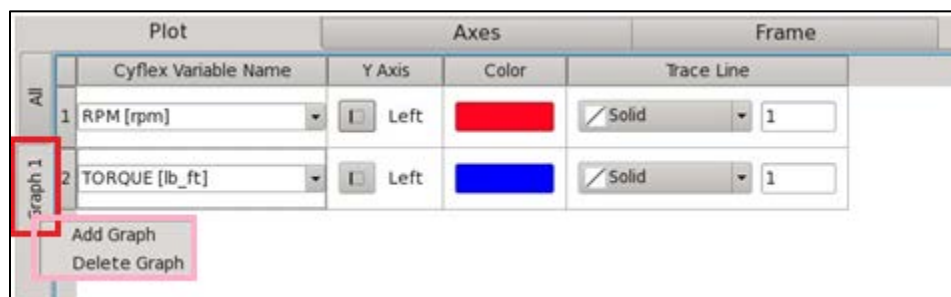
    3. Right-click on the bottom (highest number) graph tab in the column on the left margin as in *Figure 8*.

    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:

          o 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.
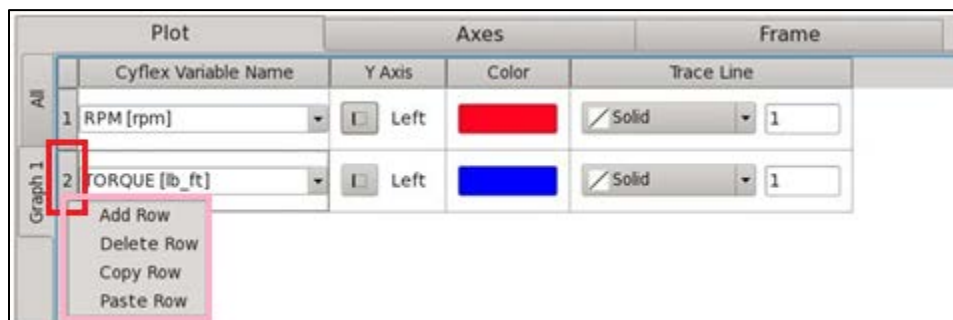
ⓘ *Important:*

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

4.3.3 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**.

Figure 9: Plot Tab to Add or Remove a Trace

3. Right-click the integer row # button immediately to the left of the **CyFlex Variable Name** field to show the Trace Options menu as in *Figure 9*.

4. Add or remove a trace:
   a. Add a trace:
      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 trace:
      o Select **Delete Row** in the menu to remove the row and its trace in the graph.

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

4.3.4 Setting the Y Axis Range

The Y Axis range can be manually set or auto-ranged to let the program automatically determine the optimum range for the Y Axis to ensure that all plotted values are visible and no clipping occurs.

4.3.4.1 *Manually Setting the Y Axis Range*

1. Right-click anywhere in the **Plot Area**.

2. Select the **Axes** tab in the **Configuration Dialog**.

Figure 10: Configuration Dialog to Manually Set Y Axis Range
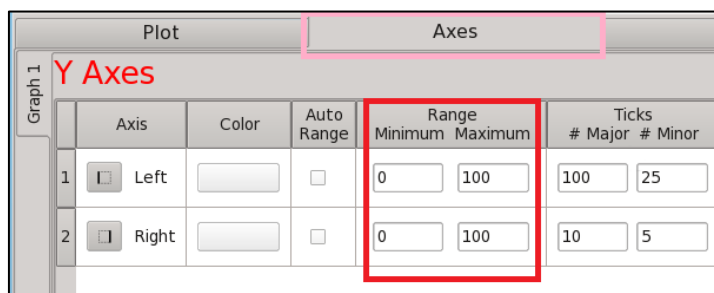
3. As in *Figure 10*, click in the **Range Minimum** or **Maximum** field in the desired row. Selected rows display the attributes of either the **Left** or **Right** Y Axis.

4. Enter the numeric value for the CyFlex Variable assigned to the Y Axis. The Dialog will verify that the value is numeric and that **Maximum** is greater than the **Minimum**.

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

4.3.4.2   *Auto-Ranging the Y Axis*
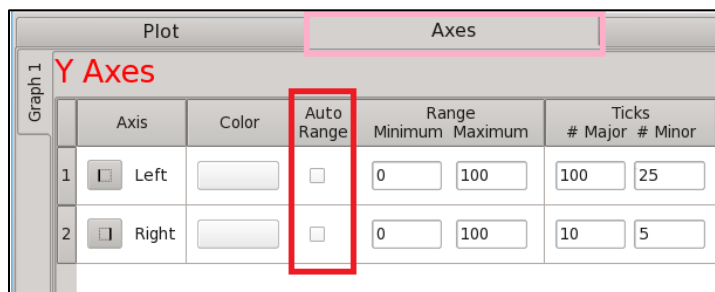
1. Right-click anywhere in the **Plot Area**.
2. Select the **Axes** tab in the **Configuration Dialog.**

Figure 11: Configuration Dialog to Auto-Range Y Axis

3. Check the box in the **Auto Range** column for **Left** and/or **Right** Axis.

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

The program will dynamically adjust the Y Axis range(s) according to the data currently 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** Axes are displayed with **Auto Range**, then changing the gridlines color of either one is recommended.

4.3.5   Automatically Plotting at Startup

Enter the following command to have Stripchart start plotting automatically without having to click the **Start** button:
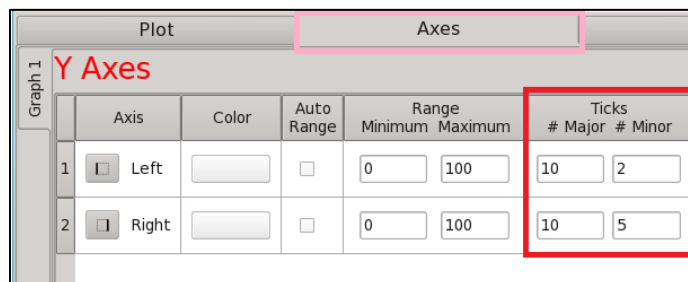
```
qtstripchart -a
```

The −a autostart parameter starts plotting immediately and causes the **Stop** button to be displayed.

4.3.6 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**.

Figure 12: Configuration Dialog Axes Tab to set Gridlines and Tick Marks

3. Enter the integer number of horizontal gridlines to display in the **Ticks # Major** field in the desired row. 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. 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. Major Ticks have horizontal gridlines and are labeled with their numeric values at the axis; Minor Ticks are simple marks

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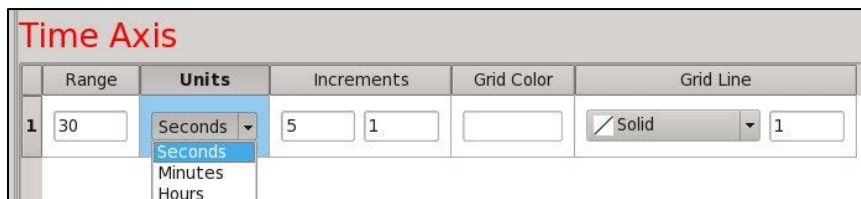
The requested number in **Tick # Lines** *may* not match the number of gridlines actually shown in the Main Window because the program computes the closest match so that the grid intervals are multiples of 1, 2, or 5 times a power of 10. The corresponding grid is easy to interpolate as a result.

4.3.7 Setting the Time Range

Set the time range for the X or Time Axis of the plot:

1. Right-click anywhere in the **Plot Area**.

2. Select the **Axes** tab in the **Configuration Dialog**.

3. Select the **Time Units** for the **Range** in the **Units** list.

Figure 13: Time Units Range

4. Enter the numeric time value in the **Range** field. The Dialog will verify that the value is a positive integer.

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

The **Range** determines the scrolling window of time represented by the full width of the Plot Area. The default value is 30 [sec].

Numeric time labels at the base of the scrolling vertical gridlines indicate the time from the most recent **Start** button event, in the selected **Units**.

As desired, select the time between gridlines and tick marks in the two fields of the **Increments** column.

4.3.8   Changing Background Color of the Plot Area

Optionally change the background color of the **Plot Area** in the graph from the default black in the **Plot** tab of the **Configuration Dialog**:

1. Click the **Background Color** field to display the **Select Color** dialog as in *Figure 14* below.

Figure 14 Select Color Dialog
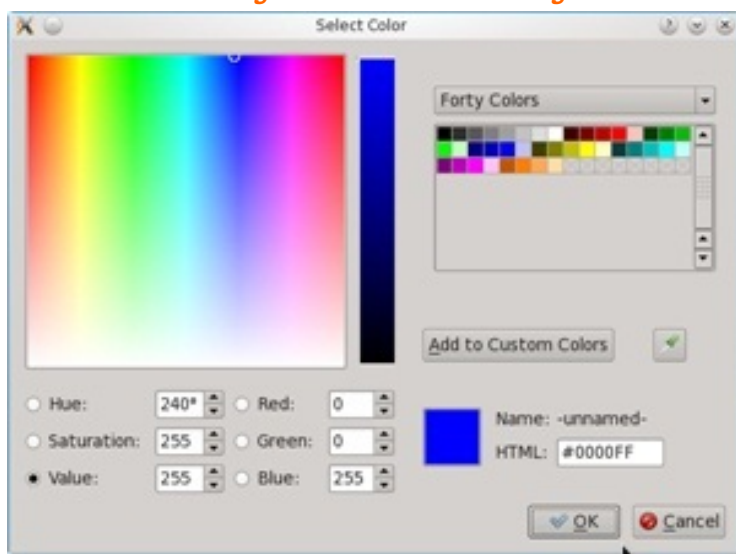
2. Select the background color:
    a. Click in the color space.
    b. Select from most recent choices

       or

       adjust values in the **Hue** / **Saturation** / **Value** or **Red** / **Green** / **Blue** fields.
3. 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.

Figure 15: Pan Toggle

2. Place the cursor in the **Plot Area** and drag it in any direction to "pan" or translate the image

3. To stop Pan, click the **Pan Stop** toggle button.

Notes:

- Pan remains in effect until clicking **Pan** button again to disable it.
- Data are displayed in real-time during pan and no data is lost.
- 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 as in *Figure 16*.

Figure 16: 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.

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.

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.

3. Click the Zoom Reset button as in *Figure 17* to display the original view.

Figure 17: Zoom Reset

Notes:

- The Time and Y Axis labels will be updated and the number of gridlines maintained in all cases.
- Data are displayed in real-time during pan and no data is lost.
- Pan and Zoom cannot be used together. Turn off one before starting the other.

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 Stripchart has more than one graph, select the one to change with the numbered **Graph** tabs at the left margin of the dialog. *Figure 18* shows a selected **Graph** tab example.

Figure 18: Graph Tab Example

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.
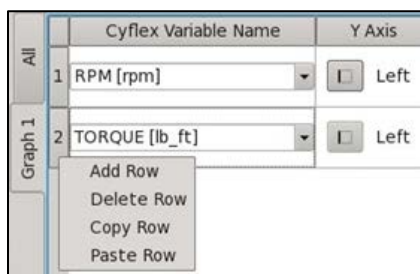
4.5.1 Trace Options

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 19*.

Figure 19: Trace Options

2. Select an option for that row:

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

4.5.2   CyFlex Variable Name

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

1. Click and scroll in the pulldown lists of valid **Variables Names** to select the desired variable.
2. If you know the first few characters of the **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 only to either the **Left** or **Right 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 20*.

Figure 20: Select Color Dialog for Trace Display
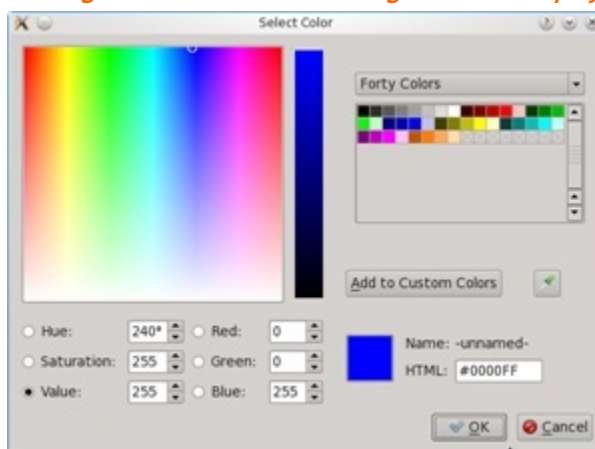
2. Choose the trace color:
   a. Click in the color space.
   b. Select from most recent choices
      or
      adjust the numeric values in the **Hue** / **Saturation** / **Value** or **Red** / **Green** / **Blue** fields.
3. Click the **OK** button to incorporate the change.

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.

4.6 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 **X Axis**. If your Stripchart 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 21* shows the **Y Axes** portion of the **Axes** tab screen.

Figure 21: Y Axes

	Axis	Color	Auto Range	Range Minimum Maximum		Ticks # Major # Minor		Label	Grid Color No Grid		Grid Line Type Thickness	
1	☐ Left		☐	0	100	10	5	RPM		☐	╱ Solid ▾	1
2	☐ Right		☐	0	100	10	2	Torque		☐	╱ Solid ▾	1

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

- **Axis:** select to identify the **Left** or **Right** Y Axis for which the other fields in the row apply.

- **Color:** select the color for the Y Axis label and scale:

  a. Click in the color field to display the **Select Color** dialog as in *Figure 22* on page 24.

Figure 22: Select Color Dialog for Axis Label and Scale
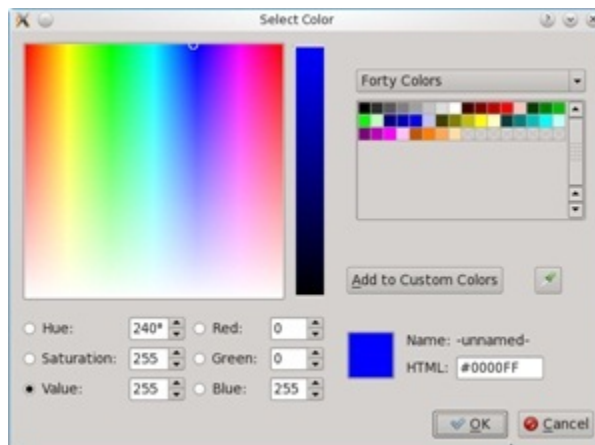
    b. Select from most recent choices

        or

        adjust the numeric values in the **Hue** / **Saturation** / **Value** or **Red** / **Green** / **Blue** fields.

    c. Click **OK** to incorporate the change.

- **Auto Range**: enable or disable auto ranging to dynamically adjust the 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 major tick marks to display as gridlines.

  Enter the integer number of horizontal gridlines to display in the **Plot Area**.

- **Ticks / # Minor**: specify the number of minor tick marks to display as dashes 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 space.
  - b. Select from most recent choices

    or

adjust values in the **Hue** / **Saturation** / **Value** or **Red** / **Green** / **Blue** fields.
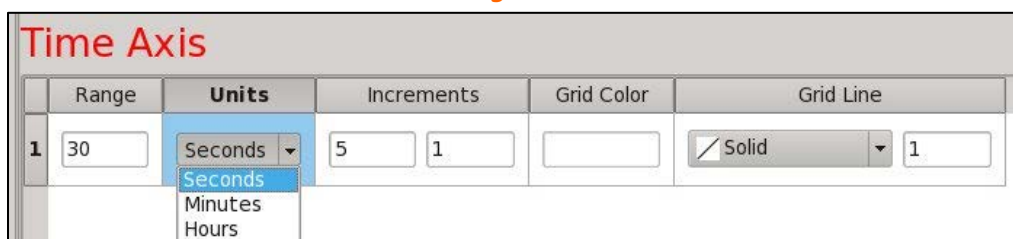
    c.   Click **OK** to incorporate the changes.

- **Grid / No Grid**: select whether to show or hide gridlines.
  - o   Check the box to display horizontal gridlines.
  - o   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:
  - o   **Solid**
  - o   **Dashed**
  - o   **Dot**
  - o   **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 23 shows the **Time Axis** portion of the **Axes** tab screen.

<p align="center">Figure 23: Time Axis</p>

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

- **Range**: specify the time duration displayed in the **Time Axis**.

  Enter the numeric time range to display on the horizontal **Time Axis**.

  The screen size of the **Plot Area** is determined by the Main Window size, while the **Range** sets the horizontal resolution of the Traces.

- **Units**: specify the units of measure for the time **Range**:

  Click the pulldown menu and select one of the following time units:
  - o   **Seconds**
  - o   **Minutes**
  - o   **Hours**

- **Increments / Major**: specify the number of major tick marks to display as gridlines.

  Enter the integer number of vertical gridlines to display in the **Plot Area**.

- **Increments / Minor**: specify the number of minor tick marks to display as gridlines.

  Enter the integer number of vertical gridlines to display between each vertical gridline on the **Time Axis** scale.

- **Grid Color**: Select the color of the vertical gridlines:
    a. Click in the color field to display the **Select Color** dialog as in *Figure 24*.

Figure 24: Select Color Dialog for Vertical Gridlines
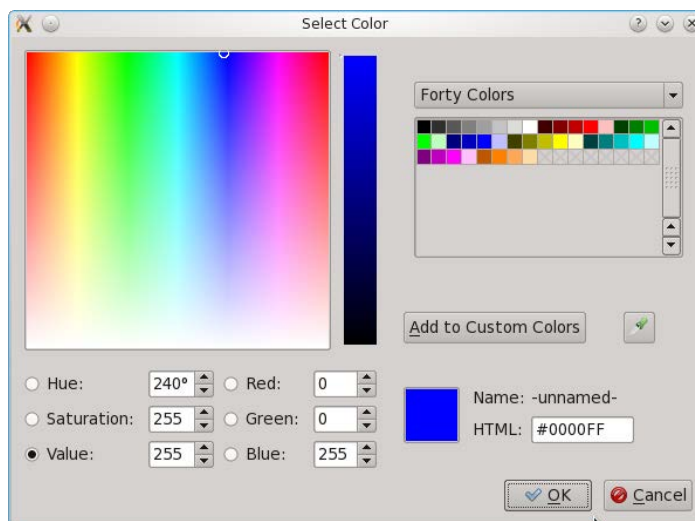
    b. Select from most recent choices

    or

    adjust the numeric values in the **Hue** / **Saturation** / **Value** or **Red** / **Green** / **Blue** fields.

    c. Click **OK** to incorporate the change.

- **Grid / Line Type**: select the pattern of the gridlines. Click in the pulldown list to choose one of the following pattern types:
    o **Solid**
    o **Dashed**
    o **Dot**
    o **Dot Dash**

- **Grid / Thickness**: specify the thickness of the gridlines. Enter an integer in the range **1** to **5** where greater is thicker.

4.6.2.1 *Time Axis Number Definition*

Each vertical gridline on the **Time** (X) **Axis** is labeled numerically; the gridlines and their labels scroll with time from screen right to left. The values displayed indicate the Data Sampling elapsed time from the most recent Start event, i.e. the **Start** button was clicked. The time value resets to zero each time the **Start** button is clicked.
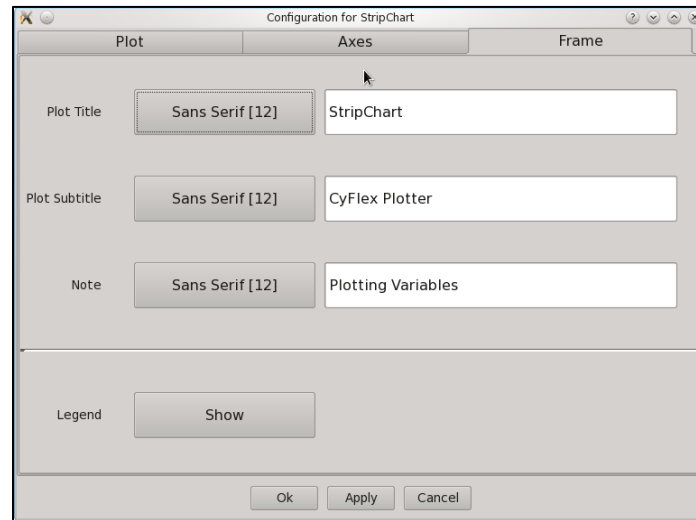
ⓘ *Important:*

Any sequence of **Stop** and then **Start** will erase all currently stored data.

4.7 Working in the Frame Tab

Change some of the supplemental text and the Legends in each Graph in the **Frame** tab of the Configuration Dialog.
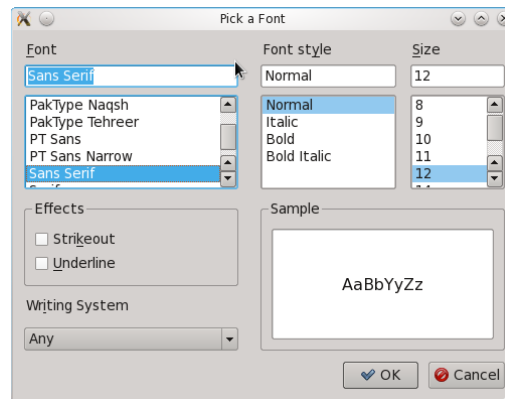
Figure 25: Frame Tab Configuration

4.7.1   Plot Title

Select Plot title to revise 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 **Font** to display the Font dialog as in *Figure 26*.

Figure 26: Font Dialog for Plot Title

3. Click **OK** to incorporate the change.

4.7.2   Plot Subtitle:

Select **Plot Subtitle** to revise 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 Font to display the Font dialog as in *Figure 26* on page 27.
3. Click **OK** to incorporate the change.

4.7.3   Note:

Select Note to revise 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 Font to display the Font dialog as in *Figure 26* on page 27.
3. Click OK to incorporate the change.

4.7.4   Legend:

Select **Legend** and then select whether to **Show** or **Hide** the **Legend**s in each graph that identify the Trace colors with their CyFlex Variable names.

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 27: Export Data 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 Stripchart 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 19.
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 as desired.

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 **Gwenview**.

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:
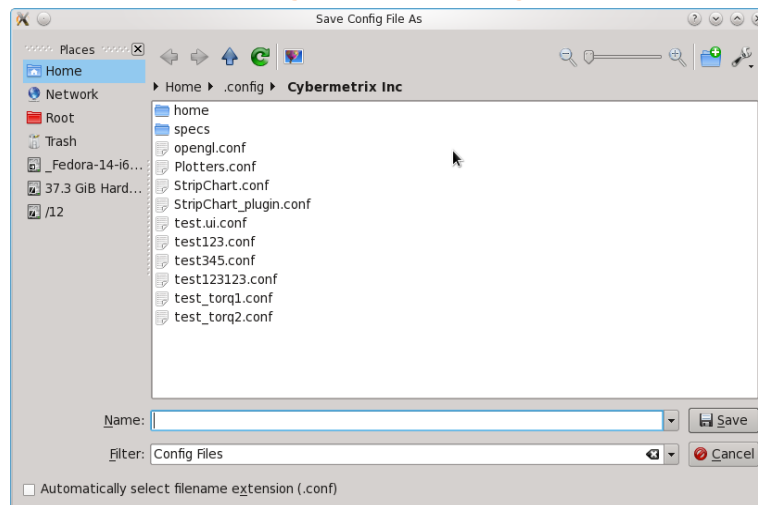
1. Click **File > Save Settings** as in *Figure 28*.

Figure 28: Save Settings
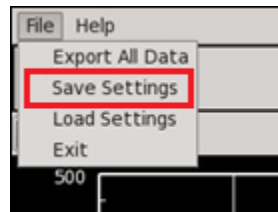
2. The program will display the **Save Config File As** dialog.

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 as in *Figure 29*.
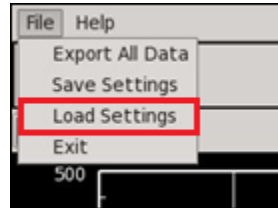
Figure 29: Save Configuration File

4.9.1 Loading an Existing Configuration

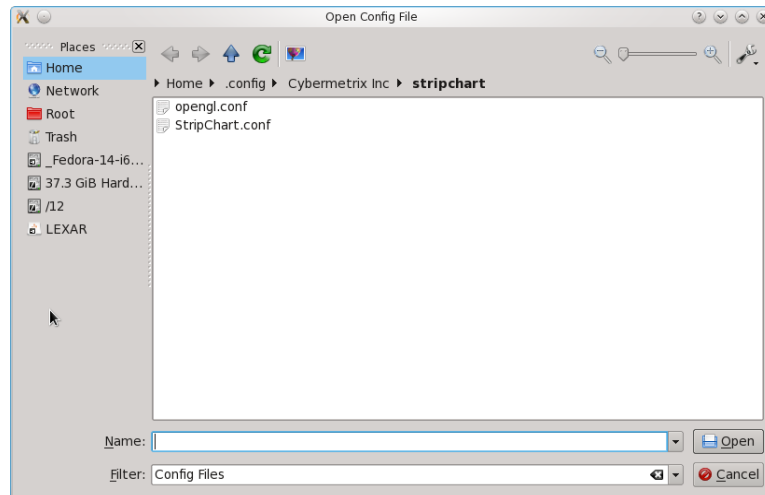Load plot settings in an existing configuration file from the **File** menu at top left in the Main Window:

1. Click **File > Load Settings** as in *Figure 30*.

Figure 30: Load Configuration File Settings

2. The **Open Config File** dialog is displayed as in *Figure 31*.

Figure 31: 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:

```
qtstripchart –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/stripchart/
```

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

Optionally, specify the `–a` parameter to check both **Auto Range** boxes for **Left** and **Right Y Axes** without opening the **Configuration Dialog**.