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Getting Started with the SAS Graphics Accelerator

What Is the SAS Graphics Accelerator?

The SAS Graphics Accelerator (accelerator) enables users with visual impairments or blindness to create, explore, and share data visualizations such as graphs.

The accelerator provides text descriptions, tabular data, a visualization of the graph, and interactive sonification. Sonification uses non-speech, musical audio to convey important information about a graph, such as the graph’s overall shape and specific contours. Data is represented through musical notes and other sounds, enabling you to hear the data points. You can interact with the accelerator by itself or in conjunction with a screen reader such as JAWS and NVDA. Whether you want to quickly grasp the basic shape of the graph or examine the graph in more detail, the accelerator makes the full graph accessible.

The accelerator includes a laboratory in which you can create accessible graphs of your own data. These graphs can be sonified, visualized, and downloaded. You can explore table variables and access automatically generated sample graphs. For more information, see Chapter 5, “Graphing Your Data,” on page 25.
Installing the Accelerator on Your Browser

The accelerator is supported on the Google Chrome browser. You can install the accelerator extension on Chrome from the browser’s Extension page. For an installation link, see SAS Graphics Accelerator on the SAS support site.

Access the Accelerator Menu

You use the accelerator’s menu to access a number of features. For example, you can access the Laboratory and Options pages from the menu.

Complete these steps to access the accelerator’s menu:

1. In the browser toolbar, navigate to the SAS Graphics Accelerator icon ( ). The icon is to the right of the website address field.

   **TIP** If you are using the keyboard, press Alt to access the Chrome menu. Then use the left arrow key to navigate to the SAS Graphics Accelerator icon.

2. Activate the icon and then select the menu item that you want.

The menu contains the following items:

<table>
<thead>
<tr>
<th>Menu Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extract Tables from This Page</td>
<td>Extracts data from one or more tables that reside on the current web page.</td>
</tr>
<tr>
<td>Laboratory</td>
<td>Displays the Laboratory page. On this page you can import data tables and generate graphs of the data.</td>
</tr>
<tr>
<td>Options</td>
<td>Displays the Options page. On this page you can specify browser-specific options. Options include text color, background color, font size, focus indicator color, and more.</td>
</tr>
<tr>
<td>Resources</td>
<td>Displays the SAS Graphics Accelerator page on the SAS support site. On this page you can find supported browsers, related documentation, sample graphs, and more.</td>
</tr>
<tr>
<td>About</td>
<td>Displays release and legal information about the accelerator.</td>
</tr>
</tbody>
</table>
What Is an Accessible Graph?

An accessible graph is a graph that can be opened and interpreted by the accelerator. To be accessible, a graph must meet the following conditions:

- contain a plot that is one of the supported plot types. For a list of supported plot types, see SAS Graphics Accelerator on the SAS Support site.
  
  Note: The graph can contain only one plot. Multi-cell graphs are not supported. In addition, the accelerator does not support graphs that contain plot overlays.

- contain the SAS information required to be interpreted by the accelerator. The following types of graphs satisfy this requirement:
  - graphs that you create manually within the accelerator’s laboratory.
  - graphs that the accelerator creates automatically as you explore data within the laboratory.
  - graphs that you create in one of the SAS products that create accessible graphs. Graph accessibility must be enabled.
  - graphs that you encounter on the web that have been created to be accessible. For more information, see Creating Accessible SAS Output Using ODS and ODS Graphics.

Get Started Using the Accelerator

Here are the main steps to use the accelerator:

1. Open an accessible graph in a web browser on which the accelerator has been installed.

   The accelerator scans the HTML page when the graph is opened or refreshed in the browser. The accelerator sounds a chime and displays an Accelerate button in the lower right corner of the graph.

   Note: If you are accessing the graph in one of the SAS products that create accessible graphs, your method of accessing the graph varies with the product. For more information, see the product’s documentation.

2. Activate the Accelerate button. The accelerator opens a new browser tab and displays the graph in the graph view. In that view, you can explore a graph visually and through sound.

3. To see the graph, activate View, download, and share a visualization of this plot-type. (The text plot-type is replaced with the type of plot you are viewing.) The graph is displayed in the visualization view. The graph has been optimized for users with low vision. In the visualization view, you can download the graph and share it with others.
When you are finished viewing the graph, use the browser's back button to return to the graph view.

You can also create graphs for your own data in the laboratory. The laboratory enables you to import, create, and manage data.

For a complete list of tasks that you can perform, see "Guide for Using the Accelerator" on page 4.

See Also

Chapter 2, “Quick Start Example: Exploring a Graph,” on page 7

Guide for Using the Accelerator

The accelerator enables you to explore an accessible graph audibly and visually. You can also work with data tables in the accelerator’s laboratory and create graphs for the data. The following tables list the tasks that you can perform.

Table 1.1 Exploring Graphs

<table>
<thead>
<tr>
<th>Goal</th>
<th>Related Tasks</th>
</tr>
</thead>
</table>
| Hear and see the graph| Hear the graph and see graph data in the graph view. This view also provides the following information:  
|                       | a brief description of the graph                                              |
|                       | the graph’s data table                                                        |
|                       | Change auditory settings.                                                     |
|                       | See the graph in the visualization view.                                      |
| Download the graph    | From the visualization view, you can download the graph as an HTML file and as a PNG image file. |
| Save graph data       | Save graph data to the laboratory.                                            |
|                       | Download graph data to your file system.                                      |
Table 1.2  Working with Data Tables in the Laboratory

<table>
<thead>
<tr>
<th>Goal</th>
<th>Related Tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add a data table to the laboratory</td>
<td>Import a data table from your file system. Manually create a data table in the laboratory. While accessing a graph in the graph view, save the graph data to the laboratory. Extract data from one or more tables that reside on a web page. After extracting the tables, you can add them to the laboratory.</td>
</tr>
<tr>
<td>Modify a table</td>
<td>Change table properties, such as the table’s name. Change a column’s properties, including the data type. Apply one or more filters to the data.</td>
</tr>
<tr>
<td>Download a table</td>
<td>Download the table in several formats: comma-separated value (CSV) file HTML file SAS program that generates a SAS data set</td>
</tr>
<tr>
<td>Graph the table data</td>
<td>Manually create one or more graphs. Access graphs that are created automatically for your data.</td>
</tr>
<tr>
<td>Explore the data for a table</td>
<td>Explore table variables in detail. You can compare variables using sample graphs that are generated automatically.</td>
</tr>
</tbody>
</table>

SAS Products That Create Accessible Graphs

Several SAS products can create accessible graphs. For some of these products, a graph accessibility option must be enabled in order to create the accessible graphs.

The accelerator works with the following SAS products:

- SAS Studio 3.6 or later and SAS University Edition.

To enable accessible graphs in SAS Studio, in Preferences, select Enable accessible graph option.


For more information about using SAS University Edition, see its Documentation page on the SAS Support site.
TIP  SAS University Edition has a quick start guide for students with visual impairments.

- SAS Report Viewer 8.2 or later, and SAS Visual Analytics Viewer 7.4 (the modern viewer only). With these products, accessibility is enabled for the graph objects that support the accelerator.

  For more information, see the SAS Visual Analytics Documentation page on the SAS Support site.

- SAS Enterprise Guide 7.13 or later. See the online Help for information about enabling accessible graphs.
Quick Start Example: Exploring a Graph

About This Example

The accelerator provides text descriptions, tabular data, a visualization of the graph, and interactive sonification. This example walks you through the steps to examine each of those features.

The following image shows the graph to be explored in this example:
The example graph contains a line chart that shows the increase in international air travel over a period of time. Miles traveled are measured in units of a thousand.

Access the Graph for the Example

Make sure that you are using one of the supported web browsers on which the accelerator has been installed.

1. Point your browser to the Samples and Tips tab of the SAS Graphics Accelerator product page on the SAS support site.

2. Under Highlighted Samples, select sample graphs. A web page containing sample graphs is displayed.
   The accelerator detects the accessible graphs and sounds a chime. Each graph includes an Accelerate button.

3. Navigate to the series plot showing international air travel. If you are using JAWS, you can press the G key repeatedly to move to the plot.

4. In the graph, activate the Accelerate button. The accelerator opens a new browser tab and displays the graph view.

   **TIP** Instead of navigating the accelerator product page as described in steps 1 and 2, in the browser you can search for SAS Graphics Accelerator samples. The first search result is a link to the sample graphs.
Hear and See the Graph Data

In this step, you explore the graph using musical sound. As you navigate the X axis, the accelerator’s sonification feature represents the corresponding Y values using pitch. High Y values are represented by high-pitch notes, and low Y values are represented by low-pitch notes.

When you access the graph view, the keyboard focus is on the graph, enabling you to immediately begin navigating the graph.

Note: If you are using a screen reader such as JAWS, you must enter Forms Mode before you can interactively explore the graph using keyboard commands.

1. Listen to the shape of the graph as a whole. Press Shift+right arrow to play all data items starting at the current position and moving left to right. You can hear the rise and fall of the pitch, corresponding to the increasing and decreasing Y values. Although the graph contains peaks and valleys, you can hear that overall the data trends upward.

   **TIP** For a list of keyboard commands available for the graph, press H.

2. Now that you have an idea of the graph’s overall trend, explore each data point interactively.

   a. Press Ctrl+left arrow to return to the far left side of the X axis. If you are working on macOS, use Options+left arrow.

   b. Press the right arrow key to move along the X axis one data point at a time. As you do so, listen to the audio feedback. You can also see the data values in the right side of the screen.

Hear and See a Description of the Graph

In this step, you access descriptive information about the graph. You can use your screen reader to hear a description of the graph. In addition, the graph view has been optimized so that users with low vision can see the description.

The description area is directly beneath the graph that you sonified in the previous step. This area includes the following items:

- (left side of the page) the graph’s title “International Air Travel.”
- a summary of the graph, including the graph’s type, a description of the axes, and the number of data points.
- a link that displays a visualization of the graph. The visualization has been optimized for users with low vision. To see the graph, activate View, download,
and share a visualization of this series plot, which appears under the Visualization heading. The graph is displayed in the visualization view. In that view, you can download the graph and share it with others.

When you are finished viewing the graph, use the browser's back button to return to the graph view.

(right side of the page) up to the first 20 rows of the graph data in tabular format.

buttons that enable you to do the following tasks:

- save the graph and data to your laboratory. In the laboratory, you can create your own graphs for the data.
- download the data. The data file is downloaded to your file system. This file can be opened in another application such as Microsoft Excel.

This example provided a quick look at the accelerator and showed how you can use sound to visualize a graph.
Exploring a Graph Visually and by Sound

About Visual and Auditory Exploration

When you open a graph in the accelerator, the graph view is displayed. In the graph view, you can explore a graph audibly and visually. You can also save the graph data to your laboratory and download the data.

The graph view contains the following panes:

sonification (top pane)

Sonification enables you to explore a graph using audio feedback. Data is represented through musical notes and other sounds, enabling you to hear the data points. This feature also provides a visual presentation of the data that has been optimized for users with low vision.

Note: Some graphs can be described but cannot be sonified. In those cases, the sonification pane is not displayed. Only the graph summary and data table are displayed (as described later in this topic).

The sonification pane contains the following three regions:

- The menu bar (top of pane) enables you to configure settings and get help.

  The Settings menu enables you to adjust the auditory feedback settings. You can use keyboard shortcuts to quickly cycle through those settings.

  The Help menu displays keyboard commands and other context-sensitive help that is relevant to the type of graph currently being displayed. Alternatively, when the keyboard focus is on the graph, you can press the H key to display the Help.
The graph (left side of pane) provides the audio feedback as you navigate the graph. A large cursor tracks the progression through the graph.

You navigate in a graph using the arrow keys and various modifier keys such as Ctrl and Shift. For example, you can press the Shift+right arrow to play all data items starting at the current position and moving left to right.

**TIP** For a list of keyboard commands available for the graph, press H.

For more information, see the following topics:
- “What You Hear, and What It Means” on page 13
- “Navigation” on page 14

The visual details (right side of pane) show the data point values as you move through the graph. This presentation has been optimized for users with low vision.

**Note:** Graphs that have a horizontal orientation, such as a horizontal bar chart, are transformed to vertical for purposes of sonification. This adjustment provides a consistent user experience. Regardless of the graph’s orientation, you can navigate along the X axis using the left or right arrow keys.

For more information about sonification, see “Working with Sonification” on page 13.

**graph summary (lower left pane)**

The graph summary pane contains the following information:

- the type of plot that the graph contains.
- the graph’s title if one has been provided.
- information about the axes, including the label, range, type, scale, and more. For a categorical plot, the categories are listed. If a summary statistic is used in the graph, that information is provided as well.
- summary of the graph layout, such as the number of columns and rows or the number of data points.

You can activate the **View, download, and share a visualization of this plot-type** link that appears in the pane. The accelerator displays a visualization of the graph that you can explore. The visualization has been optimized for users with low vision. In the **visualization view**, you can download the graph and share it with others.

The graph summary contains two buttons:

- **Save to Laboratory** saves the graph data to the accelerator’s laboratory.
- **Download Data as CSV** downloads the data as a comma-separated value (CSV) file to your file system.

**data table (lower right pane)**

The **Data** pane displays up to the first 20 rows of the graph data in tabular format.
Save the Graph Data to the Laboratory

When a graph is open in the graph view, you can save the graph’s data to the laboratory.

1 In the graph view, activate the **Save to Laboratory** button.

   Depending on the table’s size, all or part of the table is displayed on the Prepare Table page. To display the full table, activate the **Show Full Table** button at the bottom of the table. You can later restore the partial view by activating the **Show Partial Table** button.

2 On the Prepare Table page, make changes as needed. You can change the table name and specify whether the table has column headers, row headers, or both. (You can change the name and specify row headers after you have saved the data.)

3 When you are satisfied with the information that is on the Prepare Table page, activate the **Save to Laboratory** button. The table is saved to your laboratory. Depending on the table’s size, all or part of the table is displayed on the Table page. On that page, you can change information about the table, such as the table’s name or the data type that is associated with a column.

   After you have saved the data, you can create one or more graphs of the data. For more information about working in the laboratory, see Chapter 5, “Graphing Your Data,” on page 25.

Working with Sonification

The **graph view** enables you to explore a graph using the keyboard, audio feedback, and a visual presentation that has been optimized for users with low vision.

What You Hear, and What It Means

In the **sonification pane of the graph view**, you use arrow and modifier keys such as Ctrl and Shift to **navigate along the X and Y axis**. For some charts, such as computed bar charts, you can navigate along only the categorical X axis.

   The X axis is mapped to your left and right speakers. Data points on the left side of the axis are heard with your left speaker, and data points on the right side are heard with your right speaker.

   Moving from left to right along the X axis, you can trace the curve and shape of the graph through a series of piano-like, musical notes. Pitch is a key component of
sonification and is defined as the degree of highness or lowness of a tone. The accelerator uses other sounds as well.

Here are the sounds that are used by the accelerator:

**Y value**
- musical note that uses pitch to represent changes to the Y value. The pitch increases with an increase in the Y value, and decreases with each decrease in the Y value. This is a very logical and ordered way to hear and visualize the shape of a graph.

**Z value**
- white-noise sound whose frequency increases with an increase in the Z value. The Z value is used in some graphs, such as heat maps and scatter plots, to quantify a third-dimensional value.

**missing value**
- a low thud that sounds like tapping on a wooden table.

**end of data**
- a mid-frequency sound indicates that there are no more data points in the specified direction, or the dimension is not supported in the graph being viewed.

**TIP** It is recommended that you use headphones to hear these different sounds with greater fidelity.

You can adjust the auditory feedback using the Settings menu. You can use keyboard shortcuts to quickly cycle through those settings.

Navigation

**Overview of Navigation**

In the sonification pane of the graph view, you navigate in a graph using the arrow keys and various modifier keys such as Ctrl and Shift. The keyboard focus is on the graph when the graph view is displayed. This focus is indicated by a musical note of fixed pitch. If you move the focus to some other area of the screen, you must return focus to the graph area before you can navigate in the graph.

**Note:** If you are using a screen reader such as JAWS, you must enter Forms Mode before you can interactively explore the graph using keyboard commands.

The combination of keyboard commands and navigation keys was designed for efficiency. You can quickly access the navigation commands by pressing the arrow keys with your right hand and pressing modifier keys if needed with your left hand. Also, you can change auditory settings by pressing the corresponding keyboard shortcuts with your left hand and cycling through the available options while your right hand rests over the arrow keys.

**TIP** For complete keyboard commands for a graph, press the H key to see the Help page. Some of the commonly used navigation commands are described here.

The keys behave differently depending on whether you are using the explore mode or the scan mode.
Explore Mode versus Scan Mode

You select a navigation mode from the Settings menu. There are two modes for navigating a graph:

Explore

enables you to explore the graph using the arrow keys by themselves or with various modifier keys such as Ctrl and Shift. For example, you might listen to the shape of the graph as a whole or explore each data point interactively.

Explore mode is the default. If you change the mode, then the new mode remains in effect until you change it again.

Scan

enables you to play all items or cells in the corresponding direction from beginning to end without first having to navigate to the starting point. For example, you can repeatedly sonify the graph from left to right without repositioning the cursor.

This feature is useful when you need to hear the overall shape of the graph several times repeatedly. The feature is also useful when the graph contains grouped data. You can play the entire graph for one group, change to a different group, and replay the entire graph using just the arrow key.

Navigation Commands for the Explore Mode

The explore mode is on by default. If you have changed to the scan mode, to access the explore mode, press the V key until the Explore menu item is selected.

Here are the main keyboard commands:

spacebar

plays the item at the current position.

arrow key

moves the cursor and plays one item in the corresponding direction.

Ctrl+arrow key

moves the cursor to the far end of the axis in the corresponding direction.

Ctrl+Shift+arrow key

moves the cursor one segment of items or cells in the corresponding direction starting at the current position.

Shift+arrow key

plays all items or cells in the corresponding direction starting at the current position. This navigation feature includes aggregated data played by melody or by chord. In that case, all the melodies or chords are played in the corresponding direction.

Ctrl

cancels a navigation command or pauses the speech.

Note: It is not possible to navigate along the Z axis.

Navigation Commands for the Scan Mode

To access the scan mode, press the V key until the Scan menu item is selected.
Here are the main keyboard commands:

- **arrow key**
  plays all items or cells from beginning to end in the corresponding direction.

- **spacebar**
  plays the item at the current position.

- **Ctrl**
  cancels a navigation command or pauses the speech.

## Navigation for Dendrograms

### About Dendrograms

A dendrogram is a diagram that has a tree-like structure of clusters. Clusters represent the hierarchical relationships among data items. The height of the vertical tree stems reflects the distances between clusters and is expressed as Y-axis values.

*Figure 3.1*  **Sample Dendrogram with 15 Nodes**

Nodes represent the initial data along the X axis as well as the clusters to which the data belong. The root node is the highest node in the dendrogram tree. The leaf nodes are the lowest nodes and are the data points on the X axis. In the space between the root node and the leaf nodes are the clusters to which the data belong. Nodes are specified as children, siblings, and parents depending on their relationship to each other. A cluster node has two children descending from the node, one on the left and one on the right. The node can have four grandchildren, eight great grandchildren, and so on.

Levels denote the proximity of nodes from the root node. The root node is designated as level zero. Children of the root node are designated as level one, grandchildren of the root node are level two, and so on, until the leaf nodes are reached.

Both horizontal and vertical dendrograms are represented vertically in the graph view. (This orientation is also used for bar charts and box plots.) Although clusters might be represented as bars or points in your graph, clusters are always represented as points in the graph view.
Dendrogram Navigation

Here are the main keyboard commands:

- **spacebar** plays the current node.

- **arrow key**
  - moves the cursor as follows:
    - The up arrow moves the cursor up to the parent node.
    - The down arrow key moves the cursor down to the left child node.
    - The left and right arrows move the cursor to the next sibling in the corresponding direction.

- **Ctrl+arrow key**
  - moves the cursor as follows:
    - The Ctrl+up arrow moves the cursor to the root node (Level 0).
    - The Ctrl+down arrow moves the cursor to the leftmost leaf node.
    - The Ctrl+left or right arrows move the cursor to the farthest sibling in the corresponding direction.

Configure Auditory Settings

The **Settings** menu enables you to modify the auditory feedback and interaction of the graph in the **sonification pane of the graph view**. For example, for graphs that contain Z values, you can listen to the Y values or the Z values, or you can listen to both values played together.

**TIP**  Keyboard shortcuts enable you to quickly modify settings when keyboard focus is on the graph area. To access the shortcuts, press one of the keys defined in the **Settings** menu. The shortcuts are also listed on the Help page. You can cycle through the values of a specific setting by pressing the shortcut key repeatedly. For example, press the C key to cycle through the available speech settings, press the S key to cycle through the available sound options, and so on. The shortcut keys are indicated in the following list of settings.

The shortcut keys are not case-sensitive. You can use uppercase or lowercase keys.

**Speech (C)**

- controls how much text that your screen reader reads. This text appears in the lower right corner of the visual display.

Here are the options:

- **Terse** provides the data values for the X and Y variables. If the graph contains a Z variable or a group variable, those values are provided as well.

- **Verbose** provides the data labels and values for the X and Y variables. If the graph contains a Z variable or a group variable, those labels and values are provided as well.
Off
The X, Y, and Z values are not displayed.

Sound (S)
controls what you hear. For most graphs, the available options are Off and On. When you select Off, the sonification is disabled for the graph. You can navigate in the graph but there is no sound.

Exception: Sound is always enabled when you use the Shift+arrow keys to sonify the full graph. In addition, sound is always enabled when you sonify the graph in scan mode.

Some graphs, such as heat maps and scatter plots, contain individual cells or data points arranged in columns and rows. These graphs have the following options:

Cell by cell
sonifies each cell individually in a row or column. If you navigate left or right along the X axis, you hear the cells in the row. If you navigate up or down along the Y axis, you hear the cells in the column.

Row or column by melody
sonifies the string of data points for each row or column, depending on your direction of movement. The feature is useful for visualizing the data in a horizontal or vertical portion of the plot.

TIP A melody is a continuous sequence of notes that represent the data points in a row or a column.

Row or column by chord
sonifies the combined data points for each row or column, depending on your direction of movement. The feature is useful for comparing the aggregated data between rows or between columns.

TIP A chord combines the notes in the row or column so that they all are heard simultaneously.

Speed (D)
controls the navigation speed, from slowest to fastest. The speed takes effect when you do either of the following:

- play all items or cells by pressing the Shift+arrow key while in the explore mode or an arrow key while in the scan mode
- sonify a row or a column by melody or by chord

TIP You might begin exploring a graph with the fastest setting to obtain a quick overview of the graph’s shape. Then, to examine the data in more detail, you might use a slower speed when navigating the graph.

Response (R)
sonifies the Y values alone, the Z values alone, or both values played together. This option is available when a graph contains Z values.

Group (G)
sonifies the values for the group that you select. This menu is available when a graph contains grouped data.

Statistic (T)
cycles through statistics.
Plots such as box plots use settings to enable sound for the various statistics that are part of the plot. For example, with box plots you can specify the following statistics: minimum, first quartile, mean, median, third quartile, and maximum. You can play the chord for either the box, the whiskers, the outliers, or the extreme outliers. The chord for the box includes these statistics: minimum, first quartile, median, third quartile, and maximum. Whiskers include both upper and lower whiskers. Outliers include both upper and lower outliers. Extreme outliers include both upper and lower extreme outliers.

Navigation (V) specifies which navigation mode to use. You can choose either Explore or Scan.

Get Help

In the graph view, the Help menu displays keyboard commands and other helpful information. Alternatively, when the keyboard focus is on the graph, you can press H to display the Help.

In addition, you can access information about the accelerator on the SAS Graphics Accelerator product page on the SAS support site. On the product page, you can find videos, sample graphs, documentation, a blog, and more.

Working in the Visualization View

When you open a graph in the accelerator, the graph view is displayed. From that view, you can activate the View, download, and share a visualization of this plot-type link to display the graph in the visualization view.

In the visualization view, you can do the following:

- see a visualization of the graph. The visualization has been optimized for users with low vision.
- download the graph to your file system.

Note: Some graphs do not support visualization in the accelerator. In those cases, the link to launch the visualization view is not available.
Options for Downloading Data and Graphs

You have several ways to download data and graphs to your file system. You download data and graphs in the context of the task that you are performing. For example, when you access a graph in the graph view, you can download the graph data as a CSV file. After you have downloaded the data, you can share it with others and perform other actions on the data.

Here are the options:

- While accessing a graph in the graph view, you can download the data table. You can then share the data with others or import the data table into your laboratory.
- While accessing a graph in the visualization view, you can download the graph in HTML and PNG formats.
- While accessing table data on the Table page, you can download the table in several formats, including a SAS program that generates a SAS data set.

Download a Graph’s Table Data

When you open a graph in the accelerator, the graph view is displayed. In that view, you can download the data as a comma-separated value (CSV) file.
To download the data, activate the **Download Data as CSV** button. The button appears beneath the data table. The CSV file is downloaded to your file system's download directory. This file can be opened in another application such as Microsoft Excel.

---

**Download a Graph**

While accessing a graph in the visualization view, you can download the graph in two formats.

The graph download feature enables you to share the graph with other people. To download the graph, you can activate the following buttons:

- **Download Graph as HTML**. The HTML file is downloaded to your file system's download directory. After you have downloaded the graph, you can open the HTML file in the browser. You can email the HTML file or make the HTML page available in a file location that others can access.

- **Download Graph as PNG**. The image is downloaded as a Portable Network Graphic (PNG) file to your file system's download directory. After you have downloaded the graph, you can open the PNG file in a graphics editor. You can also import or copy and paste the image into another application such as Microsoft Word or Microsoft PowerPoint.

The graph’s title is used as the file name for the downloaded HTML or PNG file.

---

**Download a Table in Various Formats**

The **Table page** is displayed when you select the name of an existing table on the Laboratory page. The Table page is also displayed after you save the table for an accelerated graph to the laboratory.

When you view a table on the Table page, you can download the table as described in the following steps:

1. Activate the **Download** button.

2. From the **File type** list box, select one of the following items:

   - **Comma-separated values (*.csv)**
     
     downloads the data as a comma-separated value (CSV) file. The CSV file is downloaded to your file system's download directory. You can then share the data with others or import the CSV file into your laboratory.

   - **SAS program (*.sas)**
     
     downloads a SAS program in a SAS file. The program contains a SAS DATA step that, when executed in SAS, generates a SAS data set. The generated data set is added to the WORK library in the current SAS session. The data set maintains the labels and formats that were specified in the laboratory.
Web page (*.html)

downloads the table as an HTML file. You can then make the web page available to others. For example, other people might want to extract the data from the HTML page.

3 (Optional) In the Filename text box, you can change the file name.

When you download a SAS program file, the file name is used for the name of the data set that the program creates. Changes are made to the data set name if necessary to comply with SAS naming requirements. If you later download and execute the same file using the same file name, the original data set is overwritten.

4 Activate the Download button.
Overview of Graphing Your Data

The accelerator provides a laboratory in which you can create accessible graphs of your own data. These graphs can be visualized, downloaded, and explored in the graph view.

Here are the main aspects of working with data:

- You provide the data tables that you want to use for your graphs. You have several options for providing data.
- You can change the table’s properties. You can change the table name and specify whether the table has row headers.
You can change a column’s properties, including the data type.

You can apply one or more filters to the data.

You can explore table variables and access automatically generated sample graphs.

Here are the main aspects of creating graphs:

- For each table that you have in the laboratory, you can create one or more graphs. Every graph is associated with a particular data table.
  
  In addition, as mentioned previously, the accelerator can generate sample graphs automatically for exploration.

- The graphs can be viewed, described, and sonified in the accelerator. They can be downloaded and shared with others.

**Note:** The graphing feature enables users with visual impairments to quickly discover insights and relationships within their data. The feature is useful for students and casual users. Users who need to analyze data in an industrial or commercial context should use a fully featured SAS product in conjunction with the accelerator.

---

**Access Your Laboratory**

The laboratory is where you can create accessible graphs of your data.

1. Access the accelerator’s menu.

2. Activate the **Laboratory** menu item.

The Laboratory page lists any data tables that have been created or imported. The page also lists sample tables that are included with the accelerator.

**Figure 5.1  Laboratory Page**

You can do the following on the Laboratory page:

- activate the link for any table that is listed. Information about the table is displayed on the **Table page**. From the Table page, you can create one or more graphs of the data.
- delete one or more tables. Activate the **Manage Tables** button and select the tables that you want to delete. Activate the **Delete** button when you are ready to delete the selected tables.

- create a new table.

- import a table from your file system.

---

### Providing Data to the Laboratory

#### Options for Providing Data to Your Laboratory

You have several options for providing data:

- You can **import data tables** that exist on the file system. If you later change the data for a table, you must re-import that table.

- You can manually **create data tables** in your laboratory.

- While accessing a graph in the **graph view**, you can **save the graph data** to your laboratory.

- You can **extract data from tables** that reside on web pages. After extracting the table, you can add it to your laboratory.

---

### Import a Table from the File System

#### Import a Table

Data can be imported from the file system. See “**Requirements for the Data Tables That You Import**” on page 28.

1. From the Laboratory page, activate the **Import Table** button.

2. Browse for and select the file, and then activate **Open**. You can browse the local file system, mapped network drives, and public folders on a network.

   Depending on the table’s size, all or part of the table is displayed on the Prepare Table page. To display the full table, activate the **Show Full Table** button at the bottom of the table. You can later restore the partial view by activating the **Show Partial Table** button.

3. On the Prepare Table page, make changes as needed. You can change the table name and specify whether the table has column headers, row headers, or both.

4. When you are satisfied with the information that is on the Prepare Table page, activate the **Save to Laboratory** button. Depending on the table’s size, all or part of the table is displayed on the **Table page**.
If you later change the data for a table, you must re-import the table. However, you can change table properties and change column properties.

Requirements for the Data Tables That You Import

The following list contains requirements for the table file.

Note: For requirements about the data contained in the table and the valid formats for that data, see “Valid Input Data Types and Formats” on page 38.

- You can import the following file types: comma-separated-value (CSV), tab-separated-value (TSV or TAB), and Microsoft Excel workbooks (XLSX).
  
  The following extensions are acceptable: CSV, TSV, TXT, TAB, XLSX
  
  Note: An Excel XLSX file can contain data or objects that the accelerator does not import. For example, review comments and clip art in the Excel file are not imported into the accelerator. The accelerator imports only the displayed cell values, including formulas. In addition, merged cells and header cells are honored.

- The table must contain at least two rows.

- The table should have a single row of column headers. This must be the first row in the table. If a table does not have column headers, the accelerator creates headers with generic names, such as VAR1, VAR2, and so on. You can change the labels of the headers that are created.

- The table file can contain comments. However, comments are ignored by the accelerator. Any line that starts with a hash tag (#) is considered a comment. Comments typically reside above or below the rows and columns. Here is an example:

  # Source: http://support.sas.com/training/

  Note: Comments in Excel files are not supported.

- The maximum file size for a data table is one megabyte (1 MB).

- The accelerator does not provide any way to prepare or clean the data. The data table must be clean and ready to graph. For example:

  - The table should not contain extraneous comments.
  - A table cannot have empty rows unless the empty rows are at the bottom of the table. Similarly, a table cannot have empty columns unless the empty columns are at the end of the table.

Create a Table Manually

You can create a table in the accelerator and add data to the table. This feature is most useful when you have a relatively small amount of data that does not require updates. If you need more robust data management, you can instead enter the data in a spreadsheet application and then import the data into the laboratory.

Note: For requirements about the data that can be contained in the table and the valid formats for that data, see “Valid Input Data Types and Formats” on page 38.
1 From the Laboratory page, activate the Create Table button.
2 On the Create Table page, enter the number of columns. The default number is 2.
3 Enter the number of data rows. The default number is 2.
4 Activate the Next button. A table appears with the specified number of columns and rows. The table also contains a header row.
   In addition, Add Column and Add Row buttons appear on the page.
5 Enter the appropriate header in each column of the header row. The header can contain spaces and special characters, such as the underscore and period characters. You can change the headers later.
6 In each subsequent row, enter the data for each column.
7 (Optional) To add a column or row, activate the Add Column or Add Row button. New columns are added to the right of the existing columns, and new rows are added beneath the existing rows.
   Enter the data for each new column or row.
8 When you have entered all of your data, activate the Save button. Information about the table is displayed on the Prepare Table page.
9 On the Prepare Table page, enter the table name. You can also specify whether the table has column headers, row headers, or both by selecting the appropriate check box. Column headers are selected by default.
10 When you are satisfied with the information that is on the Prepare Table page, activate the Save to Laboratory button. The table is displayed on the Table page.
   If you later want to change the data in the table, you must re-create the table.

Extract External Table Data from a Web Page

Extract Table Data
You can extract data from one or more tables that reside on a web page. After extracting the table, you can add it to your laboratory.

Note: The table must be accessed using a web browser that is supported and that has the accelerator installed.

1 Open the web page that contains the table or tables whose data you want to extract.
2 From the accelerator’s menu, select the Extract Tables from This Page menu item.

   The accelerator scans the web page. If the table meets the necessary conditions, the table is extracted and displayed on the Prepare Table page. That page contains information about the table. If you extracted more than one table, all the extracted tables are displayed on the page.
If you are extracting data for a single table, you can bypass the Prepare Table page. See “Expedited Extraction” on page 30.

If the accelerator does not detect any tables on the web page, a pop-up box displays a message to that effect.

3 On the Prepare Table page, make changes as needed. You can change the table name and specify whether the table has column headers, row headers, or both.

When a table extracted from Wikipedia contains footnote citation numbers, the citation numbers are removed from the table. To restore the citation numbers, clear the Remove Wikipedia citations check box.

Depending on the size of the table, only the first few rows might be displayed. To display the full table, activate the Show Full Table button at the bottom of the table. You can later restore the partial view by activating the Show Partial Table button.

4 When you are satisfied with the information that is on the Prepare Table page, you can save the table or tables to your laboratory. Do either of the following:

- If you extracted one table, activate the Save to Laboratory button. Depending on the table’s size, all or part of the table is displayed on the Table page. On that page, you can change the table’s name and column properties.

- If you extracted more than one table, a check box appears above each table. All the check boxes that appear are selected by default. To save more than one table, make sure that the check box is selected for each table that you want to save. Then activate the Save to Laboratory button. The tables are displayed on the Laboratory page.

TIP You can toggle the Select All button above the tables to select or deselect all the tables. This is useful when you want to customize the list of extracted tables that you want to save.

Note: When you deselect a table, the contents of that table disappear from the window. To restore the contents, select the table’s check box.

To save a single table, toggle the Select All button to deselect all extracted tables, select the table that you want to extract, and activate the Save to Laboratory button. All or part of the table is displayed on the Table page. On that page, you can change the table’s name and column properties.

Expeditied Extraction

Expeditied table extraction enables you to extract a single table without stopping at the Prepare Table page. If there is one table, the table is extracted and displayed immediately on the Table page. If there are more than one table, the tables are displayed on the Prepare Table page.

1 Open the web page that contains the table whose data you want to extract.

2 Access the accelerator’s menu.
Press and hold the Shift key while you select the Extract Tables from This Page menu item. The table is displayed on the Table page. On that page, you can change the table's name and column properties.

Requirements for Tables to Be Extracted

The following list contains some of the requirements for the tables that you want to extract. This list does not include all possible cases where tables can or cannot be extracted. However, in most cases an error message is displayed when a table cannot be extracted.

Note: For requirements about the data contained in the tables and the valid formats for that data, see "Valid Input Data Types and Formats" on page 38.

- Tables can be extracted only from English web pages. The web page must be a page in which the HTML LANG attribute is "EN". LANG is a language attribute of the HTML element in a web page. If HTML LANG is not specified in the web page, then the page is considered to be "EN".

- The table must reside on a web page that provides access to the Chrome Extensions toolbar. (You can use Ctrl+Shift+Enter to open a link to a table in a new browser tab.)

- The table must be rectangular—that is, every row must contain the same number of columns. This determination takes into consideration ROWSPAN and COLSPAN attributes.

- The maximum file size for a data table is one megabyte (1 MB).

- The table must contain at least three columns and two rows of valid data, or it must contain at least two columns and three rows of valid data. All empty rows and empty columns are removed during extraction.

- The table must be visible. For example, a table that has the following HTML coding would be rendered invisible and cannot be extracted: `<table style="display:none"> . . </table>`.

- The table cannot contain any nested tables.

- The table cannot be a presentation table. A presentation table is one that is used only for creating a visual layout on the page. A table that has the following HTML coding cannot be extracted: `<table role="presentation"> . . </table>`.

- Only visible content within tables is extracted. Rows and individual cells that are marked hidden are not extracted as part of the table.

TIP The table can contain images and hypertext URL links. For images, the ALT text is extracted. For URL links, the URL string is extracted but is not linked.

Working with the Table Page

The Table page is displayed when you select the name of an existing table on the Laboratory page. The Table page is also displayed after you save the table for an accelerated graph to the laboratory.

The Table page contains the following elements:
name of the table
You can rename the table and change other table properties.

menu bar
You can perform a number of tasks using the buttons in the menu bar. For example, you can create and delete graphs. You can also download the table as a CSV file, an HTML file, or a SAS program.

any graphs that have been created for the table
You can do the following tasks with graphs:
- select a graph to open the graph in the graph view.
- create a new graph.
- delete any of the graphs that have been created for the table. Activate the Manage Graphs button and select the graphs that you want to delete. Activate the Delete button when you are ready to delete the selected graphs.
  Note: Manage Graphs is available only after you have created a graph.

table data
Under each column header of the table, a button shows the data type that is assigned to the column. For example, the data type might be character, number, date, or currency.

For more information about a column, or to change the data type and other properties, see “View and Change Column Properties” on page 33.

TIP A column might include an exclamation mark (!). The mark indicates a possible data assignment issue. That issue is described when you view the column properties, where you can change the data type. See also “Overview of Data Types” on page 38.

Depending on the size of the table, only the first few rows might be displayed. To display the full table, activate the Show Full Table button at the bottom of the table. You can later restore the partial view by activating the Show Partial Table button.

You can do the following:
- filter the table
- explore table variables and access automatically generated sample graphs

Change the Table Name and Specify Row Headers

The Table page is displayed when you select the name of an existing table on the Laboratory page. You can view the table data and change the table properties shown here.

1. On the Table page, activate the Table Properties button.
2. In the Table name text box, enter the name that you want.
3. To specify row headers, select the First column contains row headers check box.
View and Change Column Properties

The Table page is displayed when you select the name of an existing table on the Laboratory page. You can view and change the column properties shown here.

1 In the table, activate the data type button for the column that you want to change.

   The Column Properties window is displayed in which you can change the following column properties:
   
   - To change the column header label, select the Column label text box and enter the new label.
   
   - To change the column type, select the appropriate type from the Type list box.
     
     Note: A column might be assigned a character data type even though it contains numeric or other data. This occurs when the accelerator detects a possible data assignment issue. That issue is noted in the window. See “Overview of Data Types” on page 38.
   
   - If the column type is number, then you can specify whether commas are displayed in the table. Select or deselect the Show Commas check box. By default, commas are displayed regardless of whether the original numbers contain commas. The use of commas provides a better experience for screen reader users.
   
   - To specify whether a column is considered categorical, select or clear This column contains categorical data. When you select this option, the term Categorical appears along with the column type on the Table page. Categorical columns represent types of data that can be grouped into categories, such as age, gender, country, product type, and so on.
   
   - For a numeric or date column, select This column contains series data if the data in the column should be treated as series data. For example, if the column contains years, then select this option.
     
     A series is a sequence of measurements of the same variable collected over time. Most often, a series variable is a date, and the measurements are made at regular time intervals.
   
   - To change the format, select the format from the Format list box. This list box is available only when a format has been applied to the column data, and more than one format is available. The selected format affects the display in pages such as the Table page and the graph view.

2 To filter the data based on the values of this column, select a filter from the Filter Type list box. Then specify the filter criteria.

3 When you are finished changing properties, activate the OK button.
Filtering Table Data

About Filtering Data

While accessing table data on the Table page, you can define and apply one or more filters to the data. Filters enable you to subset your data.

You can filter based on one or more columns. If you apply a filter for two or more columns, the accelerator displays only the rows that meet the criteria specified for all filtered columns.

The following table shows which types of data can be filtered:

Table 5.1 Data Types Used for Filters

<table>
<thead>
<tr>
<th>Data Type</th>
<th>Usage Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Characters</td>
<td>The filter can match values that contain, start with, or end with a set of characters.</td>
</tr>
<tr>
<td>Numbers</td>
<td>The filter can match values that are greater than, less than, or equal to a number.</td>
</tr>
</tbody>
</table>

If a column is designated as categorical, then you can filter the data that matches a category value. This ability applies to all the data types. You can also filter the table to display only those rows that have or do not have missing data for a column.

You can show or hide matching rows. For example, if you filter on cars that originate in Japan, you can either show or hide the rows containing those cars. If you hide the rows, the accelerator shows the cars that do not originate in Japan.

Define and Apply One or More Filters

1. On the Table page, activate the data type button for the column that you want to filter. The Column Properties window is displayed.

2. Select the type of filter you want to use from the Filter Type list box.

   The available filter types depend on whether you are filtering characters, numbers, and so on. The following options are generally available:

   - **None** turns off filtering for the column. This is the default value, and it is always available.
   - **Category** enables you to specify the category for the filter. The accelerator filters the data to show or hide rows that match the category. This option is available only when the **This column contains categorical data** check box is selected.
Missing data filters the table to show or hide only those rows that have missing data for the column. This filter is always available.

For character data, filter types enable you to match values that contain, start with, or end with a set of characters.

For numeric data, filter types enable you to match values that are greater than, less than, or equal to a number.

Depending on the filter type that you specify, a list box or a text box might be displayed.

3 If applicable, do either of the following steps:
   - specify a category value in the Select category list box.
   - enter a character or numeric value in the Value text box. If you are entering a character value, you can specify whether the filter is case-sensitive. When case sensitivity is specified, the filter matches only those characters that have the exact same capitalization as the specified value.

4 Select either Show filter results or Hide filter results. This selection determines whether to show or hide the rows that match your filter criteria. The default is Show filter results.

5 Activate the OK button to apply the filter and close the window.

6 To define and apply a filter for a different column, repeat the previous steps.
   
   Note: If you apply a filter for two or more columns, the accelerator displays only the rows that meet the criteria specified for all filtered columns.

The filters that you specify remain in effect until you remove them.

Remove One or More Filters

1 On the Table page, activate the data type button for the column that contains the filter that you want to remove. The Column Properties window is displayed.

2 From the Filter Type list box, select None.

3 Activate the OK button.

4 To remove the filter for a different column, repeat the previous steps.

To remove all filters that are applied to a table, activate the Remove All Filters button on the Table page.
Creating Graphs

Create a Graph Manually

1. From the Table page, activate the Create Graph button or the Create Graph from Filtered Data button.

2. Select the type of graph from the Chart Type list.
   A description of the chart type is displayed to the right of the selection list. In addition, data entry fields are displayed for the selected chart.

3. Specify the axis variables, labels, summary statistic, or other aspects of the graph. The available options vary with the type of graph.
   Here is information about some chart options:
   - With bar charts, you can sort the bars. The sort action is not case sensitive. For example, sedan and SEDAN are sorted in the same order.
   - You can specify a group variable for the chart. Only character variables can be used as group variables.
     To help minimize clutter in the graph output, the maximum number of groups that are created by the group variable is 10. Variables with a cardinality higher than 10 are disabled in the group list.

4. Specify a title in the Title text box. As you enter data for the graph, the accelerator provides a brief description of the graph to be used for the title. You can use this default title or specify your own title. You can enter a maximum of 250 characters. The title identifies the graph in the accelerator.
   **Note:** The graph must have a title before the Submit button can become available.

5. (Optional) Enter a footnote in the Footnote text box. In the output, the footnote appears in the bottom left corner of the graph. Long text strings are wrapped as needed. You can enter a maximum of 250 characters for the footnote.
   You can provide a URL as a footnote. However, the URL is not hyper-linked in the output.
   The footnote is also displayed when the graph is viewed in the visualization view.
   By default, the Footnote text box is empty unless one or more filters have been applied to the table. In that case, the applied filters are listed in the text box.

6. Activate the Submit button. The graph is listed on the Table page.
   On the Table page, you can open the new graph in the graph view of the accelerator.
Explore Table Variables and Automatically Generated Graphs

The accelerator provides an easy way to understand, explore, and analyze the data in a table. This feature provides insights about table variables along with automatically generated graphs that you can use for analysis.

The feature does the following:

- displays information about and descriptive statistics for a variable. For category variables, the information includes a pie chart based on the category variable.
- enables you to compare two variables using sample graphs that are generated automatically.

To explore table data:

1. Open the table that you want to explore. This can be a table that was extracted, imported, or created in the accelerator. If you have applied a filter to the table, then the filtered data is used in the analysis.

2. On the Table page, activate the column header for the column that you want to explore. The Variable page is displayed in a new tab and contains the following areas:

   **Summary** (left)
   
   summarizes information about the variable. The information that is displayed depends on the type of variable. For example, for character variables, the frequency count and number of unique values are displayed. For numbers, the display includes the minimum and maximum values along with other statistics.

   If the variable is categorical, the **Summary** area contains information about the categories. The page also contains a link to a pie chart, which shows the frequency of the category variables.

   **Comparison** (right)
   
   contains the names of the other variables in the graph. To the right of some or all of the variable names are links to one or more graphs. Each graph shows the relationship of a variable to the main variable that you are exploring. The list of graphs that are available depends on the types of variables that are being compared.

3. To open any of the graphs that are listed on the page, activate the link for the graph. The graph opens in the graph view of the accelerator. You can then sonify the graph and perform other tasks.

4. To explore a different variable, activate the variable name in the **Comparison** area. The Variable page refreshes and shows the information for the new variable.
Valid Input Data Types and Formats

Overview of Data Types

A data type is a column attribute that specifies the type of data that the column contains. When you create, import, or extract data, it is important to understand the requirements for input data and how the accelerator handles data that does not conform to the requirements.

Here are the valid data types:

- character
- number
  
  Note: See “How the Accelerator Handles Very Large or Very Small Numbers”.
- currency
- date

With the exception of character data, the data must have a valid format in order to be assigned to any of the data types. The data in a column can have different formats, but the data must all have valid formats in order to resolve to the same data type. If even one cell does not conform, the column is assigned a data type of character. In addition, ambiguous date formats are assigned a data type of character. For more information, see “Valid Date Formats” on page 40.

Note: When you import character data, all consecutive, internal whitespace characters are collapsed into a single space. All trailing and leading spaces are removed. This conversion process occurs whether the table is imported, extracted, or created in the laboratory.

After creating, importing, or extracting the table, you can change the data type that has been applied to a column. When you change the data type, any invalid cells are assigned as missing.

The following sections list the formats that are valid for the various data types.

Valid Numeric Formats

- number without commas (example: 2167034)
- number with commas (example: 2,167,034)
- decimal (example: 2167.75)
- negative number (example: –680)

The following example shows the first few rows of two numeric columns. In the example, the second column contains four invalid numbers: 9.2M, 82 percent, 3e2, and (680). Therefore, the accelerator associates that column with a data type of
Valid Input Data Types and Formats

character. If you change the column type to numeric, the invalid data items are presented as missing.

<table>
<thead>
<tr>
<th>Valid Numbers</th>
<th>Four Invalid Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>5,740</td>
<td>6,735</td>
</tr>
<tr>
<td>2167.75</td>
<td>2,300.50</td>
</tr>
<tr>
<td>2167034.75</td>
<td>9.2M</td>
</tr>
<tr>
<td>78.0912</td>
<td>82 percent</td>
</tr>
<tr>
<td>300</td>
<td>3e2</td>
</tr>
<tr>
<td>–680</td>
<td>(680)</td>
</tr>
</tbody>
</table>

See Also

"How the Accelerator Handles Very Large or Very Small Numbers"

How the Accelerator Handles Very Large or Very Small Numbers

Extremely large positive or negative numbers (in the quadrillions) are not supported in the accelerator. When such numbers are detected, an error message is displayed.

Numbers can have a maximum of 14 decimal places to the right of the decimal. Numbers that exceed this limit are handled in the following ways:

- For numbers in graphs that are accelerated, the numbers are rounded to 14 decimal places.

Numbers that are calculated in the accelerator are rounded to 14 decimal places.

- For numbers in tables that are imported, extracted, or created in the laboratory, the corresponding column is assigned a character data type. If you change the data type to numeric, the numbers are rounded to 14 decimal places.

In addition, numbers that are less than 0.000001 but greater than 0 are not interpreted as numbers in the accelerator. Although the column is assigned a number type, the number is displayed as NaN in the table cell. If you change the column from a number type to a character type, the cell displays the correct number as a character string.

Valid Currency Formats

dollar (examples: $12,345,678.09, $-5,000.00)

Parentheses are supported by the accelerator to denote negative numbers when the currency value is formatted as $(number) or ($number). Examples: $(10.00) and ($10.00).
Valid Date Formats

Note: If a column of dates is ambiguous, the column is assigned a data type of character. For example, a column with some dates in the DD/MM/YYYY format and other dates in the MM/DD/YYYY is assigned a data type of character.

- DD-MM-YYYY (example: 31-10-2018)
- DD/MM/YYYY (example: 31/10/2018)
- MM-DD-YYYY (example: 10-31-2018)
- MM/DD/YYYY (example: 10/31/2018)
- YYYY-MM-DD (example: 2018-10-31)
- YYYY/MM/DD (example: 2018/10/31)
- DDmonYY (example: 31Oct18) *
- DDmonYYYY (example: 31Oct2018) *
- month DD, YYYY (example: October 31, 2018)
- weekday, month DD, YYYY (example: Wednesday, October 31, 2018)

* Although these formats are supported, after they are imported the dates are converted to DD-Mon-YYYY (example: 31-Oct-2018).
Specify Accelerator Options

The accelerator has visual and auditory options that can be set in the browser. Options include text color, background color, font size, focus indicator color, and more.

1. Access the accelerator’s menu.
2. Activate the Options menu item.
3. Make your changes and activate the Save button.

**CAUTION! Be careful when specifying options that affect how the accelerator looks or behaves.** For example, you can disable stereo sound, which maps X values in the graph to your left and right speakers. You might disable that feature if you have a hearing impairment in one ear and want to disable the panning between speakers. Otherwise, it is recommended that you keep stereo sound enabled in order to take full advantage of sonification.

**TIP** The option to invert the page colors is on by default. This setting results in white text on black background. To change to black text on white background, specify Off for Invert page colors.

In addition, if you specify Text color or Background color while the Invert page colors option is on, the inversion of the specified color is assigned to the foreground or background respectively.
Enable or Disable Accelerator Notification for Graphs

By default, the accelerator notifies you when it detects a graph that contains the necessary SAS metadata on an HTML page. The notification consists of sounding a chime and displaying an Accelerate button in the lower right corner of the graph.

You can enable or disable the notification feature for graphs.

1. Access the accelerator’s menu.
2. Activate the Options menu item.
3. Under the Notifications heading, select On from the Show the Accelerate button for graphs in web pages list box to enable notification for graphs. Select Off to disable notification for graphs.
4. Activate the Save button.
Enable Chrome to Access Local Files

For security reasons, by default the Chrome browser does not allow extensions to access local files. If you want the accelerator to access local files (locations of “file://...”, instead of “http://” or “https://”), you must configure Chrome to allow the access. This setting is also useful for accessing email attachments.

1. In the Chrome search bar, enter `chrome://extensions` and press Enter.
2. Scroll the list of extensions until you find SAS Graphics Accelerator.
3. Activate the **Details** button for SAS Graphics Accelerator.
4. Select **Allow access to file URLs** to toggle the option on or off.

macOS Notes and Issues

- Due to a known issue, VoiceOver on macOS sometimes stops announcing information from the SAS Graphics Accelerator. If this happens, try turning VoiceOver off and back on again to correct the problem. You can use the Cmd +F5 shortcut key to quickly toggle VoiceOver off and on.
- When using Chrome on macOS High Sierra (10.13), system sounds are sometimes introduced and are played when particular regions of the page are updated. The sounds can interfere with sonification. The sounds are not played when you use Web Speech software.
- On macOS with Chrome 69, the sonification pane of the graph view does not announce the position of the cursor correctly. This problem is resolved by upgrading to Chrome 70 or higher and macOS 10.14 or higher.