

# Aspen Graphics 4.2 User Manual

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**ASPEN**  
**GRAPHICS**  
TRADE WITH CONFIDENCE™

Aspen Graphics 4.2 User Manual .....	1
What Is Aspen Graphics 4.2?.....	8
Objects in Aspen .....	8
Charts .....	8
Clocks .....	8
Quotes .....	8
News .....	8
Time and Sales.....	9
Price and Volume.....	9
Other Windows .....	9
Display Options .....	9
Toolbars .....	10
Menu Bar .....	11
Status Bar.....	11
Accessing Menu Options .....	11
Managing the Desktop.....	11
Setup Options Dialog.....	12
Miscellaneous .....	12
File Management .....	13
About Aspen Pages and Aspen Windows.....	13
Saving Files.....	14
Opening Files.....	16
Charts .....	21
Adding a Chart.....	21
Chart Toolbar .....	21
Chart Elements.....	25
Chart Properties Dialog.....	26
Entering Symbols.....	31
Handling Futures Contracts .....	34
Continuing Contracts .....	35
Entering Multiple Symbols.....	37
Editing Symbols.....	38
Copy and Paste Symbols.....	39
Changing Timeframes.....	40
Timeframes and Performance .....	41
Navigating Charts .....	42
Chart Types.....	42
Bar Charts .....	42
Candlestick Charts .....	43
Displaying Candlesticks.....	44
Candlesticks Colors .....	45
Point and Figure Charts .....	47
Displaying a Point and Figure Chart.....	47
Point and Figure Parameters .....	48
Tic Charts.....	49

Tic Over Time Charts .....	50
Zero Minute Charts .....	51
Line Chart .....	53
Equitick Charts.....	54
Layer Charts.....	56
Indicators.....	59
Indicator Related Icons .....	59
Adding an Overlay .....	60
Adding a Study to a Split Window .....	61
Removing Indicators.....	63
Removing Split Windows .....	63
The Study Dialog .....	64
Displaying the Study Dialog.....	65
Using the Study Dialog.....	66
Adding Studies and Overlays.....	66
Trendlines .....	67
Entering and Exiting Trend Mode .....	67
The Trend Mode Tool Bar .....	67
Freehand Mode .....	70
Drawing Horizontal Lines.....	70
Drawing Horizontal Fibonacci Retracements .....	71
Drawing Diagonal Fibonacci Retracements .....	72
Fibonacci Options .....	73
Displaying the Fibonacci Options Dialog.....	74
Drawing Speed Lines.....	74
Drawing Gann Time/Price Angles.....	76
Gann Time/Price Options .....	77
Drawing Gann Squares .....	79
Gann Squares Options Dialog.....	80
Drawing Andrew’s Pitchfork.....	81
Drawing Thom Demark Relative Retracement.....	82
Qualifying Relative Retracement.....	84
Drawing Thom DeMark Absolute Retracement .....	84
Drawing Thom DeMark Trend Factors .....	86
Drawing Thom DeMark Retracement Arcs.....	87
Thom DeMark Trendline Property Dialog .....	89
Manipulating Trendlines.....	89
Moving Trendlines.....	89
Pivoting Trendlines.....	90
Extending and Retracting Trendlines.....	90
Adding Parallel Lines .....	91
Adding Linked Parallel Lines .....	92
Deleting Lines.....	93
Deleting a Single Line .....	93
Delete a Group of Lines.....	93
Delete All Trend Lines.....	94

Annotating Charts .....	94
Entering Text Mode .....	95
Adding Text .....	95
Changing Text Parameters .....	96
Displaying the Text Parameters .....	97
Quotes .....	97
Quote Properties Dialog .....	98
Understanding Quotes in Aspen .....	100
Quote Code Variables .....	100
Opening Pre-Defined Quote Windows .....	101
Displaying a Quote Grid Window .....	102
Displaying a Quote Board Window .....	103
Entering Symbols .....	103
Creating a Free Format Quote Window .....	105
The Quote Code Dialog .....	106
Displaying the Quote Code Dialog .....	106
Using the Quote Code Dialog .....	107
The Quote Window Toolbar .....	108
Adding Formulas or Text to a Quote Window .....	111
Fill Down and Fill Right .....	112
Filling a Specified Range .....	115
Quote Code Definitions .....	116
Clocks .....	119
Clock Toolbar .....	119
Clock Properties Dialog .....	121
Changing the Time Zone .....	122
Time Zone Codes .....	123
Price/Volume .....	124
Market Profile Anatomy .....	125
Price Volume Cursor .....	126
Displaying a Market Profile .....	126
Market Profile Toolbar .....	127
The Market Profile Menu .....	128
Profile Properties Dialog .....	129
Displaying the Market Profile Properties Dialog .....	133
Merging Profiles .....	133
Removing Merged Profiles .....	133
TPO's .....	134
Old TPO Alphanumeric Assignments .....	134
New TPO Alphanumeric Assignments .....	134
News .....	135
Displaying a News Window .....	136
News Window Toolbar .....	136
News Search .....	137
Display by Category .....	137
Keyword Search .....	138

Additional News Window Tips .....	139
Time and Sales .....	140
Displaying a Time and Sales Window .....	141
Time and Sales Property Dialog .....	141
Displaying the Time and Sales Property Dialog .....	144
Formulas .....	145
The Parts of a Formula.....	145
Expressions .....	146
Functions.....	150
Study Functions .....	151
Chart Functions.....	152
Trig Functions.....	154
Special Functions.....	154
The Chart Function .....	154
The Scale Function .....	157
Writing a Formula.....	159
The Formula Editor.....	159
Example Formula.....	161
Multi Line Formula Writing .....	166
Multi-Line Formula Examples.....	168
Color Rules .....	172
Color Rule Dialog .....	173
Creating a Custom Color Rule.....	174
Edit a Color Rule .....	176
Using Color Rules in a Chart.....	176
Alarms.....	179
What can Trigger an Alarm?.....	179
The Alarm List Dialog .....	181
Adding or Editing an Alarm .....	182
Alarm Examples.....	188
Slow Stochastic Lines Crossing.....	188
Slow Stochastic Lines Crossing Above 80 or Below 20 .....	189
Price Breakouts from Bollinger Bands .....	189
Momentum Changes Direction.....	190
Option Volume Increases.....	190
Moving Average Crossover .....	191
Index or Instrument Outside a Given Range.....	191
Instrument Up/Down 5 points.....	191
Auto-Print 3 days prior to Expire.....	192
DDE / Exporting Data to Excel .....	192
Loading the Aspen Graphics DDE toolbar in Excel.....	193
Displaying the DDE Link Generator Dialog Box.....	195
Quote – “Live” Links from Aspen Graphics into Excel.....	195
History – Exporting Historical Data from Aspen Graphics to Excel.....	197

Options - Exporting Theoretical Values and Volatility Data from Aspen Graphics .....	198
Formula - Exporting an Aspen Graphics Formula to the Spreadsheet .....	199
Initiate a DDE Link from within Aspen Graphics .....	199
Creating a Symbol using DDE.....	200
Importing Data from Excel to Aspen Graphics .....	202
Importing Static (“historical”) Data from Excel into Aspen Graphics.....	202
Import "Live" Data using the Aspen GraphicsTick Function.....	203
DDE Examples.....	205
Displaying a Formula Value as a BAR Chart (intraday) .....	205
Displaying a Formula Value as a BAR Chart (Daily) .....	207
Creating a Database in Excel .....	208
Charting a Portfolio in Aspen Graphics Using DDE .....	211
Appendix A – Custom Page Walk Through .....	213
Creating a Custom Page.....	213
Create a Quote Window.....	214
Ready the Quote Window for Formatting .....	214
Format the Quote Window using the Code Menu .....	215
Display the Two Charts .....	217
Format the Charts.....	217
Add a Symbol to the Charts and Quote Windows .....	218
Add a News Window to the Page .....	218
Add and Format the Ticker Window .....	219
Adding Symbols to the Ticker Window .....	220
Save the Page .....	221
Additional Page Building Tips .....	223
Appendix B - Description of the Studies .....	224
Trend Followers:.....	224
Overbought/Oversold Indicators:.....	224
Trend Indicators: .....	225
Activity Indicators: .....	225
Acceleration .....	225
Accumulation/Distribution (A/D) Oscillator .....	229
Average Balance Volume .....	230
Average Directional Index (ADX).....	232
Bollinger Bands .....	234
Commodity Channel Index (CCI).....	237
Cumulative Volume .....	239
Directional Indicator (DMI).....	241
Directional Oscillator.....	244
HiLo Oscillator .....	245
Historical Volatility .....	247
Keltner Channels.....	250
Linear Regression .....	252
Moving Average Convergence Divergence (MACD).....	254
MACD Oscillator.....	257

Momentum.....	259
Moving Averages.....	262
Moving Average Envelope.....	264
Moving Average Momentum.....	266
Moving Average Oscillator.....	267
On Balance Volume.....	269
Open Interest.....	271
Parabolic.....	272
Relative Strength Index (RSI).....	274
Stochastic, Fast.....	276
Stochastic, Modified.....	278
Stochastic, Slow.....	280
Variable Accumulation Distribution.....	282
Volume.....	283
Volume Accumulation Oscillator.....	285
Williams' %R.....	287

# What Is Aspen Graphics 4.2?

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Aspen Graphics Workstation Version 4.01 is the latest offering from Aspen Research Group. The original application has been re-written to provide a more up-to-date and intuitive front-end, whilst retaining the powerful features and functions which traders have relied upon for 20 years.

Aspen Graphics is able to display real-time data from a number of different data vendors and sources, depending on location and method of delivery (internal LAN or internet). The majority of features and functions covered in this manual are feed independent, there are some options which are feed specific and will be dealt with at the end.

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## Objects in Aspen

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There are two objects with which we concern ourselves in Aspen, Pages and Windows. It is only possible to have one page displayed at any one time; however that one page can be made up of multiple windows. The most commonly used ones are described below:

### Charts

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Charts are perhaps the most commonly used windows in Aspen Graphics, enabling users to view historical data on an intra-day or daily basis. There are a large number of technical analysis studies which can be applied to these charts and these will be covered in a later section.

### Clocks

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The clock windows in Aspen are configurable clocks that can be set to different time zones and display modes.

### Quotes

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The quote windows in Aspen enable users to monitor price information and movement in real-time. Completely customizable, the quote windows offer limitless options for display of data

### News

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Depending on the data package subscribed to, news from a variety of sources is available through Aspen Graphics. News can be displayed by Category or specific keywords can be searched for from the whole news database.



## Time and Sales

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The time and sales window in Aspen Graphics is used to view tick data as it is received, users can view bid, ask, trade and settlement prices or any combination thereof. In addition any associated volumes can also be displayed, and users further have the choice of filtering out small or large volumes.

## Price and Volume

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Also known as Market Profile®, Price and Volume is another way of viewing data, as opposed to viewing price against time, with this display method we are able to view how much volume has traded at a given level.

## Other Windows

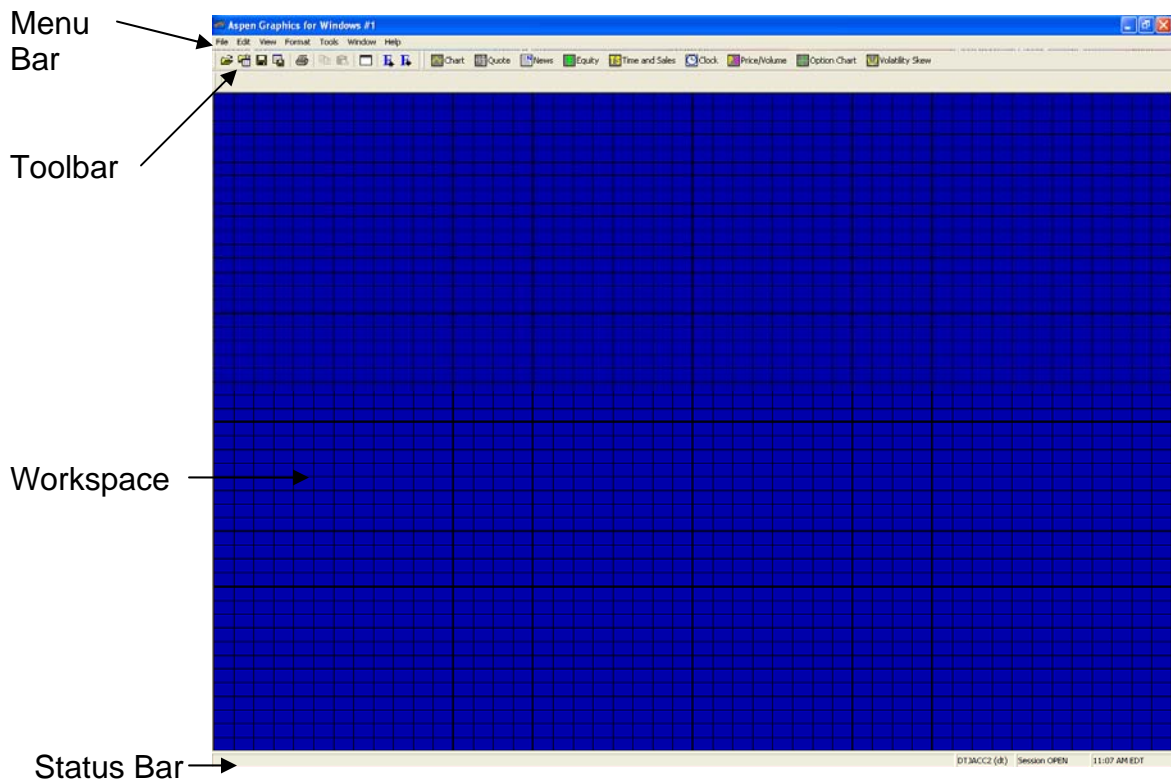
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Either not as commonly used, or feed specific, there are several other types of display in Aspen Graphics. These are mentioned in Appendix A: Additional Displays

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## Display Options

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## Toolbars

The Toolbar below is the Standard Toolbar, it contains buttons for file management functions, printing, Cut/Copy & Paste and Font Sizes/

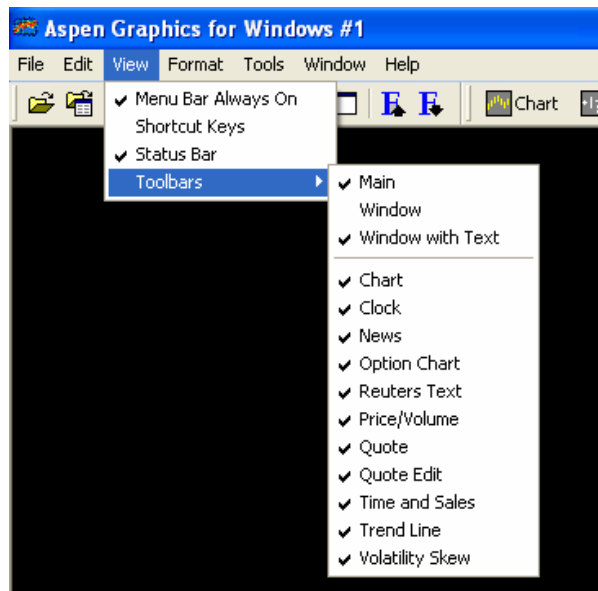


In addition, the Windows available (as mentioned above) can also be shown either as a simple icon or with their names alongside:



Clicking any of these will add a new window to your desktop, and the appropriate toolbar for that window will be added to the top of the screen. The different options on each of the toolbars will be covered under the relevant section.

Whether or not these toolbars appear is controlled by the user, and the option to view toolbars is found under View, Toolbars. It is also this option where settings for the Menu Bar and Status bar are kept.



All Toolbar buttons have ToolTips associated with them which will appear after a couple of seconds of pointing at a given button.

## Menu Bar

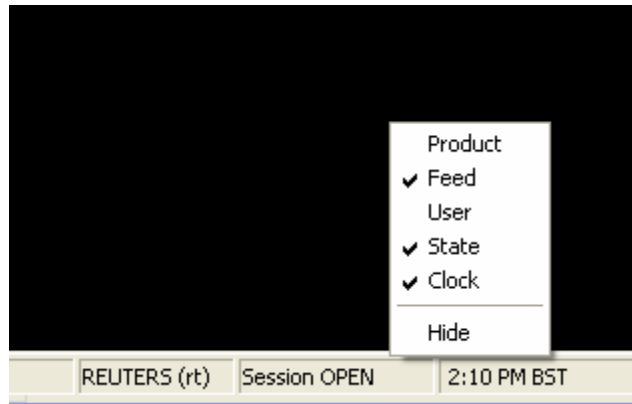
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This can either be set to be permanently displayed or to only appear when the mouse pointer is moved over the title bar.

## Status Bar

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The status bar can be turned on or off and set to display a number of pieces of information:



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## Accessing Menu Options

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In Aspen, it is possible to access menu options in several different ways. Using the mouse, a simple right-click on a window will display the quick menu, alternatively when a window has focus the options relating to that window will appear on the menu bar. As has been mentioned before, there are a number of toolbars associated with the different windows, and most of the options are also available here.

The fourth and final way is via keyboard shortcuts and commands. Almost all keyboard commands should be prefixed by the full-stop to avoid confusion, however occasionally the full-stop can be omitted. A list of the more commonly used keyboard commands is found in Appendix B: Keyboard Shortcuts.

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## Managing the Desktop

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As Windows are added to the desktop they will (by default) be cascaded down the screen. Unless disabled, each window will have a title bar at the top which contains standard Microsoft windows buttons (Maximize, Minimize, Restore and Close). If there are several windows on the desktop a quick way of organizing them neatly to fit is to use the Window, Tile Horizontally, or Tile Vertically option, note this will only work if title bars

are displayed. If different windows need to be sized and positioned independently then clicking and dragging on the border of a window will re-size and windows can be moved by dragging the Title Bar.

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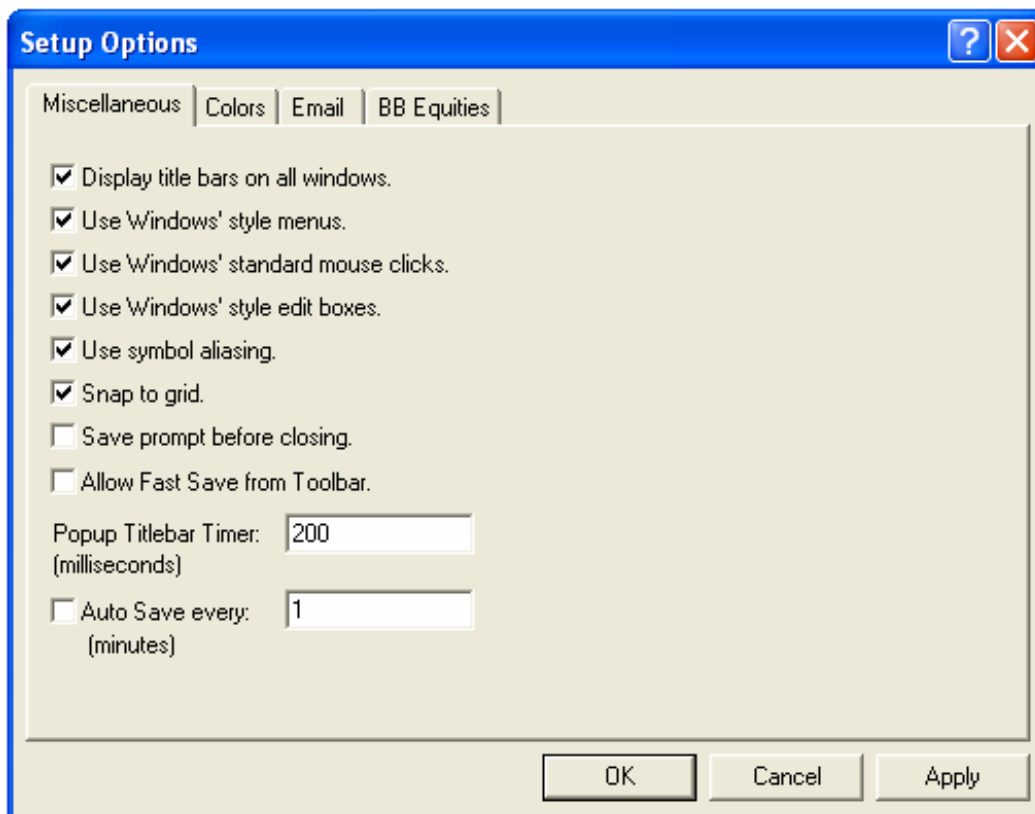
## Setup Options Dialog

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The Setup Options Dialog offers access to several features. Many of these features are global features that affect all windows for example. Other features may be feed specific.

### Miscellaneous

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- Display title bars on all windows – Toggles the display of Windows title bars for all windows.
- Use Windows' style menu – Toggles the menu style between Windows and Aspen's 3.71 styles.
- Use Window's standard mouse clicks – Toggles the mouse click style between Windows and Aspen's 3.71 styles.
- Use Window's style edit boxes – Toggles the text boxes between Windows and Aspen's 3.71 styles.
- Use Symbol Aliasing – Toggles symbol aliasing on. Custom symbol aliases can be

setup in Aspen and used in place of a feed's regular symbol.

- Snap to Grid – Causes windows to align to the workspace grid when moving or resizing.
- Save prompt before closing – Toggles the display of the save prompt when closing Aspen.
- Allow Fast Save from Toolbar – Toggles automatic overwrite when using the toolbar icons to save files.
- Popup Titlebar Timer – Specifies the length of time the mouse must point at the top of an Aspen window before the title bar is displayed. Used only when Title Bars are disabled.
- Auto Save every – Specifies a length of time in minutes that open pages are automatically saved.

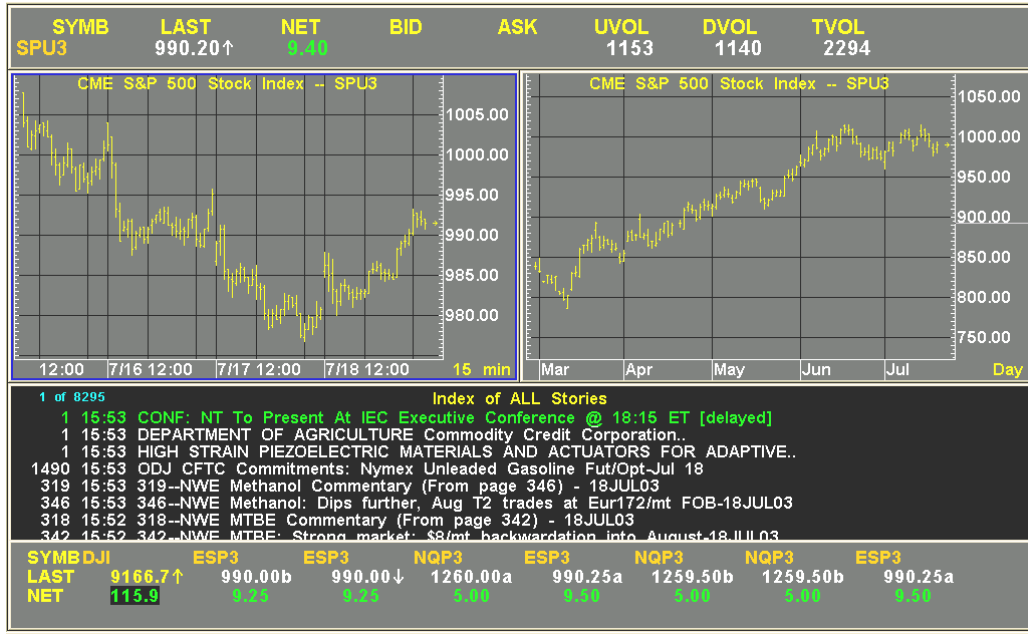
## File Management

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### About Aspen Pages and Aspen Windows

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Aspen Graphics uses two file formats when saving and opening files. These file formats are Aspen Pages and Aspen Windows. An Aspen Page is a container of one or more Aspen Windows. An Aspen Page is the entire Aspen Graphics screen layout. An Aspen Window is a single chart, quote or news window. An Aspen Page can contain any number of such Windows. The Aspen Page below contains five windows, two chart windows, two quote windows and a news window.



## Saving Files

When saving files in Aspen care must be taken to ensure that the file is saved in the correct format. Aspen Pages and Aspen Windows are stored in separate sub directories. Aspen Pages and Aspen Windows are also saved using a different process.

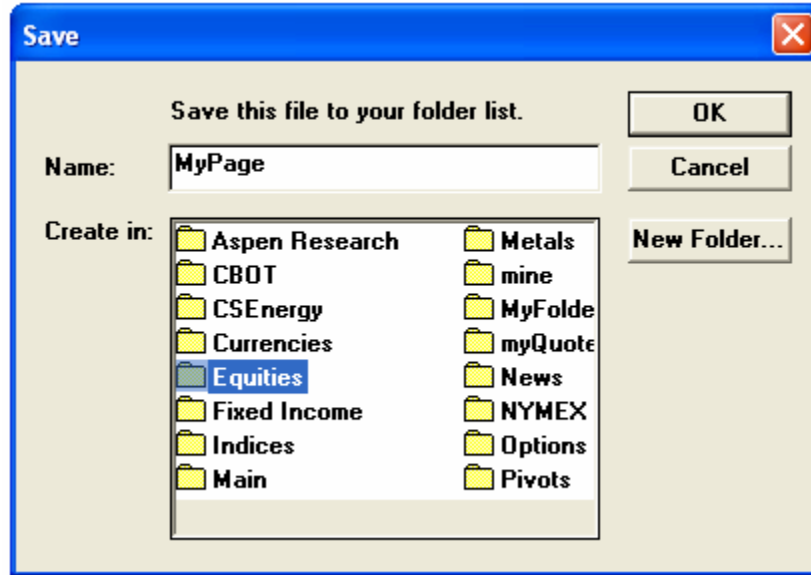
### Saving Pages

Save an Aspen Page by left-clicking on the **File Menu**, then left-click **Save Page**.



Enter a unique name in the Name field. You cannot use *only* symbols or numbers in naming pages; this will return an error message saying the name is reserved. Numbers and symbols can be used in combination with no conflict (e.g. - IBM\_15 is a valid page name). You also cannot use spaces in a page name; use the underscore ( \_ ) instead.

Select a folder from the choices available in the **Create in:** section. You may also create a new folder to store this page in. Click the **New Folder** button and, name the folder accordingly to create a new folder. When you have selected (or created and named) the desired folder, click **OK**. The software verifies that the page has been saved by displaying its name in quotes on the title bar.



### Saving Windows

Save an Aspen Window by left-click on the **File Menu**, then left-click **Save Window**. Aspen Windows must follow the same naming guidelines as Aspen Pages.

## Opening Files

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Aspen Pages and Aspen Windows are stored in separate directories. Because of this, Aspen Pages and Aspen Windows must be opened using different processes.

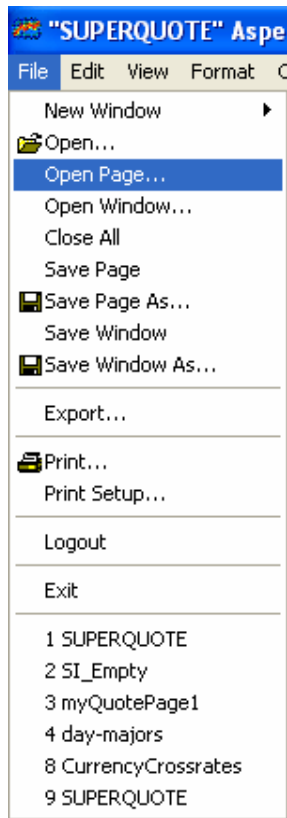


If you have difficulty in finding a previously saved file use both Open Page and Open Window. The file may have been accidentally saved as a Window when you intended to save it as a Page or vice versa.

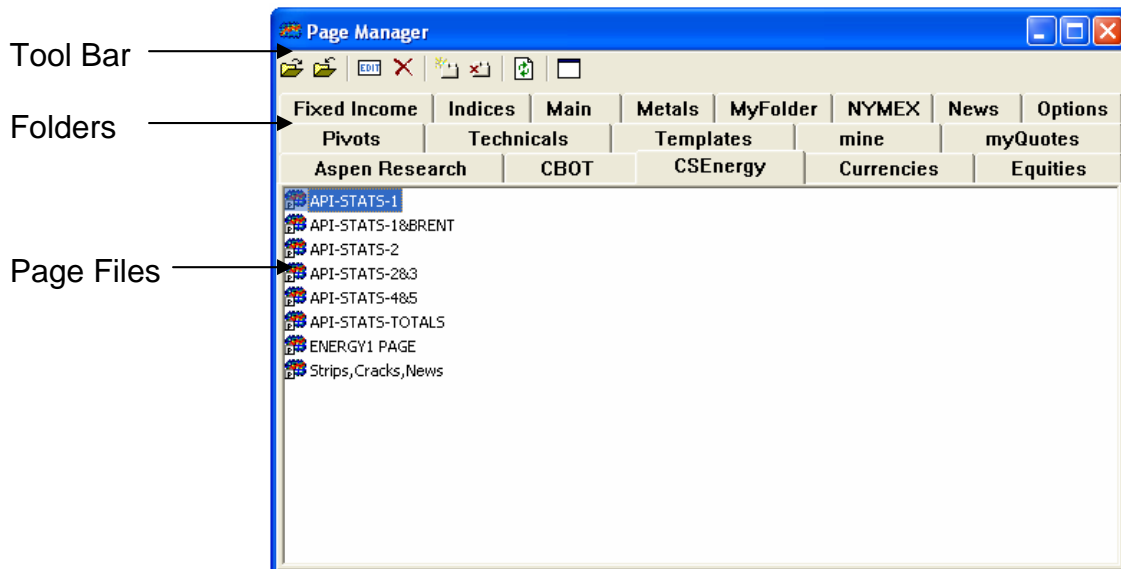
## Opening Pages

Open an Aspen Page by Left-Clicking on File and selecting Open Page. This launches the Aspen Page Manager.

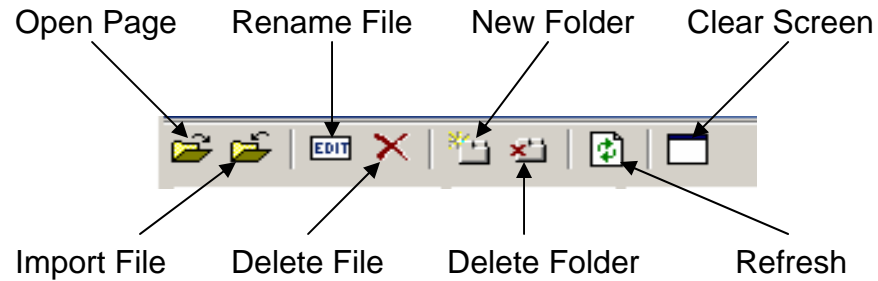




## Page Manager



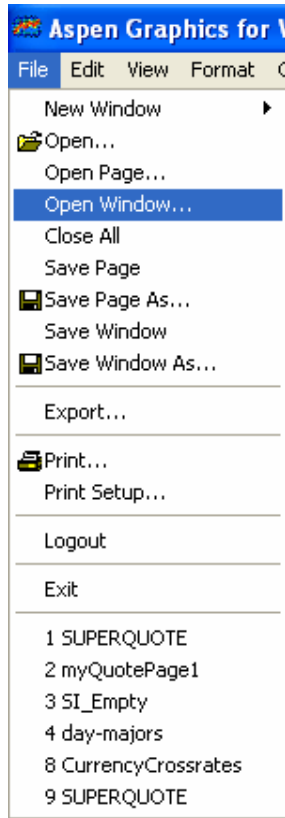
## Page Manager Tool Bar



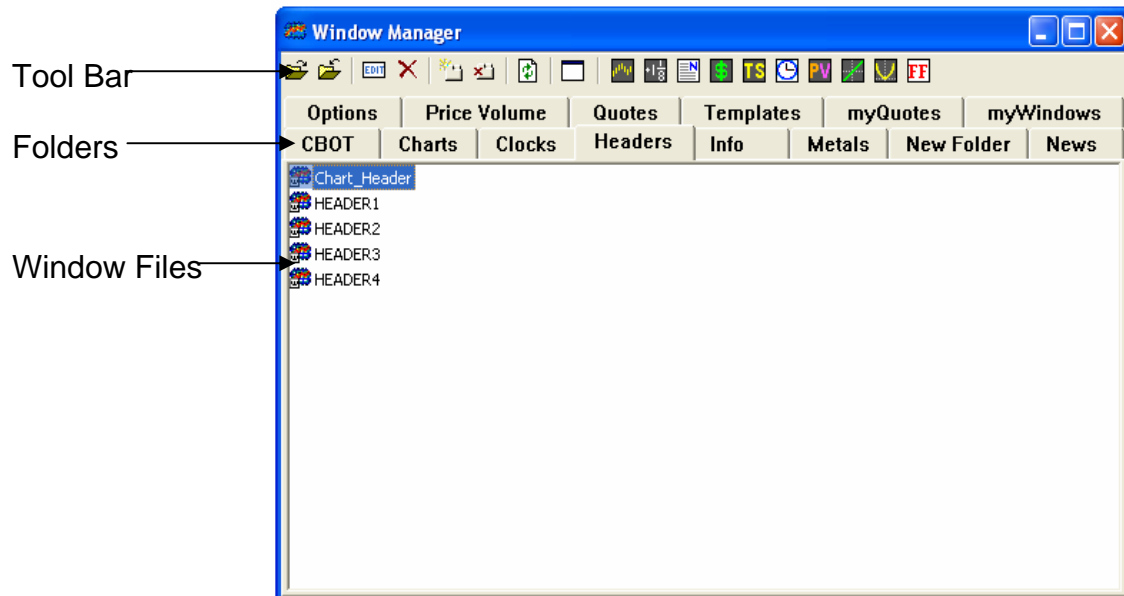
- Open Page - Opens the selected page in the Page Manager.
- Import File – Allows the user to import existing Aspen Page files from directories other than the pages directory.
- Rename File – Allows the user to rename the file in the Page Manager.
- Delete File - Sends the selected file to the Recycling Bin.
- New Folder – Creates and names a new folder in the pages directory.
- Delete Folder – Deletes the selected folder.
- Refresh – Refreshes the Page Manager contents.
- Clear Screen - Removes and charts or quotes from the Aspen Graphics display.

## Opening Windows

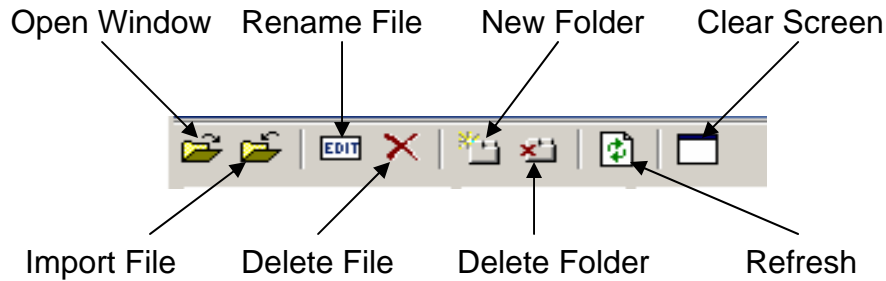
Open an Aspen Window by left-clicking on File and select Open Window. This launches the Window Manager.



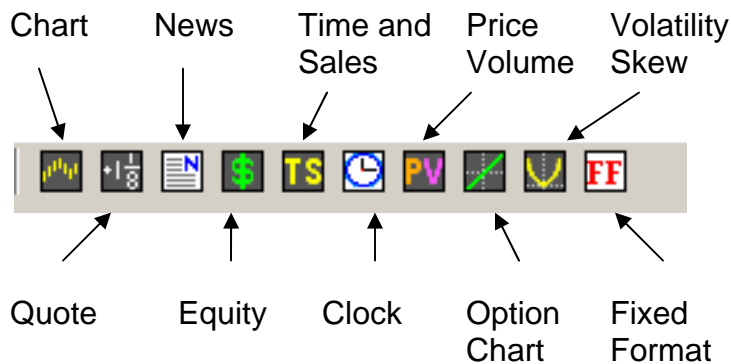
## Window Manager



## Window Manager Tool Bar



- Open Window – Opens the selected Aspen Window file.
- Import File – Allows the user to import existing Aspen Window files from directories other than the windows directory.
- Rename File – Allows the user to rename the file in the Page Manager.
- Delete File – Sends the selected file to the Recycling Bin.
- New Folder – Creates and names a new folder in the pages directory.
- Delete Folder – Deletes the selected folder.
- Refresh – Refreshes the Page Manager contents.
- Clear Screen - Removes charts or quotes from the Aspen Graphics display.



- Chart – Opens a blank, default Chart Window in Aspen.
- Quote – Opens a blank Quote Window in Aspen.
- Equity – Opens an Aspen Equity window.
- Time and Sales – Opens an Aspen Time and Sales window.
- Clock – Opens an Aspen Clock Window.
- Price Volume – Opens an Aspen Price Volume window.
- Option Chart – Opens a default Option Chart Window in Aspen.
- Volatility Skew – Opens a Volatility Skew Window in Aspen.

- o Fixed Format – Opens the Platts Fixed Format Page Window in Aspen.

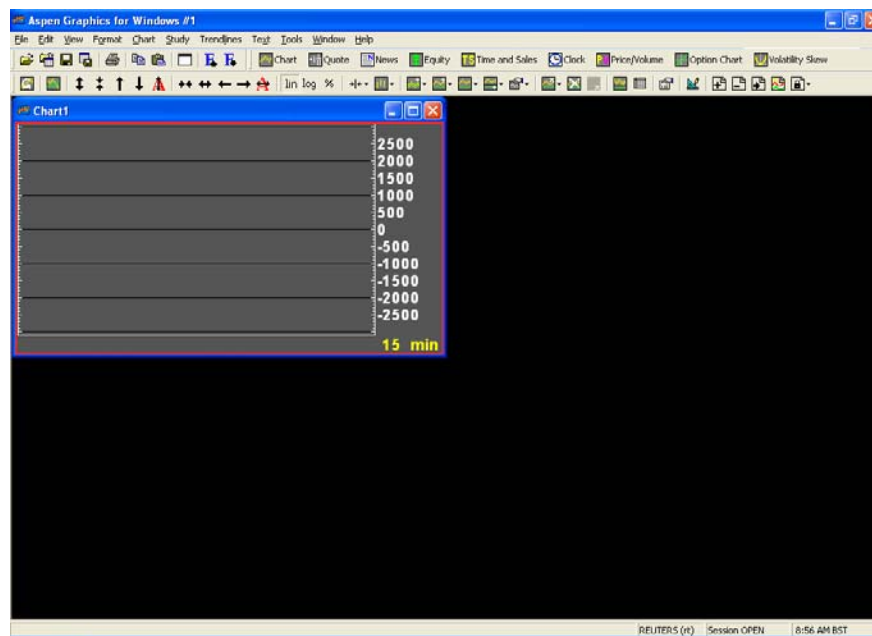
# Charts

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## Adding a Chart

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If the Window Toolbar is visible then simply click the Chart button, alternatively choose **File, New Window** and select a chart from the list. Both of these methods will add a default chart, that is to say a daily bar chart occupying a quarter of the screen.



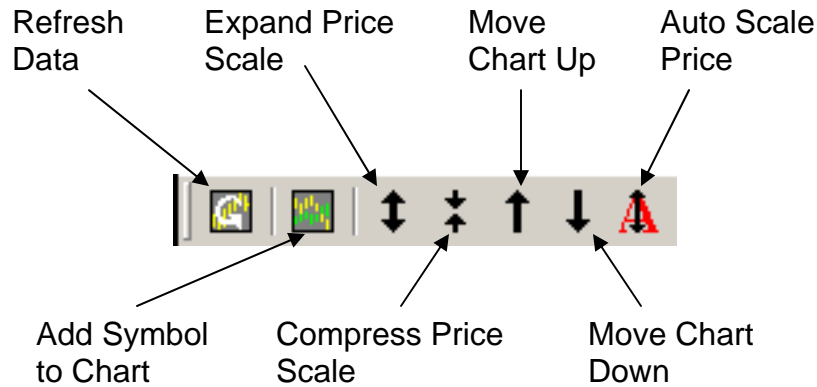
If more than one chart is required, repeat the process until all the charts are added. These can then be arranged by choosing Window, Tile Horizontally, or Tile Vertically.

Once all the charts are added, they can be populated by entering the symbols on each chart.

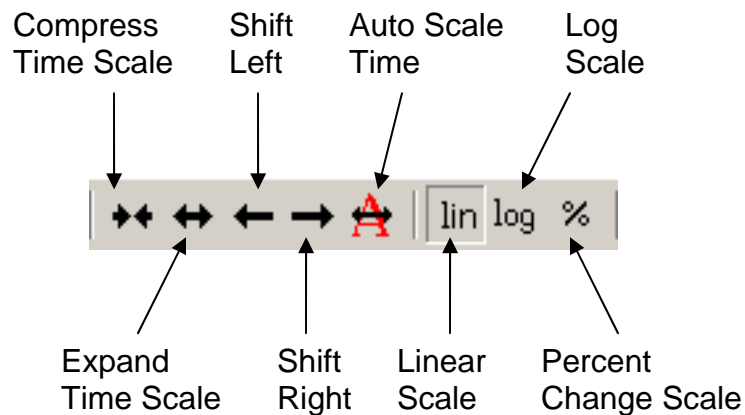
## Chart Toolbar

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The Chart Toolbar is enabled once a chart window is opened or created in Aspen. The Chart Toolbar contains commands for configuring the various charting features available in Aspen Graphics.

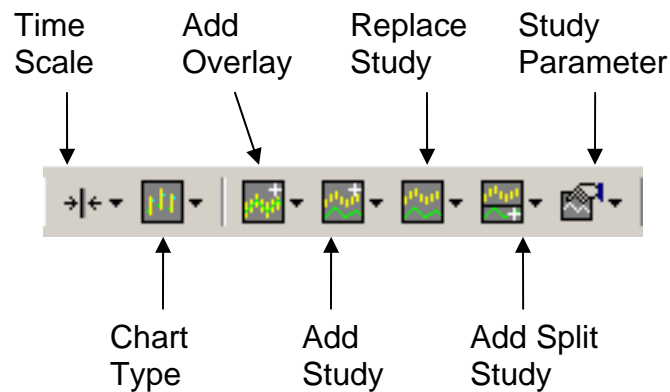


- Refresh Data – Queries the server and fills in missing data on Aspen Servers. Refresh will only fill in missing data visible on the chart.
- Add Symbol to Chart – Opens a text box for entering a symbol on the chart.
- Expand Price Scale – Increases the details along the Price axis.
- Compress Price Scale - Decreases the details along the Price axis.
- Move Chart Up – Moves the entire chart up.
- Move Chart Down – Moves the entire chart down.
- Auto Scale Price – Restores the default price scale for the chart.

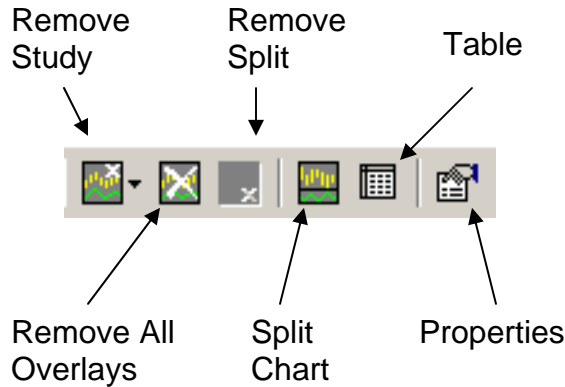


- Compress Time Scale – Decreases the details along the Time axis.
- Expand Time Scale – Increases the details along the Time axis.
- Shift Left – Moves the entire chart to the left.
- Shift Right – Moves the entire chart to the right.
- Auto Scale Time – Restores the default time scale for the chart.
- Linear Scale – The price scale is set by an instrument's trading units, and the bar plots linearly along the scale.

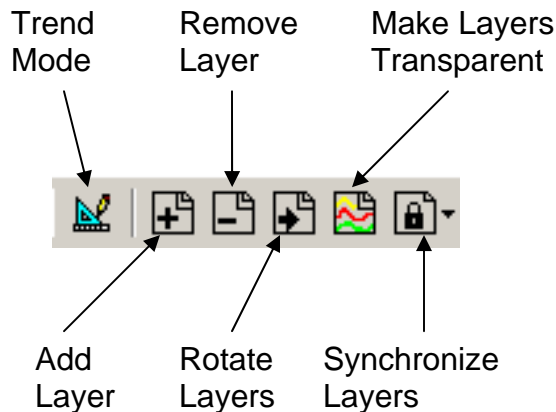
- Logarithmic Scale - Plotting prices on a logarithmic scale allows the presentation of a uniform picture of performance and permits the easy comparison of instruments that differ widely in dollar amount.
- Percent Change Scale - Percent change charts are used to compare the percent change in price from the close of the left-most bar.



- Time Scale – Opens a Drop-Down Menu containing popular time frames. Selecting a time frame will change the time frame for the chart.
- Chart Type – Opens a Drop-Down Menu containing chart type options for Aspen. Selecting a chart type will change the current chart type.
- Add Overlay – Opens a Drop-Down Menu containing indicators that can be displayed in the same window as the chart. Selecting an indicator will apply the indicator to the chart.
- Add Study – Opens a Drop-Down Menu containing indicators that are displayed in a split window. Selecting an indicator will apply the indicator to the selected window.
- Replace Study – Opens a Drop-Down Menu containing indicators and chart types. Selecting a menu item will remove the current indicator or chart type and replace it with the selection.
- Add Split Study – Opens a Drop-Down Menu containing indicators that must be displayed in a split window. Selecting an indicator splits the chart and applies the indicator to the new split window.
- Study Parameter – Opens a Drop-Down Menu containing the current indicators. Selecting a menu item will display the Parameters Dialog for the selected Item.



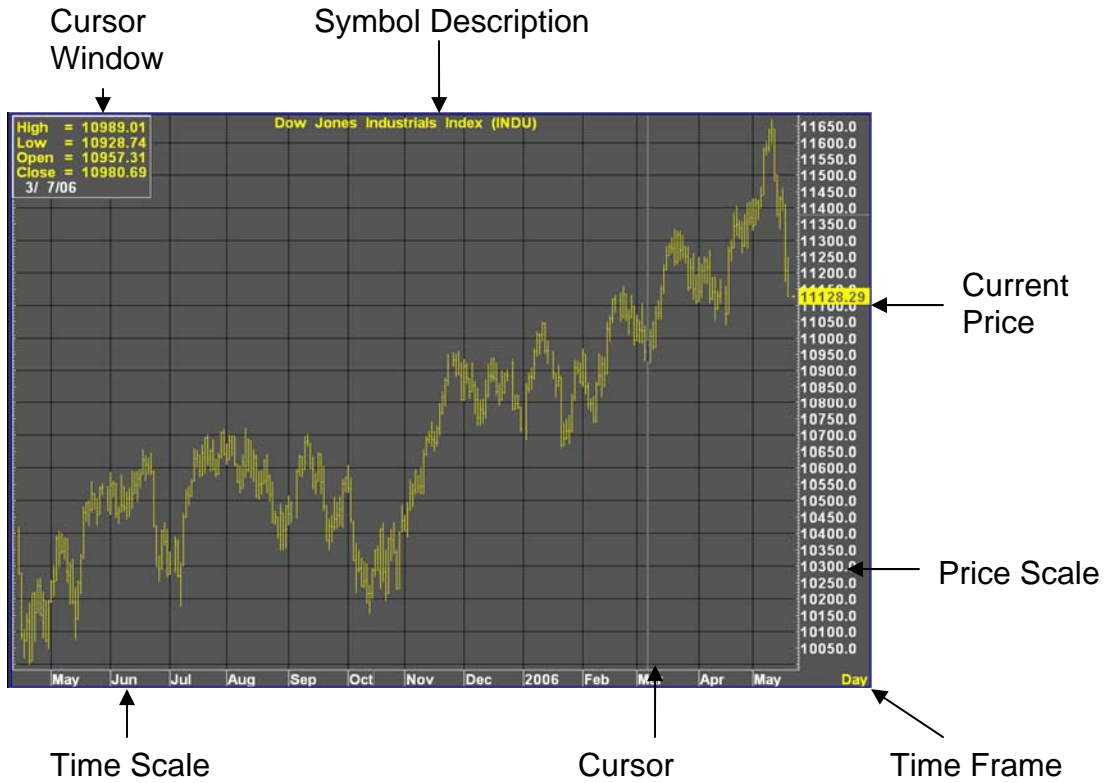
- Remove Study – Opens a Drop-Down Menu containing the indicators and charts in the window. Selecting an item from the menu removes it.
- Remove All Overlays – Removes all the overlay indicators on the chart and leaves the underlying chart in place.
- Remove Split – Removes the selected split window.
- Table – Displays chart data as a table.
- Properties – Displays the Chart Properties Dialog.



- Trend Mode – Toggles Trend mode for drawing trend lines, Gann and Fibonacci features.
- Add Layer – Adds a layer to the chart.
- Remove Layer – Removes the selected layer from the chart.
- Rotate Layers – Rotates the display of layers bringing layers from the back to the front.
- Make Layers Transparent – Enables viewing off all the current chart layers.
- Synchronize Layers - Opens a Drop-Down Menu containing items that can be synchronized between layers.



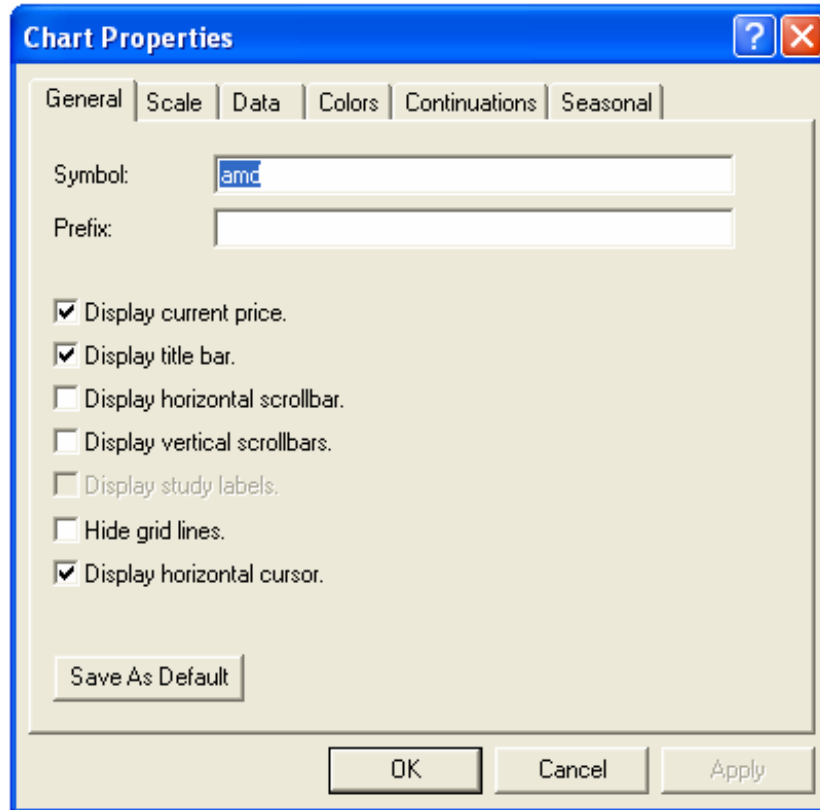
# Chart Elements



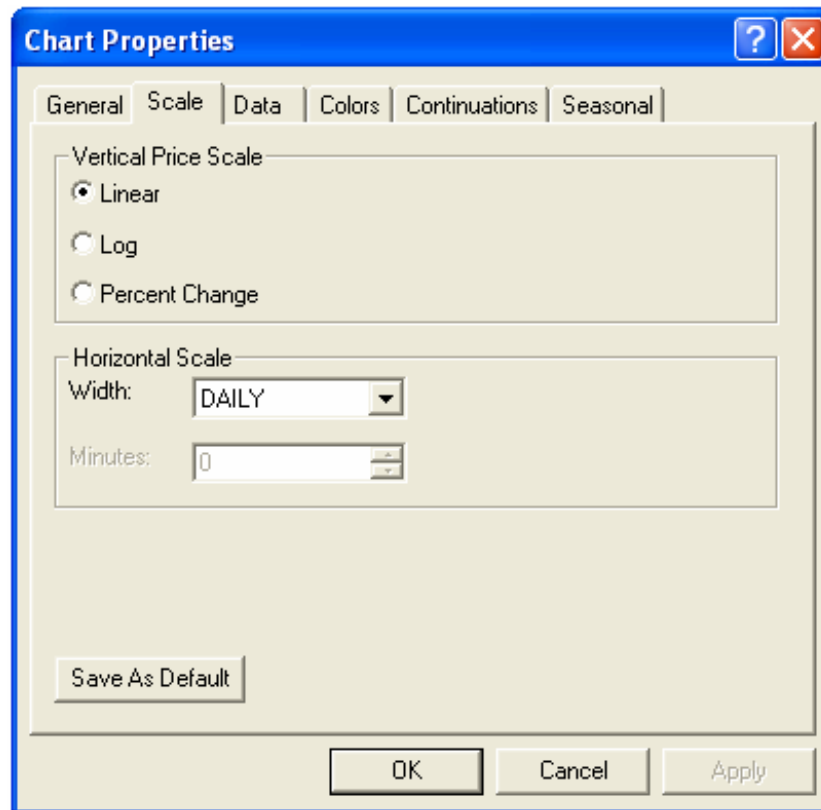
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## Chart Properties Dialog

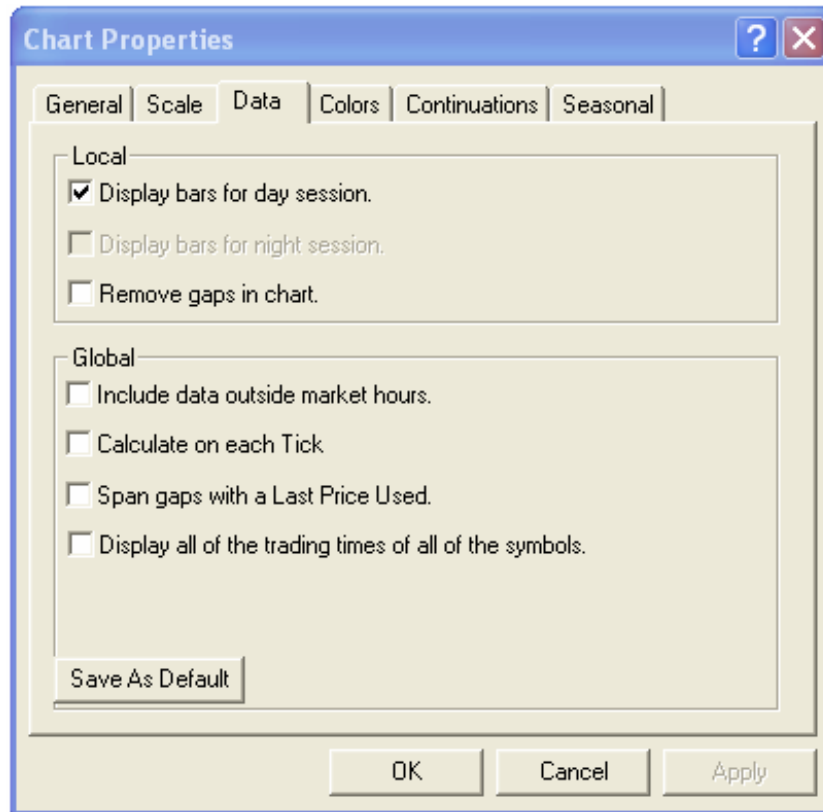
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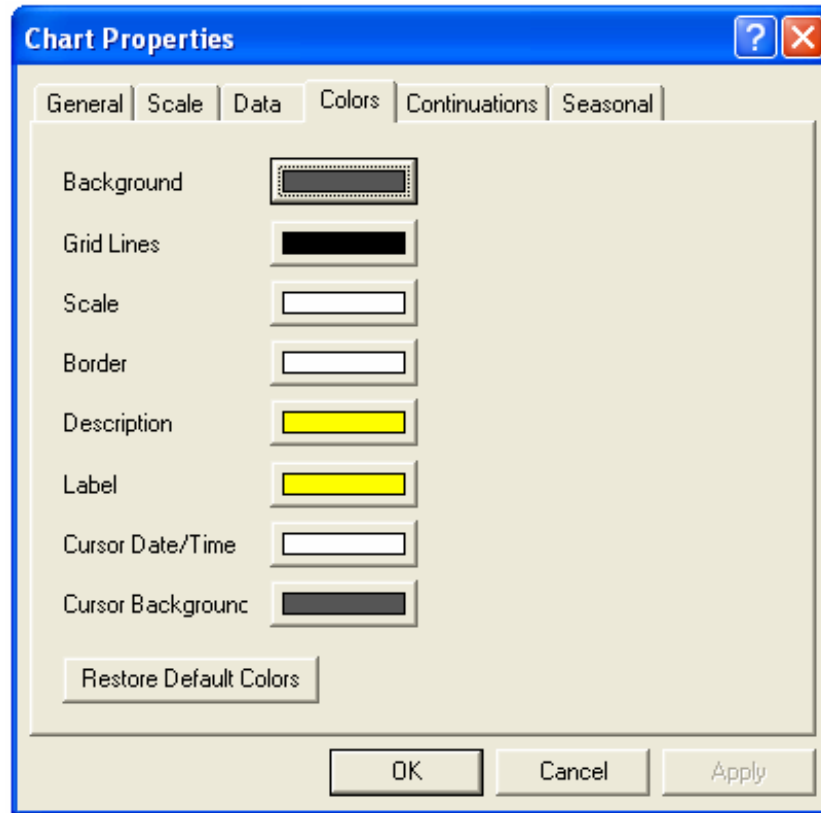
- Symbol – Contains the current symbol on the chart. Symbols and formulas can be entered here.
- Prefix – Contains any feed specific country prefixes.
- Display Current Price – Enabling this option highlights the current price on the chart.
- Display Title Bar – Toggles the display of title bars on chart windows.
- Display Horizontal Scrollbars – Toggles the display of horizontal scrollbars.
- Display Vertical Scrollbars – Toggles the display of vertical scrollbars.
- Hide Grid Lines – Toggles the display of the background gridlines.
- Display Horizontal Cursor – Toggles the display of the crosshair cursor.
- Save As Default – Sets the current options as the default display for each new chart created.



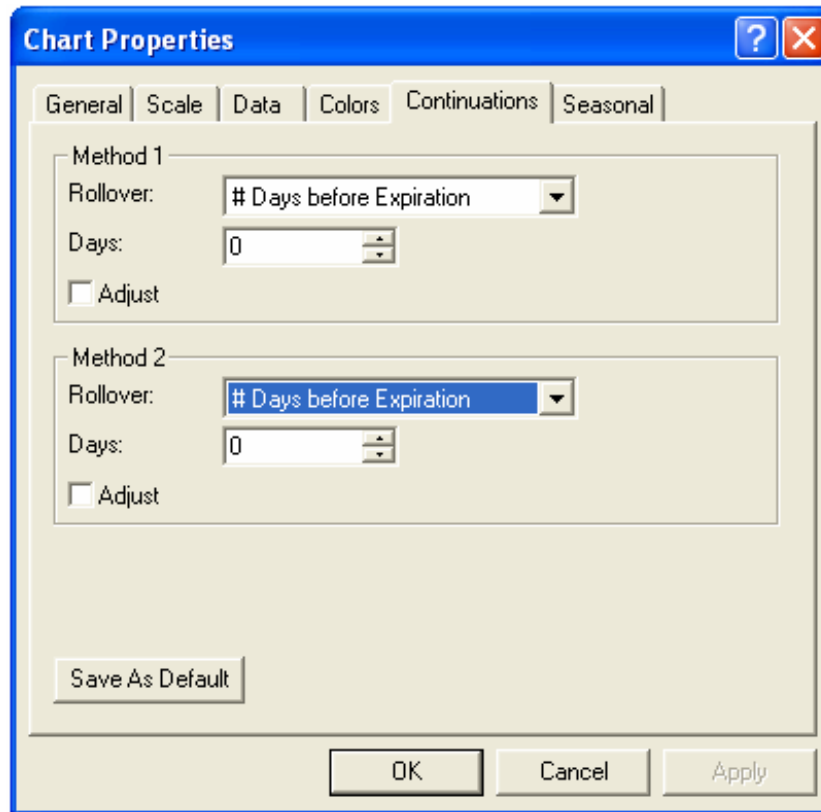
- Linear – The price scale is set by an instrument’s trading units, and the bar plots linearly along the scale.
- Log – Compares percentage price changes rather than absolute price changes.
- Percent Change – Compares the percent change in price from the close of the left-most bar on the chart.
- Width – Controls the database used to calculate the data.
- Modifier – Controls the number of items selected in the Width option when calculating a bar. Not all Width options enable the Modifier Option.
- Save As Default - Sets the current options as the default display for each new chart created.



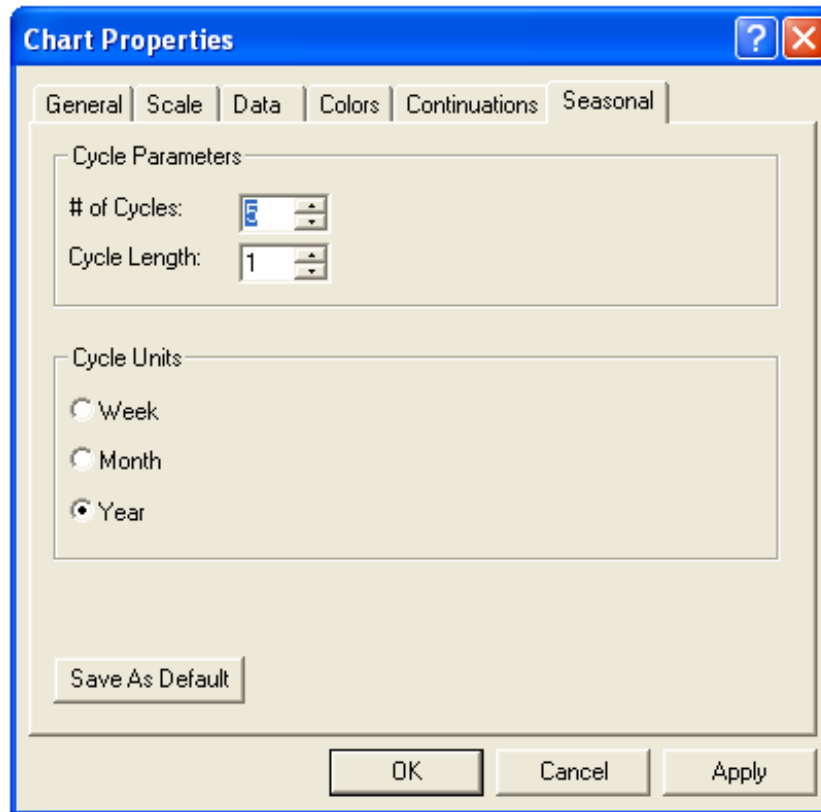
- Display bars for day session – Toggles the display of day session bars.
- Display bars for night session – Toggles the display of night session bars for instruments that have a night session.
- Remove gaps in chart – Toggles the display of any weekend or holiday gaps in the chart.
- Include data outside market hours – Toggles the display of after hours market data for instruments that may be traded outside of market hours.
- Calculate on each Tick – Enabling this causes Aspen to rebuild the current bar with each Tick. Disabling it causes Aspen to wait until the bar is completely built before updating the bar.
- Span gaps with Last Price Used – Toggles the display of the last bars data over weekends and holiday gaps.
- Display all of the trading times of all of the symbols – Creates a time scale that is an “intersection” of trading hours, or a period when the trading hours of the instruments in the formula overlap.
- Save As Default - Sets the current options as the default display for each new chart created.



- Background – Displays the color picker for changing the Background color.
- Grid Lines – Displays the color picker for changing the Grid Lines color.
- Scale – Displays the color picker for changing the Price and Time scale colors.
- Border – Displays the color picker for changing the border color of the chart.
- Description – Displays the color picker for changing the symbol name on the chart.
- Label – Displays the color picker for changing the color of the current price highlight.
- Cursor Date/Time – Displays the color picker for changing the color of the cursor's date and time field.
- Cursor Background – Displays the color picker for changing the background color of the cursor window.
- Save As Default - Sets the current options as the default display for each new chart created.



- Method 1 Rollover – Changes roll over options for continuation ‘C1.
- Method 1 Days – Specifies the number of days prior to expiration to roll the contract over for the ‘C1 continuation.
- Method 1 Adjust – Toggles adjustment of gaps between old and new contracts for the ‘C1 continuation.
- Method 2 Rollover – Changes roll over options for continuation ‘C2.
- Method 2 Days – Specifies the number of days prior to expiration to roll the contract over for the ‘C2 continuation.
- Method 2 Adjust – Toggles adjustment of gaps between old and new contracts for the ‘C2 continuation.
- Save As Default - Sets the current options as the default display for each new chart created.



- # of Cycles – Represents the number of seasons to break the chart into and display on the screen.
- Cycle Length – Specifies the length of the cycle.
- Cycle Units – Specifies the type of units used to break the chart into seasons.
- Save As Default - Sets the current options as the default display for each new chart created.

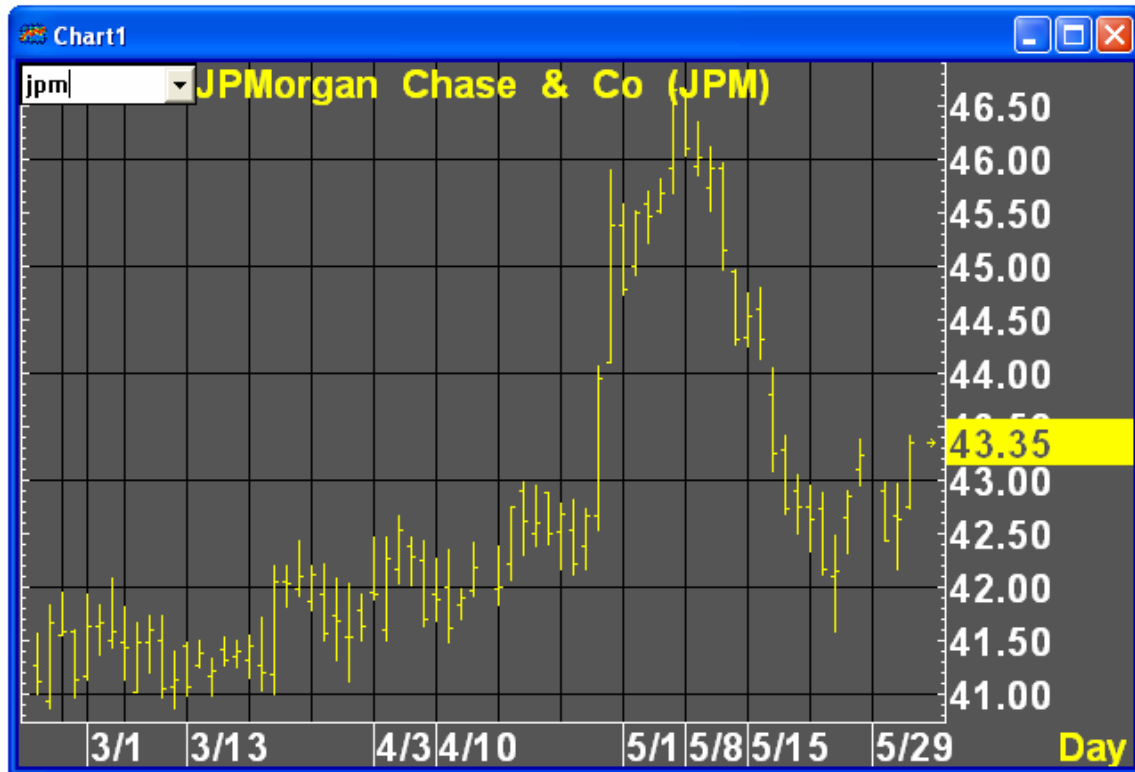
---

## Entering Symbols

---

Before any symbols can be entered it is important that the correct window has focus and if symbols are to be added to a quote list, then the cell into which the symbol needs to go is clicked. If no cell in a quote list is selected then it will be entered into the first cell, overwriting whatever is there.

To enter a symbol, simply begin typing. A textbox will appear containing the text you are typing. After typing the symbol press the enter key on your keyboard and Aspen will contact the server and begin to download data.



Alternatively, the Add Symbol to Chart Icon or the Edit Symbols Icons can be used to enter symbols. Left-Click the appropriate icon, type in the symbol and press enter on your keyboard to add the instrument to the chart.



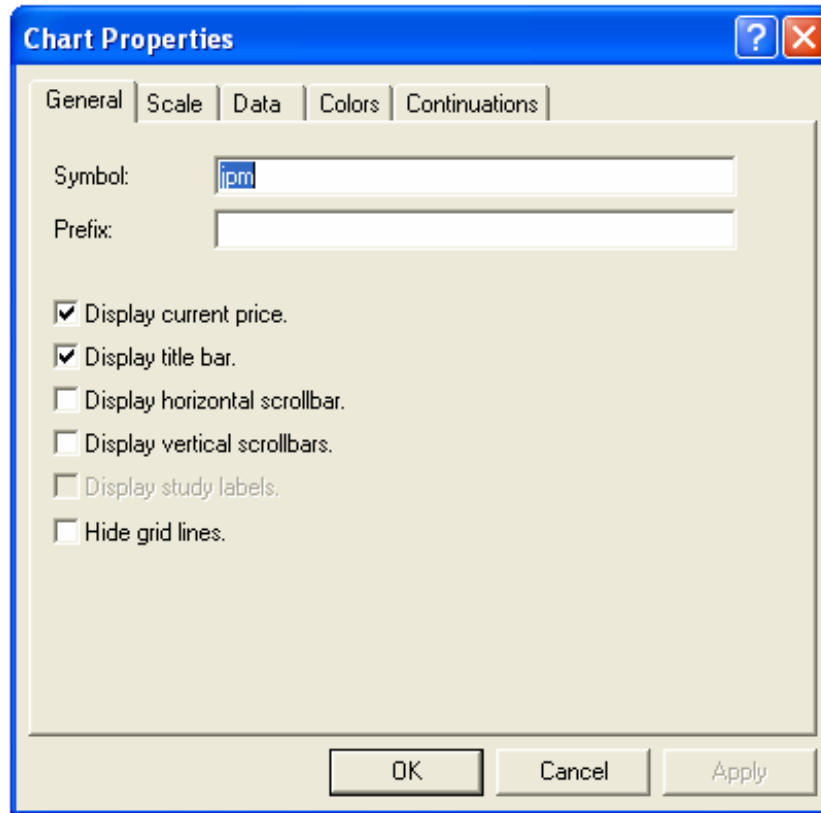
← Add Symbol to Chart Icon



← Edit Symbols Icon

A third method for entering symbols can be used on charts. Right-Click the chart and select Properties from the new menu. In the Chart Properties Dialog select the General Tab. Left-Click into the Symbol: Text Box and left-click on Apply and Ok when finished.





Calculations such as a spread or a multiplication to give weight to an instrument may also be entered as a symbol. In this case it is important to remember that some symbols use mathematical functions as part of the symbol code, and as such there is a danger of causing confusion in Aspen. To avoid problems it is recommended that any symbols which contain such functions be enclosed in quotation marks and, in the case of Reuters RICs, made uppercase. Holding down the shift key while pressing the enter key automatically wraps the symbol string with quotation marks. This process does not work however, when performing math on two different symbols.

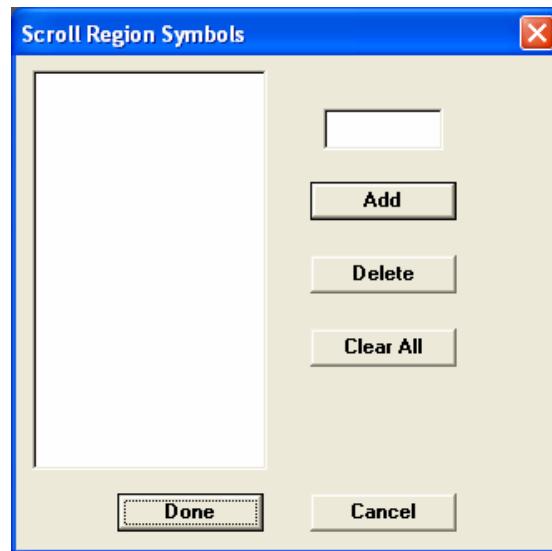
```
"%EU30YT=RR" - "%EU10YT=RR"  
"HGX.X"
```

"%EU30YT=RR" - "%EU10YT=RR" will display the difference between the Euro 30 year and 10 year government bond yields.



To enter similar spreads (10's 5's, 10's 2's etc) onto different charts, rather than re-enter the whole string from scratch use the F12 function key to recall the last command typed and simply edit it.

If a scroll region has been created then the symbols themselves cannot be typed directly into the quote page, instead they need to be entered into a list. To add items to a list right-click the quote page and choose Edit Symbols. The following dialog will appear:



To enter the symbols type them into the input box and then click Add until all symbols are entered, then select Done.

## Handling Futures Contracts

---

Given the ever-changing nature of futures contracts in terms of the month and year codes, maintaining these symbols manually on quote pages and charts would be a time-consuming process. Aspen Graphics has a means of automating the process. Typically a futures contract has a symbol root followed by month and year code extensions. For Reuters and ComStock data there is a month code and a single digit year code, Bridge symbols have a double-digit year code followed by the month.

**Reuters and ComStock**  
USmy – e.g USZ4

**Bridge**  
USymm – e.g. US04Z

When automating the process in Aspen, we take the symbol root and then attach one of the following characters:

# - By itself this code will give us the front (nearest to expiration) contract irrespective of whether the contract is drawing to a close and the next month has higher volume.

C# - This macro returns the front month for corn.

#number – This will not look at the front month but the contract x number of months away, depending on whether a contract trades every month (serial contracts) or only quarterly.

US#2 - Assuming the current contract is Sep06 and given that the 30 Year Long Bond trades quarterly this will give us prices for two quarters out i.e. Mar06

@ - By itself this code will give us a chain of all currently traded contracts starting with the nearest to expiration.

@HU – This macro returns all the contracts for unleaded beginning with the month nearest to expiration.

@number – This will provide a chain of the next x number of contracts. This is particularly useful when a contract trades many months into the future (for example Eurodollar and Crude Light)

CL@8 – This will give us the next 8 Crude Light contracts.

## Continuing Contracts

---

When looking at a long-term futures chart it is often not sufficient to simply look at the currently traded contract; there may be little or no activity in the current month. What is of more use is to see how the contract that was the front month *at the time* performed. For this we use continuous contracts. Continuations simply chart each contract, end-to-end, based upon the expiration date of the contract.

Depending on data vendor there are one or two types of Continuation Contract available to users of Aspen Graphics. Subscribers to Bridge, Reuters and to a limited extent PLATTS can make use of those data vendors proprietary continuous contracts. Irrespective of data vendor all Aspen Graphics users can use the Aspen Continuation charts.

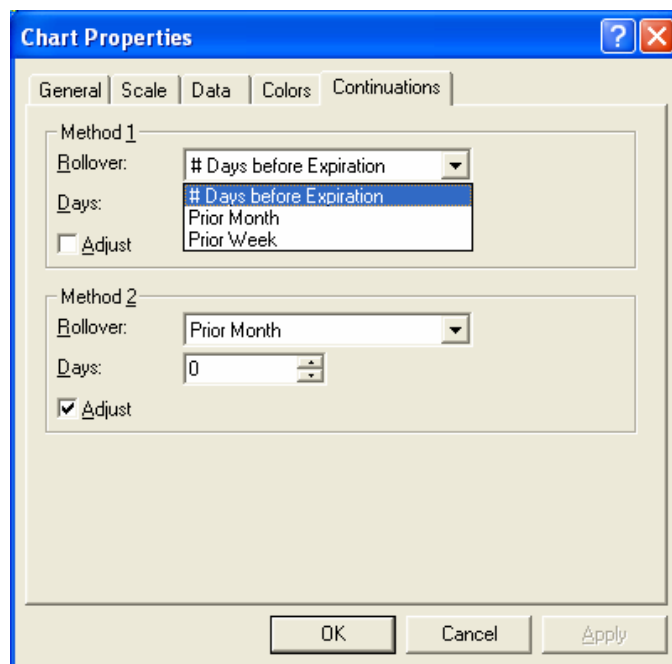
The continuous contracts offered by some data vendors are assigned a separate symbol – symbol root followed by ‘c1’ for Reuters and by ‘.1’ for Bridge. The data for the current contract is used as the source data for this symbol and updates at the same time, rolling to the next month upon expiration.

For many users this will be sufficient; however there are a number of drawbacks to these proprietary contracts. First, the market often considers the next contract to be the front month several days prior to expiration of the current contract; and, secondly it may be desirable to exclude certain serial contracts and only include the quarterly ones, or specify exactly which months are used.

By making use of the Aspen continuations both the above can be remedied. The way in which Aspen builds its continuation charts is to take the underlying futures contract and

string them together in a chain. Because each contract has an expiration date, we can reference this and set the contracts to roll early; either by a fixed number of days, on the first trading day of expiration week, or the first trading day of expiration month. Further, because we are referencing the underlying contracts we can state exactly which ones are to be used. The sole disadvantage of using the Aspen continuation method is that the data cannot be plotted on an intra-day basis.

Different types of futures may require separate handling in this regard and to that end we have two methods of continuous contracts available in Aspen. Again the symbol root is used followed by either 'c1 (apostrophe c1) or 'c2, for method one or method two. Exactly how methods one and two differ is controlled by the Continuations Settings menu option.



For each method we can specify when to roll contracts and whether or not we want them adjusted. To change the rollover method, click the drop-down list and make the selection. When # Days before Expiration is selected the Days input box can be used to specify the number of days. If Prior Month or Prior Week is used then any value in here is ignored.

The Adjust option is used to 'smooth' any vertical price gaps that may appear when switching from one contract to another. What Aspen does is to take the difference between the closing price of the out-going contract and the opening price of the incoming contract to obtain either a positive or negative value. This value is then applied to the preceding bars, effectively smoothing out these price jumps.

Having specified which continuation method to use, we can then specify which months are to be included in the continuation chart by simply typing the month codes.

In the examples below continuation method 1 is set to 3 days before expiration without adjust and method 2 is set to Prior Month with adjust.

ED'c1 – will produce a continuous chart of all Eurodollar contracts rolling 3 days before expiration.

ED'c1HMUZ – will produce a Eurodollar continuous contract built from the quarterly (Mar, Jun, Sep and Dec) contracts, again rolling 3 days before expiration.

PL'c2FJNV – will produce a Platinum continuation contract using its major months (Jan, Apr, Jul, and Oct) rolling on the first day of expiration month and adjusting for any price jumps

One final advantage of using the Aspen continuations is that we are not limited to using the front month for the currently-used contract. By suffixing a number to the end of the string we can take contracts x number of months (or quarters) in the future and have that popular the current bar.

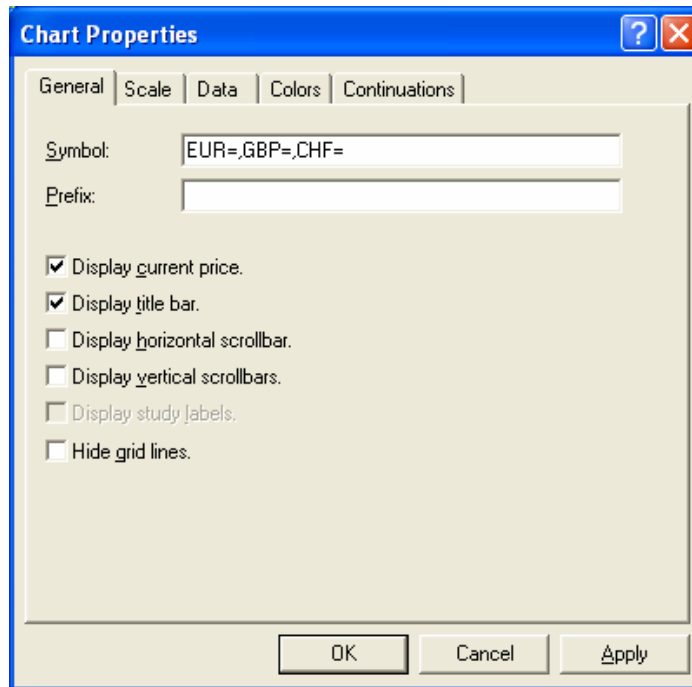
FEI'c1HMUZ2 – Given that the current nearest to expiration month is August 04 (the Euribor trades serially), this string will give us a continuation chart built only from the quarterly contracts, but looking two quarters in advance, so the current bar will be populated by March 05's data. Again because we have set continuation method 1 to roll three days early this will roll to take Jun 05 data on Friday 10 Sep 04 (September's contract expires on 13 Sep).

## Entering Multiple Symbols

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A second symbol may be added to a chart either by entering the second symbol prefixed by a comma, or selecting the Add Symbol button from the Chart Toolbar.

Further symbols can be added in exactly the same way for each one required, or to add them all at once, right-click the chart and select Properties. In the Symbol input box of the general tab, the symbols required can all be added with commas between them.

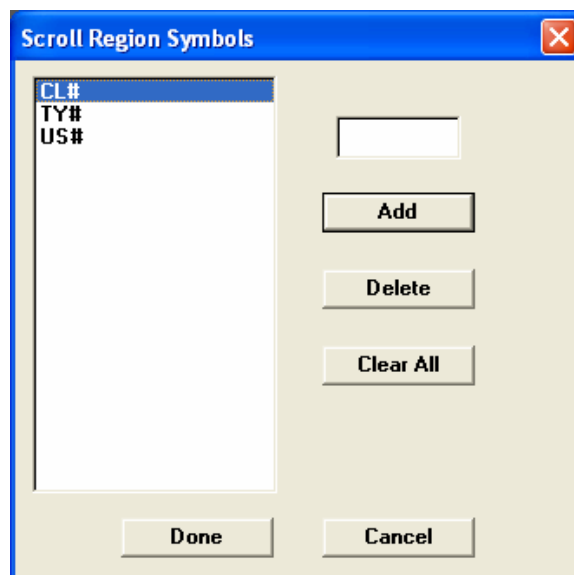


If multiple symbols for a futures contract are required then they should be entered as described in the section on Handling Futures Contracts above.

## Editing Symbols

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Once a symbol is entered onto a quote page, it can be changed simply by clicking on the symbol and amending the code. If the quote page is a scroll region then the list of items can be modified by choosing Edit Symbols from the quick menu and either add additional symbols or remove them by clicking them on the left and column and choosing Delete



## Copy and Paste Symbols

---

If the same (or similar) symbols need to be used on multiple windows, we saw above how using F12 enabled the last thing typed to be displayed. However this will only work for the current session. If Aspen is closed and then re-opened none of these will be remembered.

We therefore have the ability to copy and paste symbols between windows. Simply place focus on the window from which you wish to copy, click the copy button (or CTRL+C), and then place focus on the new window. Now click the paste button (or CTRL+V) and the symbol(s) will be copied.



To apply the same codes to all open windows, prefix the code with a backslash \.

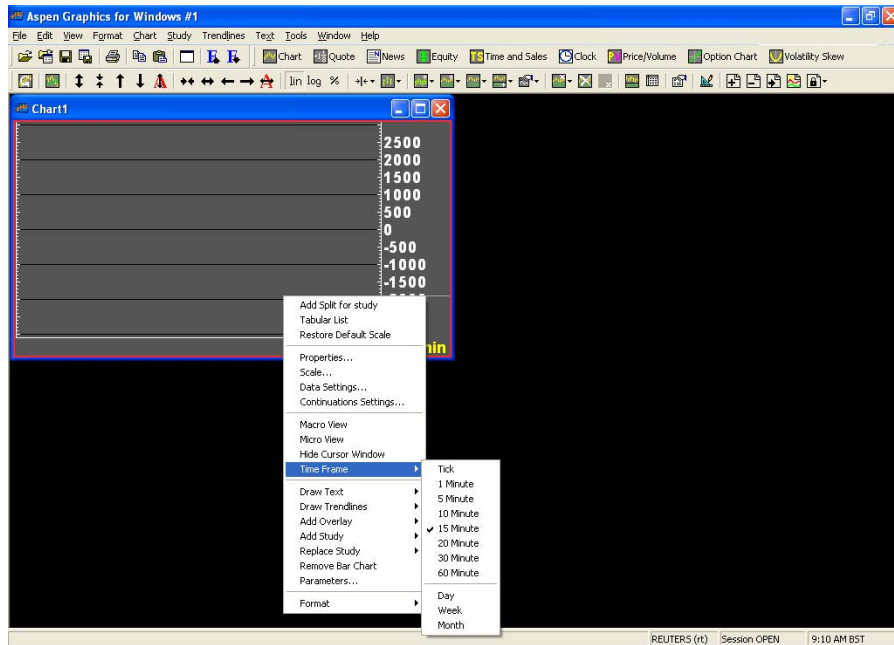
`\FGBL#` - This will place the current German Bund in all open windows in the current Aspen session.

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# Changing Timeframes

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Aspen has the ability to chart any intra-day timeframe plus daily, multi-day, weekly, monthly quarterly and yearly charts. The smallest timeframe that Aspen can chart is a tick chart. As each tick (bid, offer, trade etc) is received this is displayed as a single dot, with the high, low, open and close all of equal value. To make a chart display ticks we set the timeframe to zero by either typing the number 0 <Enter> , clicking on the timeframe button or going through the menu, choosing Time Frame and selecting tick from the list:



 - Timeframe Icon

Due to the nature of ticks, it is important to note that the times on the x-axis will be non-linear, one minute may contain no ticks and the next may have huge activity. The more common time periods are listed in the drop-down list of times, but this is by no means exhaustive. If a time period not listed is required simply type the number of minutes for each bar onto a chart. Aspen can chart any time period from 0 minutes (ticks) to 1439 minutes (one minute short of a day, but not recommended for the reasons given below). For daily-based charts the following commands should be used if typing:

.DAY - For a daily chart

.WEEK - For a weekly chart

.MONTH - For a monthly chart



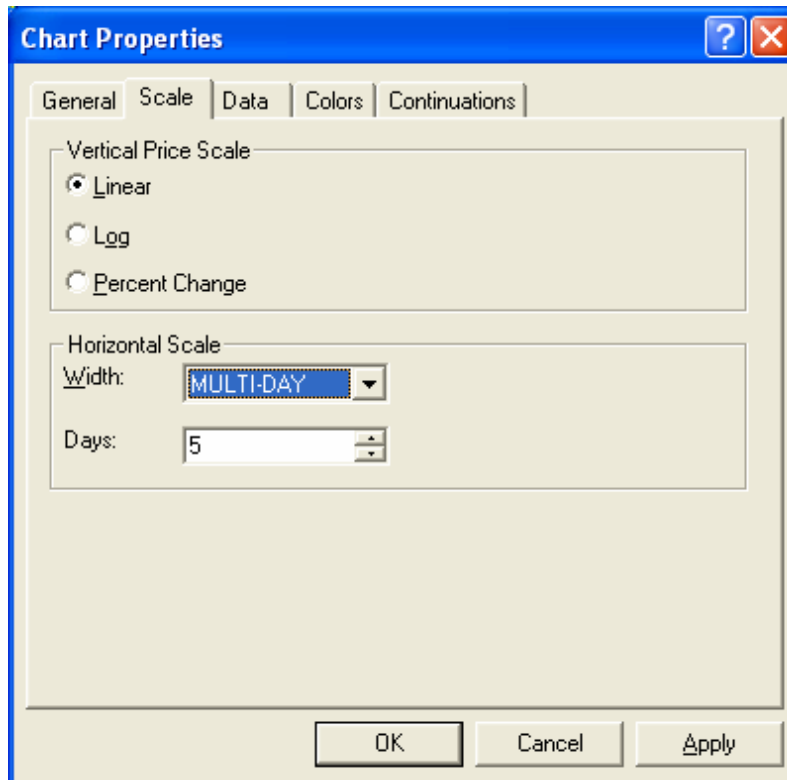
.QUARTER - For a quarterly hart

.YEAR - For a yearly chart

Notice that there is a period before each of these commands. While not always absolutely necessary it is advisable to prefix commands with this. DAY is actually listed on NYSE, and, if entitled for this exchange, a user may find that opposed to changing the timeframe, it is actually the instrument being charted that gets changed!



Aspen has the ability to display multi-day charts. To change the chart to a multi-day chart, right-click the chart and choose Scale from the quick menu. In the dialog box choose Multi-Day from the width drop-down list and then enter the number of days in the input box:



## Timeframes and Performance

---

Aspen is capable of displaying data in many customizable time frames. To increase performance, Aspen uses databases that are designed around three different time periods. These time periods are daily, 15 minutes and ticks. Daily, weekly, monthly and yearly time frames are built using the data from the Daily database. Intraday time frames that are

multiples of 15 are built using the 15 minute database. Any other intraday timeframe is built using the tick database.

Using timeframes that pull from the tick database can be very resource intensive. User timeframes that fall close to a multiple of 15 should be specified as a multiple of 15. A 14 minute time frame is a good example of a user specified timeframe that should be specified as 15 minutes. In the case of a 14 minute chart, the Aspen Workstation must query the server for every tick in a 14 minute period and calculate the high, low, open and close price from that data. For heavily traded instruments this translates into tens of thousands of calculations and if a chart is attempting to display months of historical data this can translate into millions of calculations that must be performed prior to any data being sent. A 14 minute time frame will cause Aspen to run poorly. In contrast, if a workstation requests 15 minute data, the server simply replies with the high, low, open and close prices. No math calculations need to be performed. While any timeframe is possible in Aspen, some will perform better than others.

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## Navigating Charts

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Aspen offers a number of methods for navigating charts. Moving forward or backward along the Time Scale and expanding or contracting the Time Scale can be accomplished in two ways.

1. Use the Time Scale Navigation Icons.
2. Place the Mouse Cursor over the Chart's Time Scale and use the Mouse Wheel.  
Simply rotating the Mouse Wheel will move the chart forward and backward in time. Rotating the Wheel Button while rotating the Wheel Button will expand or contract the Time Scale.

The Price Scale can be navigated in a similar fashion.

1. Use the Price Scale Navigation Icons.
2. Place the Mouse Cursor over the Chart's Price Scale and use the Mouse Wheel.  
Rotating the Mouse Wheel will move the chart up and down. Rotating the Wheel Button while rotating the Wheel Button will expand or contract the Price Scale.

# Chart Types

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## Bar Charts

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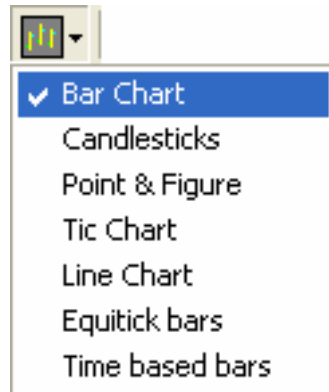
By default, Aspen charts display bars. A bar is a line representing the trading range, with a hash mark on either side representing the open and last (or close):

Traditionally, bars are created temporally--that is, the time base of the chart controls bar formation. In a fifteen minute chart, the trading day is sliced into fifteen minute periods,

and the ticks that occur in a given fifteen minute period form the bar for that period. When the fifteen minute period ends, a new bar begins. There are several ways to display a bar chart in Aspen:

## Using Icons

1. Select the chart by Left-Clicking on the Numerical Scale.
2. Left -Click the Chart Type Icon
3. Select Bar Chart:



## Using the Context Sensitive Menu

4. Right Click the chart.
5. Select Replace Study.
6. Select Bar Chart.

## Using the Main Menu

7. Left-Click Study in the Main Menu.
8. Select Study.
9. Left-Click Bar Chart.

## Using a Dot Command

10. Type `.bar <enter>`

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## Candlestick Charts

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Candlestick charts are an ancient Japanese price prediction methodology. Candlesticks date back to the 1700's, when they were used for analyzing rice markets. At that time, Munehisa Homma, a legendary rice trader, gained a huge fortune using candlestick analysis and established candlestick popularity.

Aspen supports candlestick charting. Candles offer an alternate perspective on market data.



The body of the candlestick is called the real body and represents the range between the open and closing prices. A "black," or filled-in, body represents that the close during that time period was lower than the open. When the body is "white," or hollow, the close is higher than the open.

The thin vertical line above and/or below the real body is called the upper/lower shadow, representing the high/low price extremes for the period.

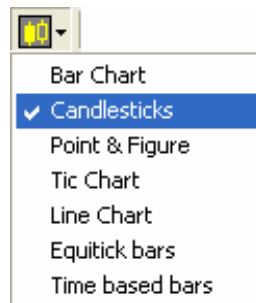
## Displaying Candlesticks

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There are several ways to display a Candlestick Chart in Aspen:

### Using Icons

11. Select the chart by Left-Clicking on the Numerical Scale.
12. Left-Click on the Chart Type Icon.
13. Select the Candlesticks item from the Drop-Down Menu.



### Using the Context Sensitive Menu

14. Right-Click on the chart.
15. Select Replace Study.
16. Select Candlesticks.

### Using the Main Menu

17. Left-Click Study in the Main Menu.
18. Select Replace Study in the Study Menu.
19. Left-Click Candlesticks in the new menu.

## Using a Dot Command

20. Type `.cand` <enter>

## Candlesticks Colors

---

There are two methods for displaying the Candlesticks Parameters Dialog:

### Using Icons

21. Select the chart by Left-Clicking on the Numerical Scale.
22. Select the Parameters Icon.
23. Select Candlesticks from the Drop-Down Menu.



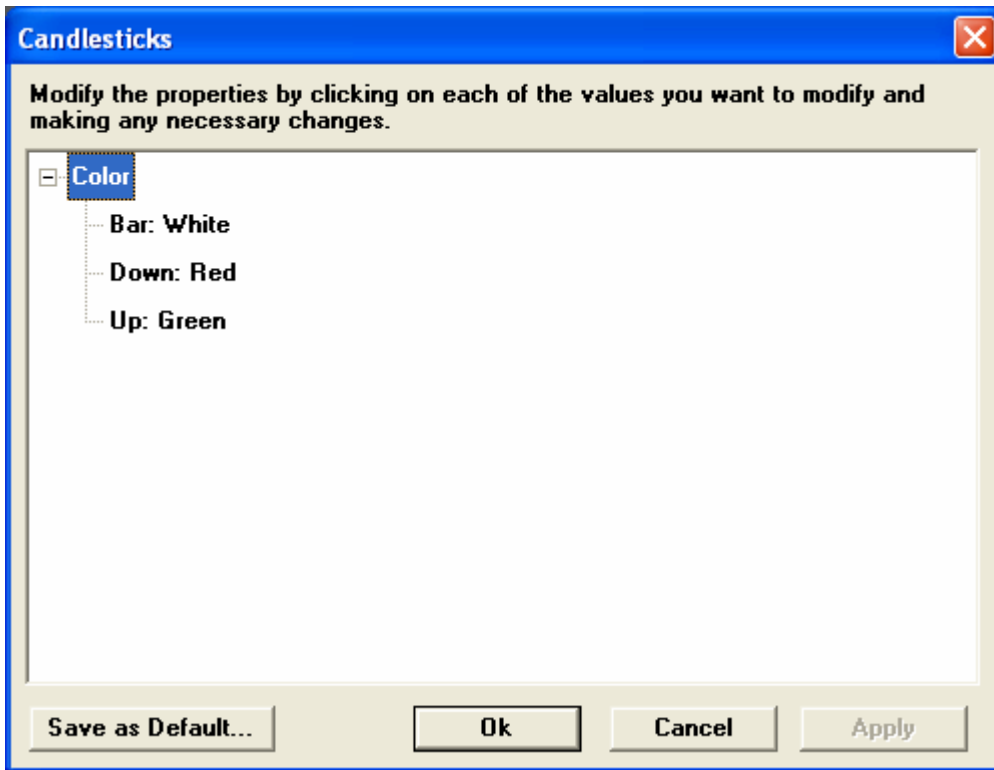
### Using the Context Sensitive Menu

24. Right Click the Candlestick Chart.
25. Select Parameters...

### Using the Main Menu

26. Left-Click Study in the Main Menu.
27. Left-Click Parameters... in the Study Menu.

## Candlesticks Parameter Dialog



The body of the Candlestick is represented by the Up and Down options. To change the color:

28. Left-Click on the Item.
29. Left-Click on the Color Box that appears.
30. Left-Click on the new color in the Color Picker.



31. Click Apply.
32. Click Ok.

### Save as Default...

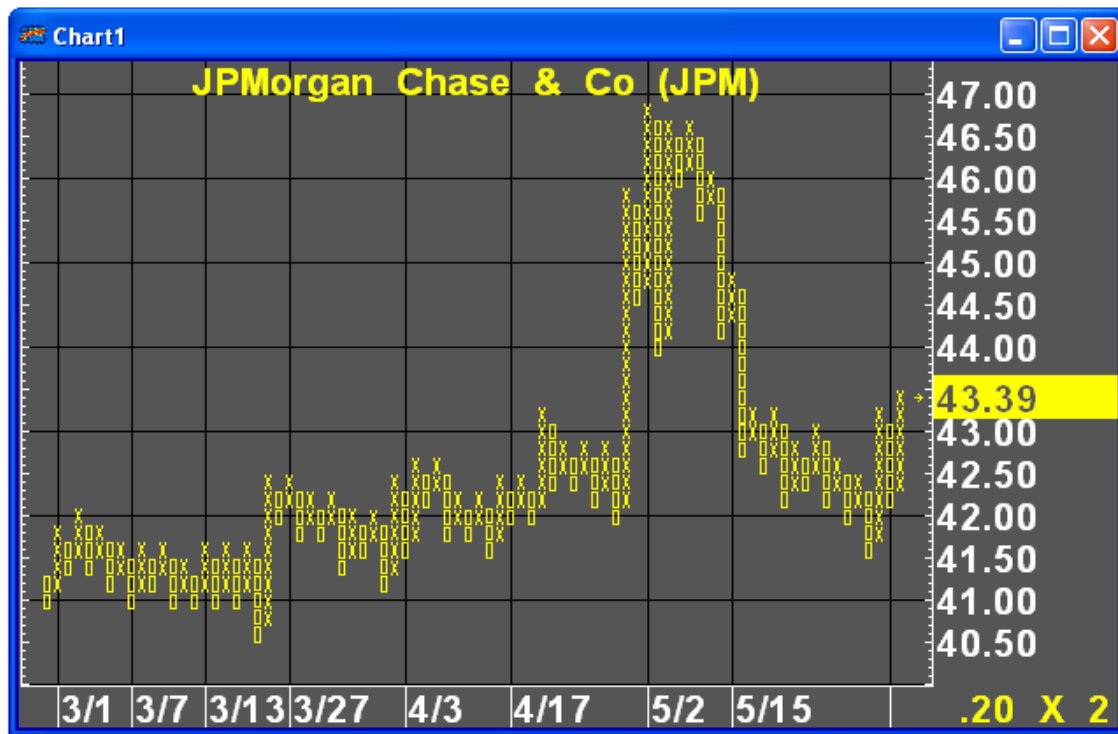
The save as default option will store user preferences in Aspen. By selecting this option, all future Candlestick chart will automatically be configured with the specified color options.

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## Point and Figure Charts

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Point and Figure Charts present another method for analyzing market data. Point and Figure charts display trend reversals through the use of X's and O's. An X is drawn on the chart to record upward price movements and an O is displayed for downward price movement. Each time a trend reverses, a new column is started. The user has control over sensitivity to trend reversal through choice of box size and reversal amount.



Box Size

Reversal

---

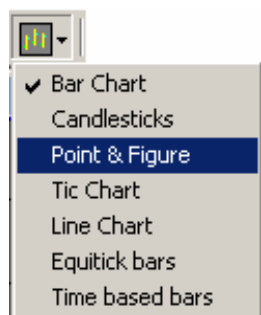
## Displaying a Point and Figure Chart

---

Aspen offer three methods for displaying Point and Figure Charts.

### Using Icons

33. Select the chart by Left-Clicking on the Numerical Scale.
34. Left-Click the Chart Icon.
35. Select Point & Figure.



## Using the Context Sensitive Menu

36. Right –Click the chart.
37. Select Replace Study.
38. Left-Click Point Figure

## Using the Main Menu

39. Left-Click Study in the Main Menu.
40. Select Replace Study in the Study Menu.
41. Left-Click Point Figure in the new menu.

## Using a Dot Command

42. Type `.p&f <enter>`

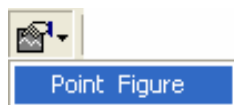
## Point and Figure Parameters

---

There are two methods for displaying the Parameters Dialog for a Point and Figure Chart:

### Using Icons

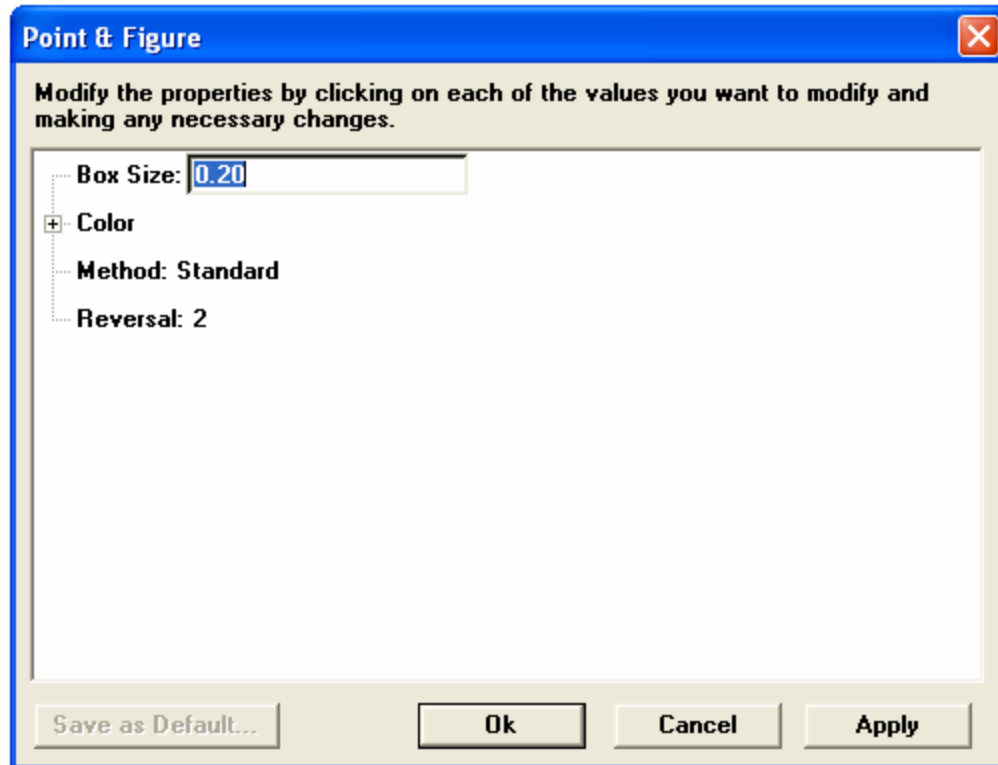
43. Select the chart by Left-Clicking on the Numerical Scale.
44. Left-Click on the Parameters Icon.
45. Select the Point Figure option from the Drop-Down Menu.



### Using the Context Sensitive Menu

46. Right-Click on the Point and Figure Chart.
47. Select Parameters...





- Box Size – Specifies the minimum price move which will draw either an X or O. A box size of 0.20 will draw an X every time the price gains 0.20 and an O every time the price drops 0.20.
- Color – Specifies the colors of the X and O columns.
- Reversal – Specifies the number of boxes necessary to reverse a trend. A reversal of 2 and a Box Size of 0.20 means that the price has to move 0.40 (2 x 0.20) opposite of the existing trend to plot a new column of X's or O's on the chart.
- Method – There are three types of Point and Figure charts: Standard, Original and Daily. Standard and Original are very similar. Standard allows a minimum reversal amount of one, while Original allows a minimum reversal amount of two. Daily Point and Figure charts allow you to analyze historical data on a Point and Figure chart.
- Save As Default - Sets the current options as the default display for each new chart created.

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## Tic Charts

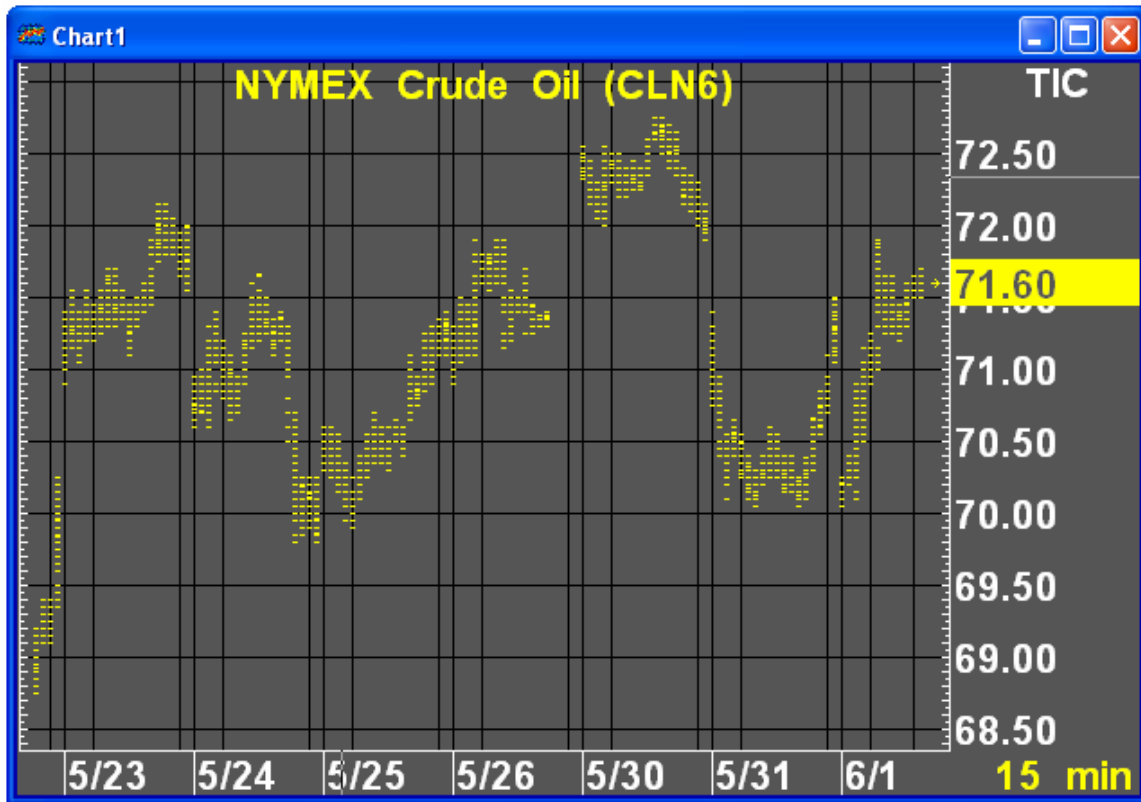
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Aspen offers two types of Tic Charts:

48. Tic Over Time Charts
49. Zero Minute Charts

## Tic Over Time Charts

Tic charts differ from Bar and Candle Stick charts in that they plot a point at each price the instrument traded at during the specified interval.



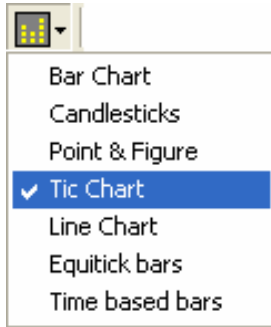
### Displaying a Tic Over Time Chart

Aspen offers three methods for displaying a Tic Over Time Chart:

#### Using Icons

50. Select the chart by Left-Clicking on the Numerical Scale.
51. Left-Click the Chart Type Icon.

52. Select Tic Chart from the Drop-Down Menu.



### Using the Context Sensitive Menu

53. Right-Click the Chart.

54. Select Replace Study

55. Left-Click Tic Chart.

### Using the Main Menu

56. Left-Click Study in the Main Menu.

57. Select Replace Study.

58. Left-Click Tic Chart

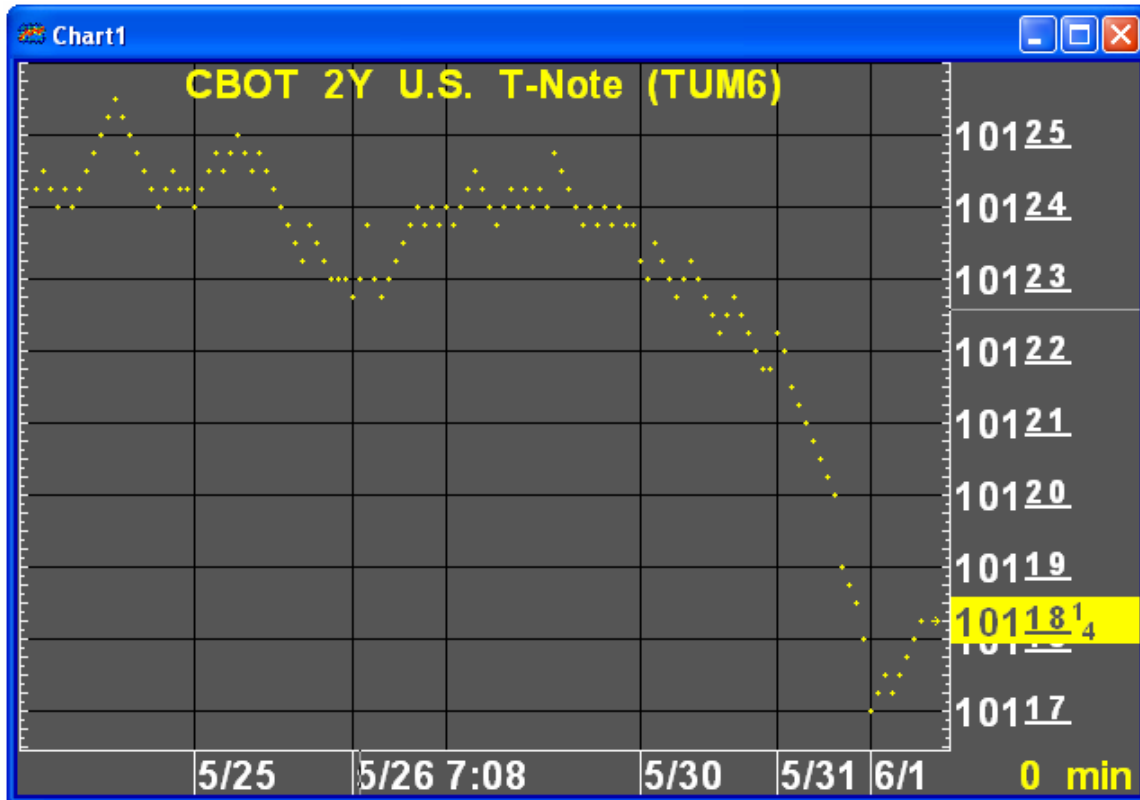
### Using a Dot Command

59. Type `.tic <enter>`

## Zero Minute Charts

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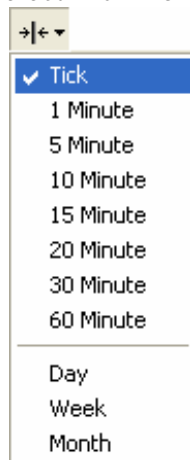
Zero Minute Charts plot each trade at the time and price they occur. Zero Minute Charts do not have a regular time scale.



## Displaying a Zero Minute Chart

### Using Icons

60. Select the chart by Left-Clicking on the Numerical Scale.
61. Left-Click the Time Frame Icon.
62. Select Tick from the Drop-Down Menu.



## Using a Dot Command

63. Type 0 <enter> on any Bar, Tic or Candle Chart.

## Line Chart

---

Line charts present another method for analyzing market data in Aspen. A line chart plots the closing prices for the underlying symbol and connects consecutive bars with a line.

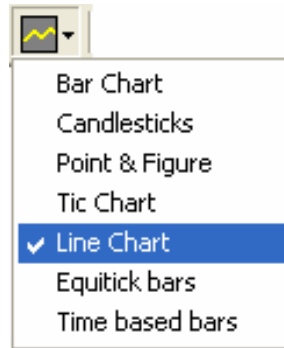


## Displaying a Line Chart

Aspen offers three methods for displaying a Line Chart:

### Using Icons

64. Select the Chart by Left-Clicking on the Numerical Scale.
65. Left-Click the Chart Type Icon.
66. Select Line from the Drop-Down Menu.



### Using the Context Sensitive Menu

67. Right-Click the Chart.
68. Select Replace Study.
69. Select Line Chart.

### Using the Main Menu

70. Left-Click Study in the Main Menu.
71. Select Replace Study in the Study Menu.
72. Left-click Line chart in the new menu.

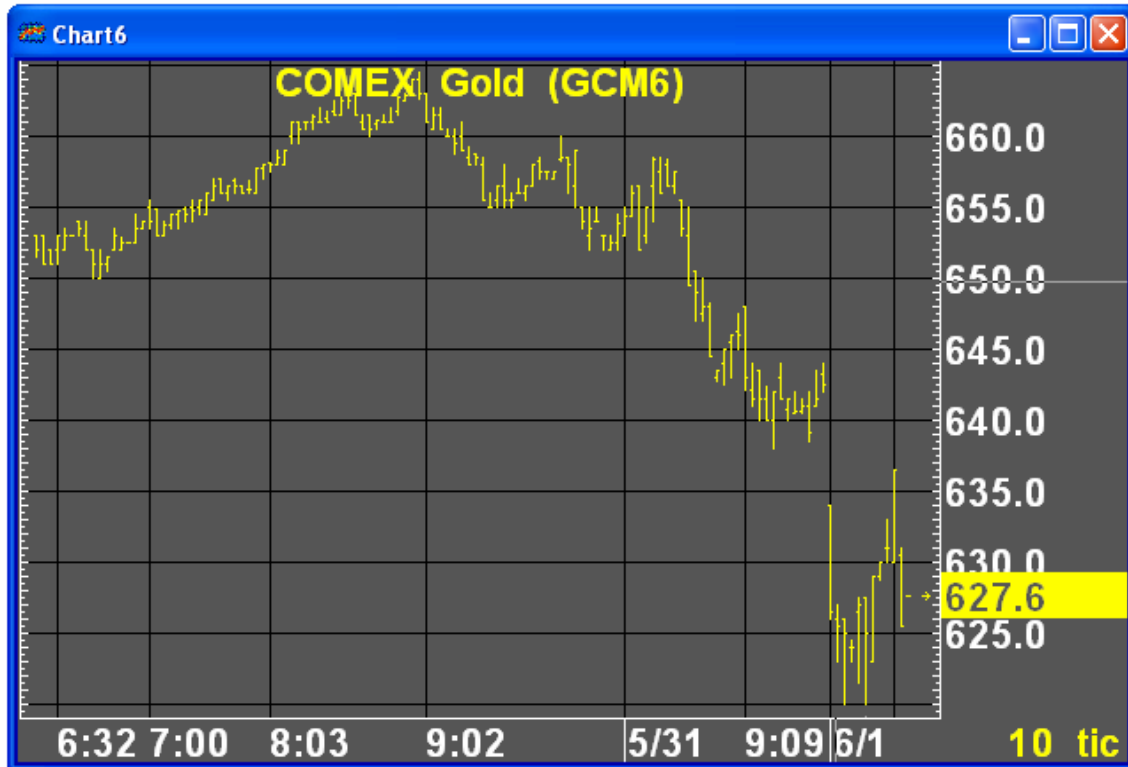
### Using a Dot Command

73. Type `.line <enter>`

## Equitick Charts

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Aspen Graphics enables you to display bars that consist of a fixed number of trades per bar, in contrast to a bar chart which displays a fixed time frame for each bar. Charts of this type are called Equi-tick charts.

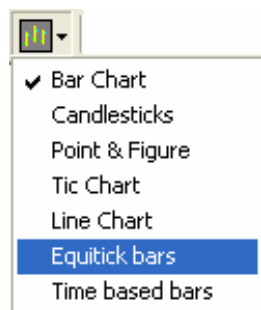


## To Display an Equitick Chart

Aspen offers three methods for displaying an Equitick chart.

### Using Icons

74. Select the Chart by Left-Clicking on the Numerical Scale.
75. Left-Click the Chart Type Icon.
76. Select Equitick Bars from the Drop-Down Menu.



### Using the Context Sensitive Menu

77. Right-Click the Chart.
78. Select Replace Study.

79. Select Equitick Bars.

### Using the Main Menu

80. Left-Click Study in the Main Menu.

81. Select Replace Study in the Study Menu.

82. Left-Click Equitic Bars.

### Using a Dot Command

83. Type `.eqtick <enter>`

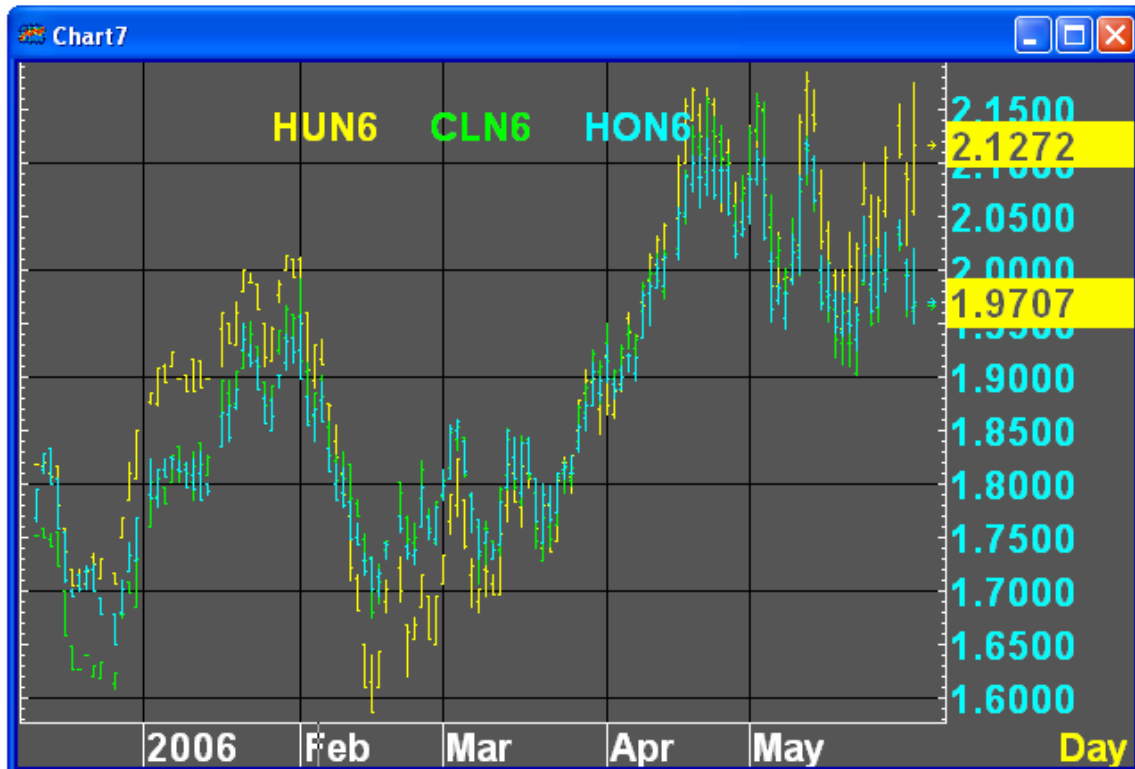
## Equitick Settings

Equitick users specify the number of ticks in a bar rather than a specific time frame. Type the number of ticks and press the enter key on the key board. Any positive integer may be entered to construct custom tick based bars.

## Layer Charts



Layer Charts allow users to display multiple symbols on the same chart even when the price scales do not match. Layer charts allow users to analyze price movements of two or more related symbols that normally would have to be displayed in separate charts.

The following example charts July '06 contracts for heating oil, unleaded and sweet crude.

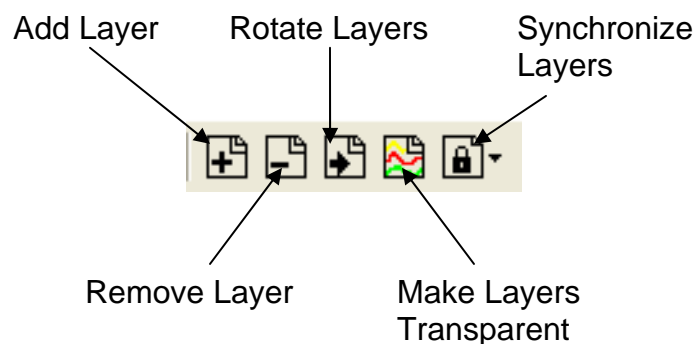




## To Display a Layered Chart

84. Create a chart with the correct time scale and add the first instrument.
85. Click the Add Layer Icon , the chart appears to go blank but what has happened is another chart with an identical timeframe has been placed on top of the first one.
86. A second instrument can now be added and, if required, more layers and more instruments can also be added. If too many layers are added then they can be deleted using the Remove Layer Icon .

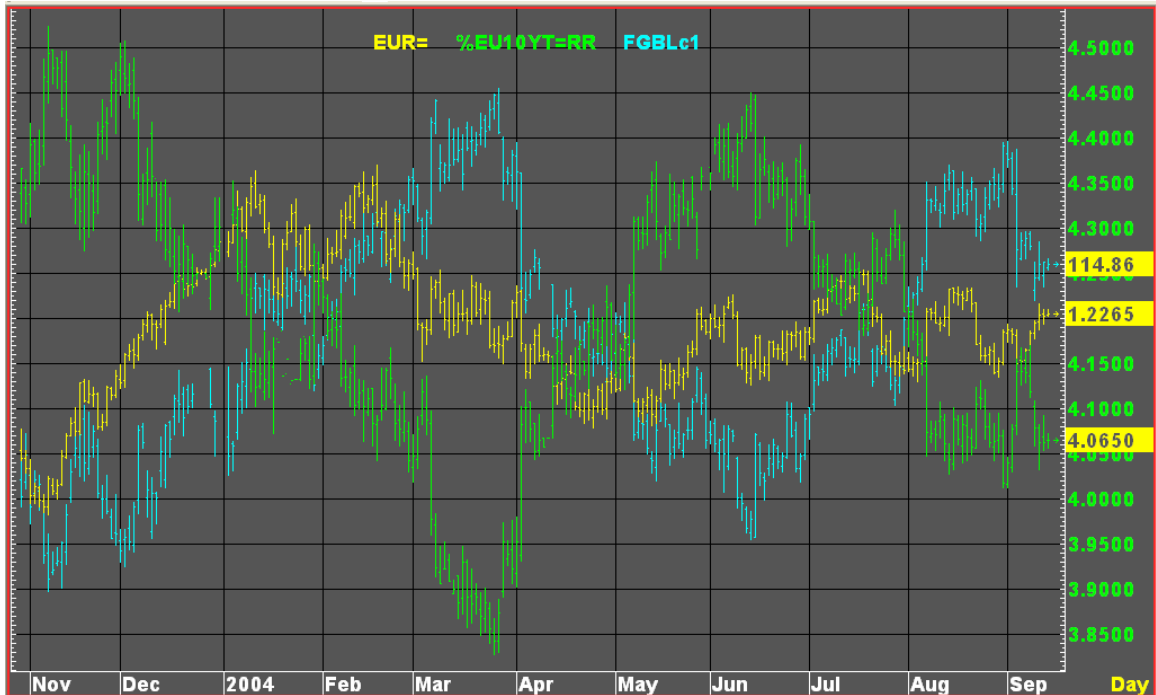
## Navigating Layers



- Add Layer – Adds a new layer to the chart.
- Remove Layer – Removes the current active layer from the chart.
- Rotate Layers – Rotates the active layer. Hidden layers can be made visible with this icon.
- Make Layers Transparent – If different instruments are placed on each layer then their relative price movement can be viewed – irrespective of price ranges
- Synchronize Layers – Locks price or time scales between layers. This allows all layers to be navigated simultaneously.

## Rotating Layers

The instrument descriptions at the top of the chart appear in different colors, and the vertical price axis is color-coded to that instrument. Clicking on a symbol name on the chart will change the price and color displayed on the price axis. In the chart below, the Euro/Dollar spot rate is being compared with the Bund and the Euro 10 Year Yield Price.



## Modifying Layers

Individual layers can be modified similar to any chart in Aspen. Changes made to one layer can be made independent to the other layers being displayed. By left-clicking the appropriate description on the chart to select that layer, time frames, scaling and similar adjustments can be made to the selected layer.

## Synchronizing Layers

By default all layers are independent of each other. If the chart is rescaled either horizontally or vertically, then the layer which has focus (indicated by the color of the vertical axis) will be changed. Similarly if the time frame is changed, only the current layer will be affected. To ensure that all layers change simultaneously layers must be 'locked'. Options for locking are found by selecting the Synchronize Layers Icon. These options include:

- Lock Time Frames
- Lock Price Scale
- Lock Date/Time
- Lock Bar Spacing
- Lock Study Type

To unlock any of these, simply remove the check mark from the option.

## Layered Chart Limitations

Although powerful, layered charts do have limitations. Layered charts cannot display indicators in Aspen Split Windows. Also, Aspen cannot display custom color rules when using Layered charts. Also, any color configured for Overlay Studies are lost when using Layered Charts. This can make Layered Charts with Overlays Studies difficult to read.

### Seasonal Charts

<< INSERT BLOOMBERG CHANGES >>>

## Indicators

---

Aspen offers many industry standard indicators. Indicators are separated into two types - Overlays and Studies. Overlays typically perform calculations whose value is similar to that of the price of the instrument being charted, for instance, averages and price envelopes. Studies on the other hand return values which work between certain levels, oscillate around zero, or contain values that are completely disparate to the price of the instrument. Typically Study Indicators are displayed in a Split Window; however, it is possible to layer both Overlay and Study Indicators in the same Split Window.

Indicators can be used with any chart type.

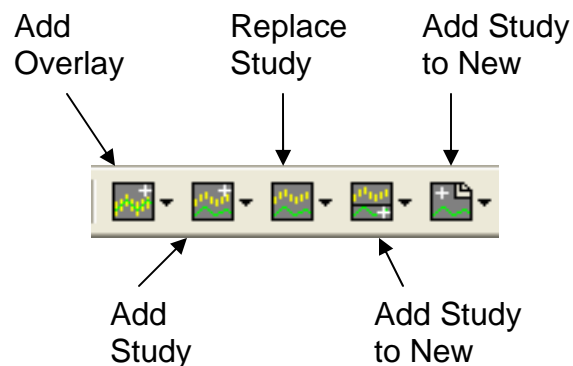
As with anything in Aspen, it is vital that the window to which the Overlay or Study is to be added has focus, the simplest way of doing this is to left-click the price scale.

A complete list of Indicators and descriptions, their applications and Aspen's calculation methods can be found in Appendix A.

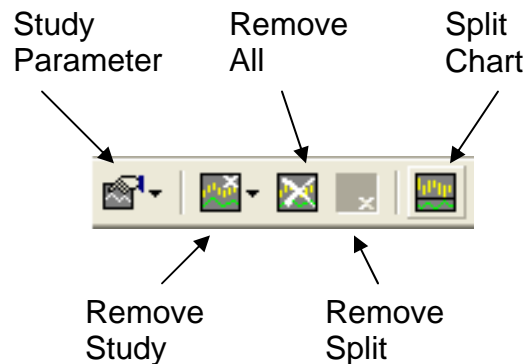
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## Indicator Related Icons

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- Add Overlay – Displays a list of Overlay Indicators to overlay on top of the chart.
- Add Study – Displays a list of Study Indicators designed to be displayed in a Split Window.
- Replace Study – Displays a list of Study Indicators designed to be displayed in a Split Window. Selecting an Indicator will replace the current Indicator on the chart.
- Add Study to New Split – Displays a list of Study Indicators designed to be displayed in a Split Window. Selecting a Study Indicator splits the window and adds the study to the new Split Window.
- Add Study to New Layer – Displays a list of Study Indicators. Selecting an Indicator adds a transparent layer to the chart and overlays the Indicator on the chart, regardless of its status as an Overlay or a Study.



- Study Parameters – Displays the Parameters Dialog for the selected Indicator.
- Remove Study – Removes the selected Indicator.
- Remove All Overlays – Removes all Overlays in the selected Window.
- Remove Split – Removes the selected Split Window.
- Split Chart – Adds a new Split Window to the chart.

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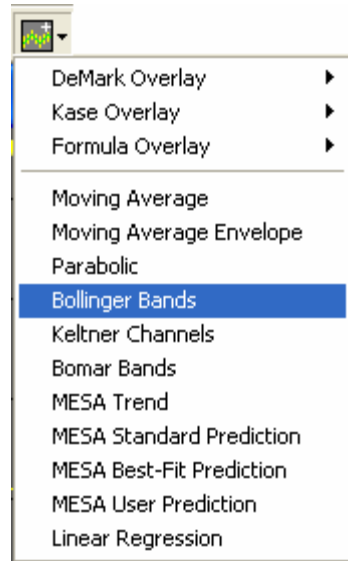
## Adding an Overlay

---

Aspen offers three methods for adding and displaying an indicator Overlay to a chart:

### Using Icons

1. Select the chart by Left-Clicking on the Numerical Scale.
2. Left-Click the Add Overlay Icon.
3. From the Drop-Down Menu Left-Click the desired Indicator.



## Using the Context Sensitive Menu

1. Right-Click the chart.
2. Select Add Overlay.
3. Left-Click the desired Indicator.

## Using the Main Menu

1. Left-Click Study in the Main Menu.
2. Select Add Overlay in the Study Menu.
3. Left-Click the appropriate Study name.

## Using a Dot Command

1. Type the proper dot command and hit enter. The dot commands for each Indicator can be found in Appendix A.

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## Adding a Study to a Split Window

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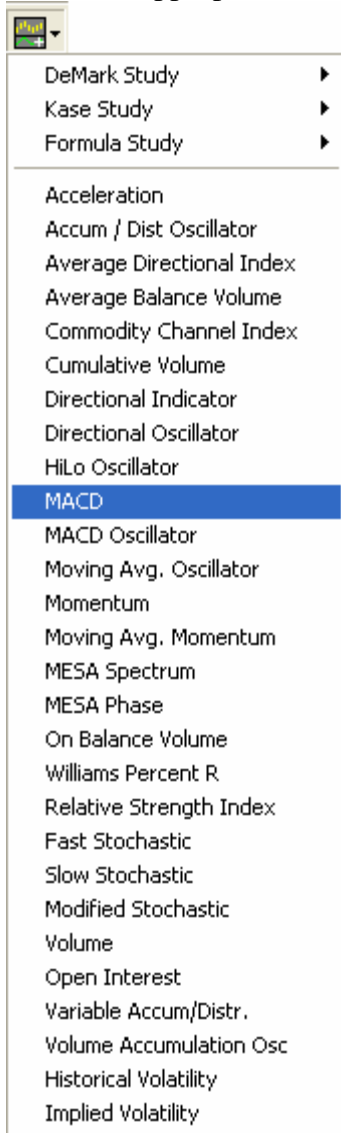
Study indicators are designed to be used primarily in a Split Window. Because of the difference in the numerical scale between many Studies and underlying price scales, Study Indicators do not always display well as an overlay. Popular Studies include the MACD, Stochastics and Volume Studies.

Aspen offers a number of methods for displaying an indicator in a Split Window:

### Using Icons I



1. Left-Click the Add Study to New Split icon.

2. Select the appropriate Study from the Drop-Down Menu.



- 3.

## Using Icons II

1. Left-Click the Split Chart Icon. 
2. By default the new Split Window is selected.
3. Left-Click the Add Study icon. 
4. Select the appropriate study.

## Using the Context Sensitive Menu

1. Right-Click the Chart.
2. Select Add Split for Study.
3. Right-Click inside the new Split Window.
4. Select Add Study.
5. Left-Click the Appropriate Study.

## Using the Main Menu

1. Left-Click Study in the Main Menu.
2. Select Add Study in the Study Menu.
3. Left-Click the appropriate Study name in the new menu.

## Using a Dot Command

1. Type `.split <enter>`
2. Type the proper dot command and hit enter. The dot commands for each Indicator can be found in Appendix A.

---

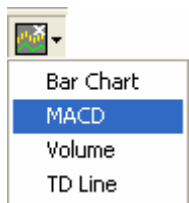
## Removing Indicators

---

The processes for removing Studies and Overlays are similar. Aspen offers a couple of methods for removing Indicators:

### Using Icons

1. Select the Chart or Split Window by Left-Clicking the Numerical Scale.
2. Left-Click the Remove Study icon.
3. Left-Click the appropriate study name to remove it.



### Using the Context Sensitive Menu

1. Right-Click the Chart or Split Window.
2. Select Remove Study.
3. Select the appropriate study name from the new panel.

### Using the Main Menu

1. Left-Click Study in the Main Menu.
2. Select Remove Study in the Study Menu.
3. Left-Click the appropriate Study name in the new menu.

---

## Removing Split Windows

---

Split Windows can also be removed. When a Split Window is removed, all of the Studies contained in the Split Window are also removed. Aspen offers two methods for removing split windows:

## Using Icons

1. Select the Split Window by Left-Clicking its Numerical Scale.
2. Left-Click the Remove Split icon.



## Using the Context Sensitive Menu

1. Right-Click the Split Window.
2. Select Remove Split.

## Using the Main Menu

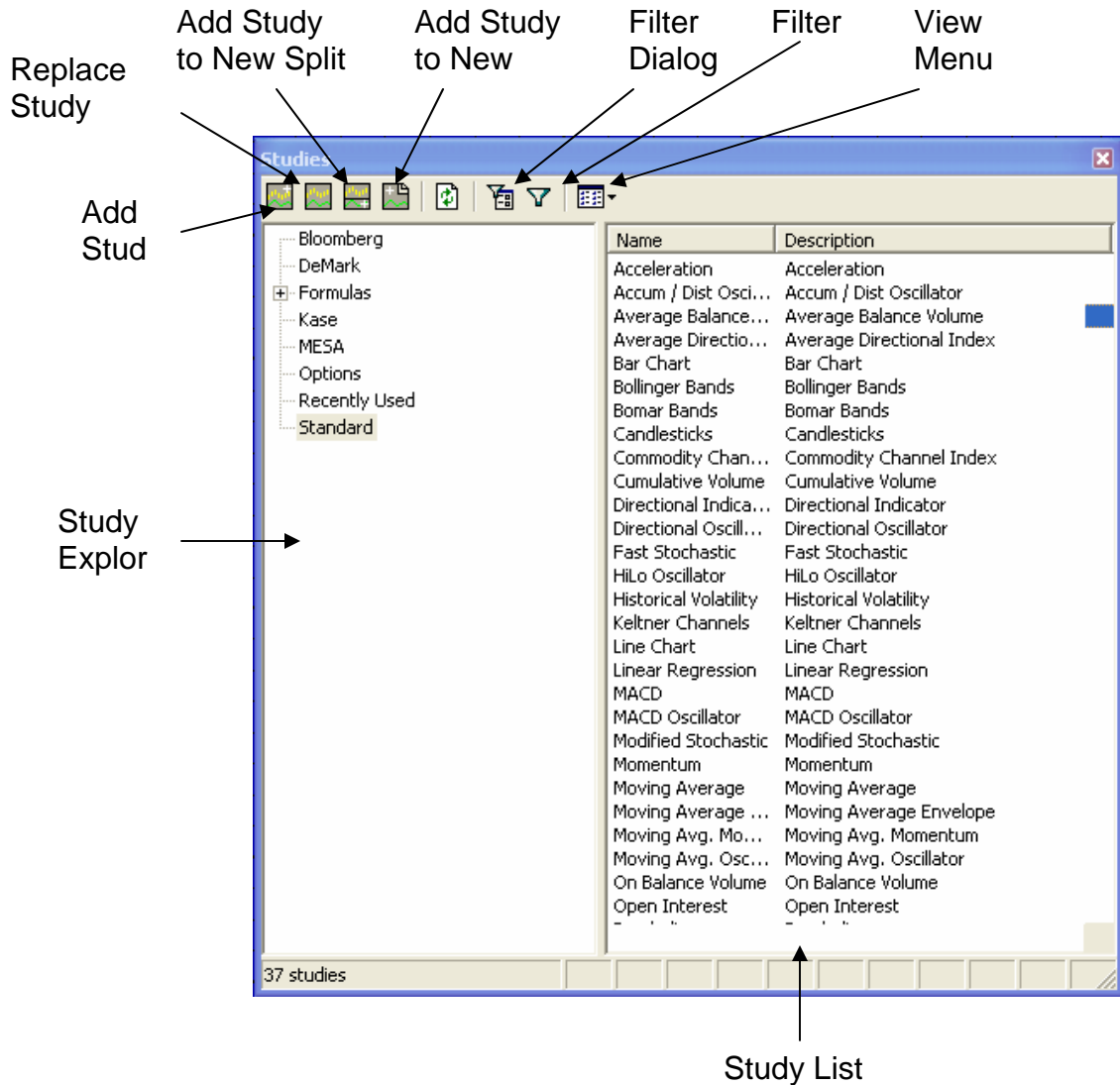
1. Left-Click Chart in the Main Menu.
2. Left-Click Remove Split in the Chart Menu.

# The Study Dialog

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The Study Dialog presents a convenient organization of indicators. The Study Dialog provides a user friendly method for managing Study and Overlay indicators. All available indicators are conveniently located and easily managed. The Study Dialog features an Explorer Style Navigation Panel and Filter controls.






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## Displaying the Study Dialog

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### Using the Context Sensitive Menu

1. Right-Click the Chart.
2. Left-Click Study Dialog...

### Using the Main Menu

1. Left-Click Study in the Main Menu.
2. Left-Click Study Dialog ... in the Study Menu.

---

## Using the Study Dialog

---

The Study Dialog is a powerful and versatile tool. Like many operations in Aspen Graphics, the Study Dialog offers several methods to accomplish the same task. At the heart of this functionality lies the Study Explorer Panel. This panel displays a list of studies in a fashion that is similar to Windows Explorer. Each item category in the Study Explorer contains one or more studies.

To display the list of studies associated with a category simply Left-Click the category name. Items with a + icon indicate the category contains sub-categories. Simply Left-Click the + icon to expand these sub-categories and Left-Click the – icon to retract these sub-categories. The list of studies associated with a category or sub-category are displayed in the Study List Panel.





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## Adding Studies and Overlays

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The Study Dialog offers three methods for adding an Overlay or Study to a chart:

### Using Icons

1. Left-Click a Category in the Study Explorer to display a list of studies.
2. Left-Click an indicator in the Study List Panel.
3. Add the Selected Study.
4. To Add an Overlay Left-Click the Add Study icon. 
5. To Replace a Study Left-Click the Replace Study icon. 
6. To Add the Study in a new Split Window Left-Click the Add Study to New Split Icon. 
7. To Add the Study to a new Layer Left-Click the Add Study to New Layer icon. 

### Using the Context Sensitive Menu

1. Left-Click a Category in the Study Explorer Panel.
2. Right-Click a Study from the Study List Panel.
3. Select Add a Study
4. To Add an Overlay Left-Click on Add Study.
5. To Replace a Study Left-Click on Replace Study.
6. To Add the Study in a new Split Window Left-Click on Add Study to New Split.
7. To Add the Study to a new Layer Left-Click the Add Study on New Layer.

### Using Point and Click

1. Left-Click a Category in the Study Explorer Panel.
2. Double Left-Click the appropriate Study in the Study List to add it.

# Trendlines

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Trendlines are another way of adding analytical displays to a chart. Unlike Overlays and Studies they are not constructed from mathematical functions, they are drawn on the chart itself, and the angle of the line used to produce values on subsequent bars.

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## Entering and Exiting Trend Mode

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In order to add Trendlines to a chart we must be in trend mode. Aspen offers several methods to switch to Trend Mode. Once in Trend Mode the Trend Mode Tool Bar appears. Trend Mode is a toggle mode. Trend Mode must be enabled to begin drawing Trendlines and Trend Mode must be exited to return to normal Aspen functionality. Actions that enable Trend Mode will also exit it if repeated while in Trend Mode.

Trend Mode is also sensitive to the selected chart or Split Window. When entering Trend Mode, only the selected chart or Split Window is placed into Trend Mode. This allows users to draw trend lines on studies in Split Windows such as the MACD as well as the actual chart. Once in Trend Mode the mouse pointer graphic turns into a pencil. This graphic will only display for charts or Split Window.

## Using Icons

1. Left-Click the Trend Mode Icon to enter or exit Trend Mode. 

## Using the Context Sensitive Menu

1. Right-Click on the Chart.
2. Select Draw Trendlines.
3. Left-Click Trend Mode.

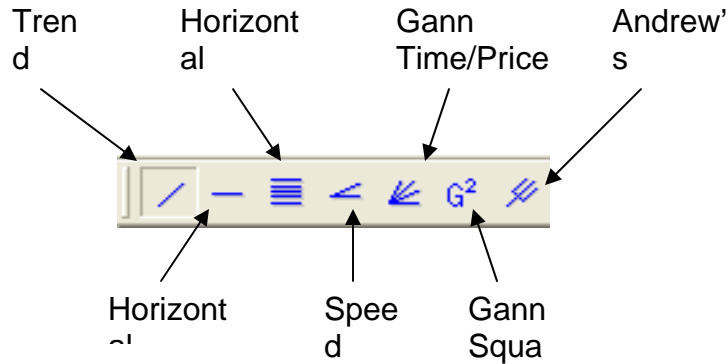
## Using the Main Menu

1. Left-Click Trend Lines.
2. Left-Click Trend Mode.

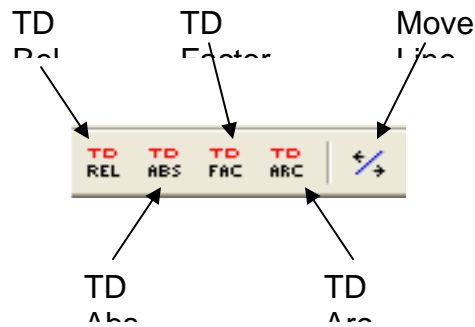
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## The Trend Mode Tool Bar

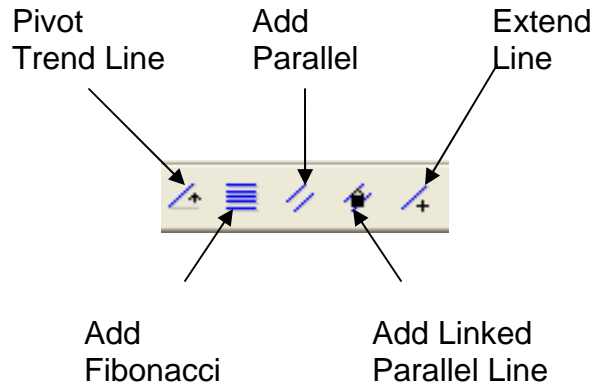
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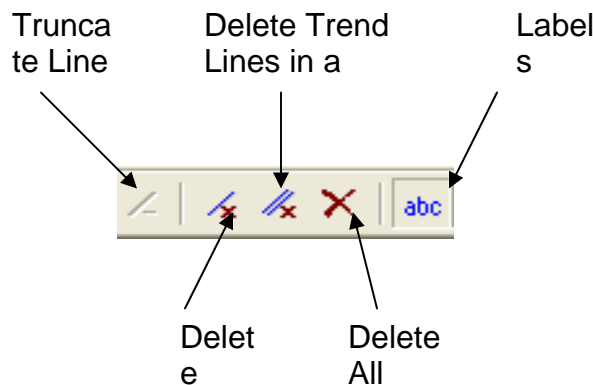
- Trend Line – Default mode for drawing point-to-point lines.
- Horizontal – Draws a horizontal line at the selected point.
- Horizontal Fibonacci – Draws Fibonacci retracements by selecting a high and low point.
- Speed Lines – Draws speed lines by selecting a starting and ending point.
- Gann Time/Price – Draws Gann Time and Price Lines by selecting two points.
- Gann Square – Draws a Gann Square by selecting a high or low point.
- Andrew's Pitchfork – Draws an Andrew's Pitchfork using points that form intersecting lines.



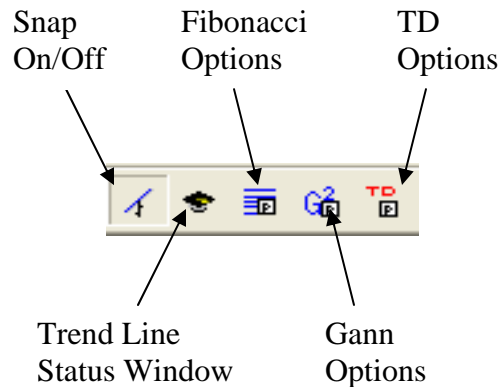
- TD Rel – Draws a Thom DeMark Relative trend line study.
- TD Abs – Draws a Thom DeMark Absolute trend line study.
- TD Factor – Draws a Thom DeMark Trend Factor study.
- TD Arc – Draws a Thom Demark Arc study.



- Pivot Trend Line – Toggles the ability to rotate the selected trend line.
- Add Fibonacci Lines - Adds Fibonacci lines to the selected line by selecting a point above or below the trend line.
- Add Parallel Line – Adds a parallel line by selecting a point above or below the trend line.
- Add Linked Parallel Line – Adds a linked parallel line by selecting a point above or below the trend line. Changes made to one line will affect the other.
- Extend Line – Extends the indefinitely into the future or past.



- Truncate Line- Truncates lines that have been expanded.
- Delete Line – Deletes the selected line.
- Delete Trend Lines in a Group – Deletes all the lines in a selected group.
- Delete All Lines – Deletes all trend lines on the chart.
- Labels On/Off – Toggles the display of trend line labels.



- Snap On/Off – Toggles the price snap feature for drawing trend lines. Enabling this option will snap drawn lines to the closest price on a bar.
- Trend Line Status Window – The Trend Line Status Window displays the exact price and time values for the end points of a trend line.
- Fibonacci Options – Displays the Fibonacci Options Dialog.
- Gann Options – Displays the Gann Options Dialog.
- TD Options – Displays the Thom Demark Trend Studies Dialog.

---

## Freehand Mode

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By default, Aspen is in freehand trend mode, meaning that lines can be freely drawn between points. The way in which a trend line is drawn, is to identify just two significant points. These can be two highs, two lows or a low and a high for example. Click and drag the pencil tip (not the eraser end) between the points and release the mouse button what must not be done is to drag the line through the second significant point and extend it on through to the price axis, this can cause problems when re-scaling as the second point has not been anchored on the chart itself.


---

## Drawing Horizontal Lines

---

Aspen offers several methods for drawing horizontal lines. These methods are outlined below:

### Using Icons

1. Enter Trend Mode.
2. Left-Click the Horizontal icon. 
3. Left-Click a point on the chart to draw the line.
4. Exit Trend Mode.

## Using the Context Sensitive Menu

1. Enter Trend Mode.
2. Right-Click the chart.
3. Select Horizontal.
4. Left-Click a point on the chart to draw the line.
5. Exit Trend Mode.

## Using the Main Menu

1. Enter Trend Mode.
2. Left-Click Trendlines in the Main Menu.
3. Left-Click Horizontal in the Trendlines Menu.
4. Left-Click a point on the chart to draw the line.
5. Exit Trend Mode.

---

## Drawing Horizontal Fibonacci Retracements

---


Aspen includes a number of configuration and drawing options for Fibonacci lines. Not only can Fibonacci lines be drawn in the more typical horizontal layout but also in diagonal formats.

By default, Fibonacci lines are drawn with five lines. These five lines are at the 0%, 38.20%, 50%, 61.80% and 100% ranges. However, these percentages may be configured and Fibonacci Extensions may be included as well.



## Using Icons

1. Enter Trend Mode.

2. Left-Click the Horizontal Fibonacci icon to toggle the Fibonacci drawing on.  

3. Left-Click a point to place the 0% line. Typically this is a low point.
4. Left-Click a point to place the 100% line. Typically this is a high point.
5. Exit Trend Mode.

## Using the Context Sensitive Menu

1. Enter Trend Mode.
2. Right-Click the Chart and Select Fibonacci to toggle the Fibonacci drawing on.
3. Left-Click a point for the 0% line. Typically this is low point.
4. Left-Click a point for the 100% line. Typically this is a high point.
5. Exit Trend Mode.

## Using the Main Menu

1. Enter Trend Mode.
2. Left-Click Trendlines in the Main Menu.
3. Left-Click Fibonacci to toggle the Fibonacci drawing on.
4. Left-Click a point for the 0% line. Typically this is a low point.
5. Left-Click a point for the 100% line. Typically this is a high point.
6. Exit Trend Mode.


---

## Drawing Diagonal Fibonacci Retracements

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The process for drawing a diagonal Fibonacci begins by defining a 0% line. This is done by drawing a regular trend line. This new trend line will become the 0% line for the Fibonacci lines.

## Using Icons

1. Enter Trend Mode.
2. Draw the 0% Trend Line.
3. Left-Click the Add Fibonacci Lines icon. 
4. Left-Click the point on the chart where the 100% line should be.
5. Exit Trend Mode.

## Using the Context Sensitive Menu

1. Enter Trend Mode.
2. Draw the 0% Trend Line.
3. Right-Click the new Trend Line.
4. Left -Click on Fibonacci.
5. Left-Click a point on the chart to place the 100% line.
6. Exit Trend Mode.

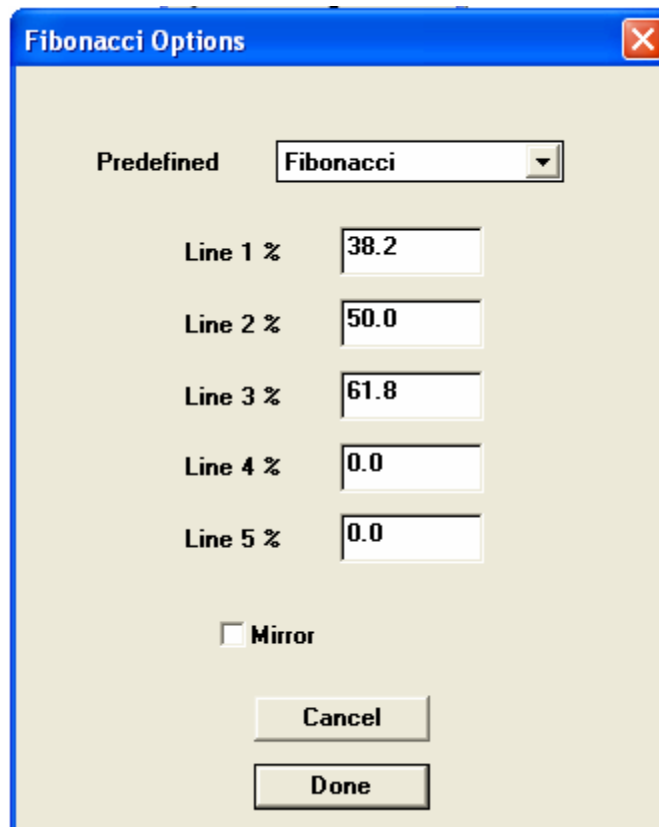


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## Fibonacci Options

---

Fibonacci line percentages are completely customizable in Aspen. The Fibonacci Options dialog is used to customize these features. 0% and 100% lines are defined and drawn automatically. To remove a line, enter the value of 0.0. To add an extension, enter the extension value in the Line 4% and/or Line 5% text boxes.



**Fibonacci Options**

Predefined: **Fibonacci**

Line 1 %: 38.2

Line 2 %: 50.0

Line 3 %: 61.8

Line 4 %: 0.0

Line 5 %: 0.0

Mirror

Cancel

Done

**Predefined: Fibonacci - Line 1% defaults to 38.2**

**Line 2% defaults to 50.0**

**Line 3% defaults to 61.8**

**Line 4% defaults to 0.0**

**Line 5% defaults to 0.0**

**Predefined: 1/3rds**

**Line 1% defaults to 33.33**

**Line 2% defaults to 66.66**

**Line 3% defaults to 0.0**

**Line 4% defaults to 0.0**

**Line 5% defaults to 0.0**

**Predefined: Custom**

**Specify custom settings for percent levels.**

- Line % 1 - Reflects the value of Predefined setting.
- Line % 2 - Reflects the value of Predefined setting.


- Line % 3 - Reflects the value of Predefined setting.
- Line % 4 - Reflects the value of Predefined setting.
- Line % 5 - Reflects the value of Predefined setting.
- Mirror - Reflects the line values to extend the Fibonacci retracements.

## Displaying the Fibonacci Options Dialog

---

The following methods can be used to display the Fibonacci Options Dialog:

### Using Icons

1. Enter Trend Mode.
2. Left-Click the Fibonacci Options Icon. 
3. Apply the changes.
4. Exit Trend Mode.

### Using the Context Sensitive Menu

1. Enter Trend Mode.
2. Right-Click the chart.
3. Select Options.
4. Select Fibonacci...
5. Apply the changes.
6. Exit Trend Mode.

### Using the Main Menu

1. Enter Trend Mode.
2. Left-Click Trendlines in the Main Menu.
3. Left-Click Options.
4. Left-Click Fibonacci...
5. Apply the changes.
6. Exit Trend Mode.

---


## Drawing Speed Lines

---

Speed Lines help identify the rate of ascent or descent or a trend. The following methods can be used to draw Speed Lines:



## Using Icons

1. Enter Trend Mode.
2. Left-Click the Speed Lines icon. 
3. Left-Click the beginning of a trend on a chart.
4. Left-Click the end of a trend on a chart.
5. Exit Trend Mode.

## Using the Context Sensitive Menu

1. Enter Trend Mode.
2. Right-Click the Chart.
3. Select Speed Lines.
4. Left-Click the beginning of a trend on the chart.
5. Left-Click the end of a trend on the chart.
6. Exit Trend Mode.

## Using the Main Menu


1. Enter Trend Mode.
2. Left-Click Trendlines in the Main Menu.
3. Left-Click Speed Lines in the Trendlines Menu.
4. Left-Click at the beginning of a trend on the chart.
5. Left-Click the end of a trend on the chart.
6. Exit Trend Mode.

## Drawing Gann Time/Price Angles

The Gann Time/Price Angles command displays a Gann fan. W. D. Gann used price and time to forecast market turns. First, a market high is identified. The dollar amount of the high is converted into a calendar unit (i.e., days, weeks, months, or years). The calendar unit is projected forward to identify dates on which market turns may occur.



### Using Icons

1. Enter Trend Mode. 
2. Left-Click the Gann Time/Price icon.
3. Left-Click a low or high on the chart to define the beginning of the fan.
4. Left-Click a high or a low to draw the fan.
5. Exit Trend Mode.

### Using the Context Sensitive Menu

1. Enter Trend Mode.
2. Right-Click the chart.
3. Left-Click Gann Time/Price.
4. Left-Click a low or high on the chart to define the beginning of the fan.
5. Left-Click a high or a low to draw the fan.
6. Exit Trend Mode.

### Using the Main Menu

1. Enter Trend Mode.


2. Left-Click Trendlines in the Main Menu.
3. Left-Click Gann Time/Price in the Trendlines menu.
4. Left-Click a low or high on the chart to define the beginning of the fan.
5. Left-Click a high or a low to draw the fan.
6. Exit Trend Mode.

## Gann Time/Price Options

---

The Gann Time/Price Options Dialog controls the display, angles and origins of the Angles. The following methods can be used to display the Gann Time/Price Options dialog:

### Using Icons

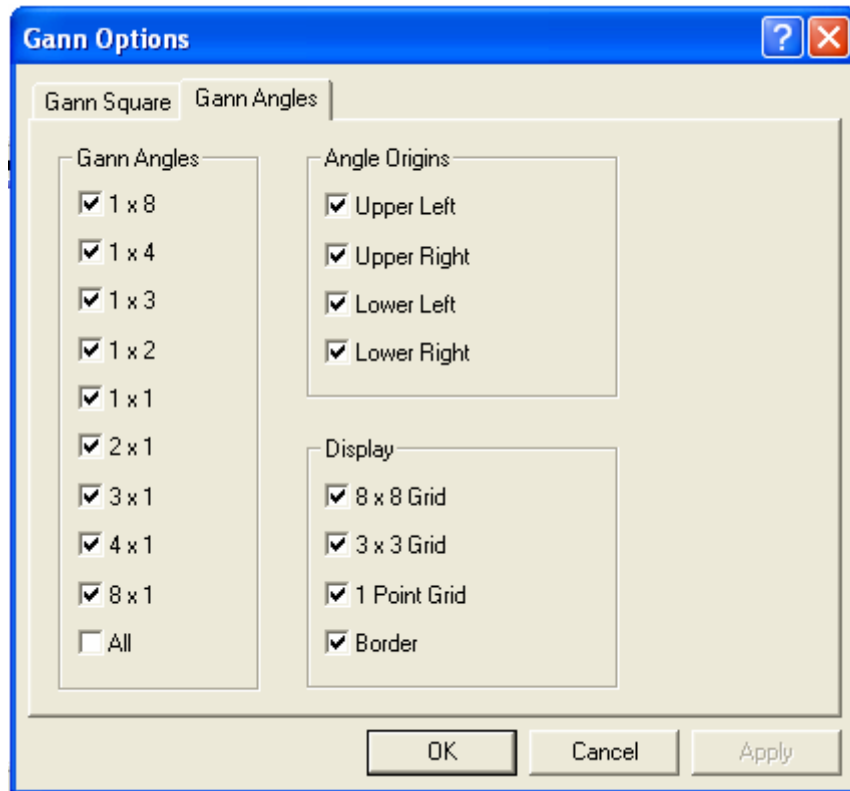
1. Left-Click the Gann Options icon. 
2. Left-Click the Gann Angles tab in the Gann Options Dialog.

### Using the Context Sensitive Menu

1. Right-Click the chart.
2. Select Options.
3. Left-Click Gann...
4. Left-Click the Gann Angles tab in the Gann Options Dialog.

### Using the Main Menu

1. Left-Click Trendlines in the Main Menu.
2. Select Options in the Trendlines Menu.
3. Left-Click in Gann... in the Options Menu.
4. Left-Click the Gann Angles tab in the Gann Options Dialog.



- 
- 1 x 8 – Toggles the display for 1 price unit for every 8 time units.
- 1 x 4 – Toggles the display for 1 price unit for every 4 time units.
- 1 x 2 – Toggles the display for 1 price unit for every 2 time units.
- 1 x 1 – Toggles the display for 1 price unit for every 1 time units.
- 2 x 1 – Toggles the display for 2 price units for each time unit.
- 3 x 1 - Toggles the display for 3 price units for each time unit.
- 4 x 1 – Toggles the display for 4 price units for each time unit.
- 8 x 1 – Toggles the display for 8 price units for each time unit.
- Upper Left – Toggles the upper left corner origin.
- Upper Right – Toggles the upper right corner origin.
- Lower Left – Toggles the lower left corner origin.
- Lower Right – Toggles the lower right corner origin.
- All – Select all Gann Angle toggles.
- 8 x 8 Grid – Toggles a 8 x 8 grid.
- 3 x 3 Grid – Toggles a 3 x 3 grid.
- 1 Point Grid – Toggles a 1 point grid.

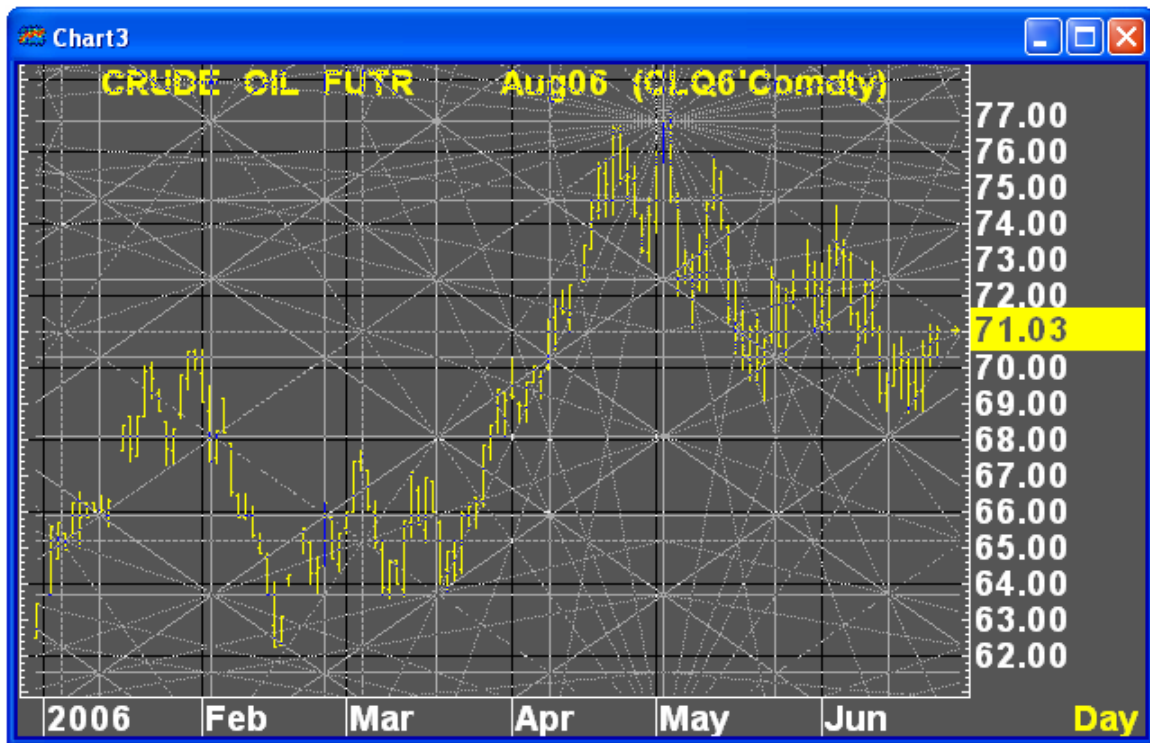
- Border – Toggles the border display.

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## Drawing Gann Squares


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A Gann square is a method of forecasting future support or resistance levels by counting forward from the all-time low or all-time high price of an instrument.



The methods below can be used to display a Gann Square:

### Using Icons

1. Enter Trend Mode.
2. Left-Click the Gann Square icon. 
3. Left-Click a point on the chart to draw the square from.
4. Exit Trend Mode.

### Using the Context Sensitive Menu

1. Enter Trend Mode.
2. Right-Click the chart.
3. Left-Click Define Gann Square.
4. Left-Click a point on the chart to draw the square from.
5. Exit Trend Mode.

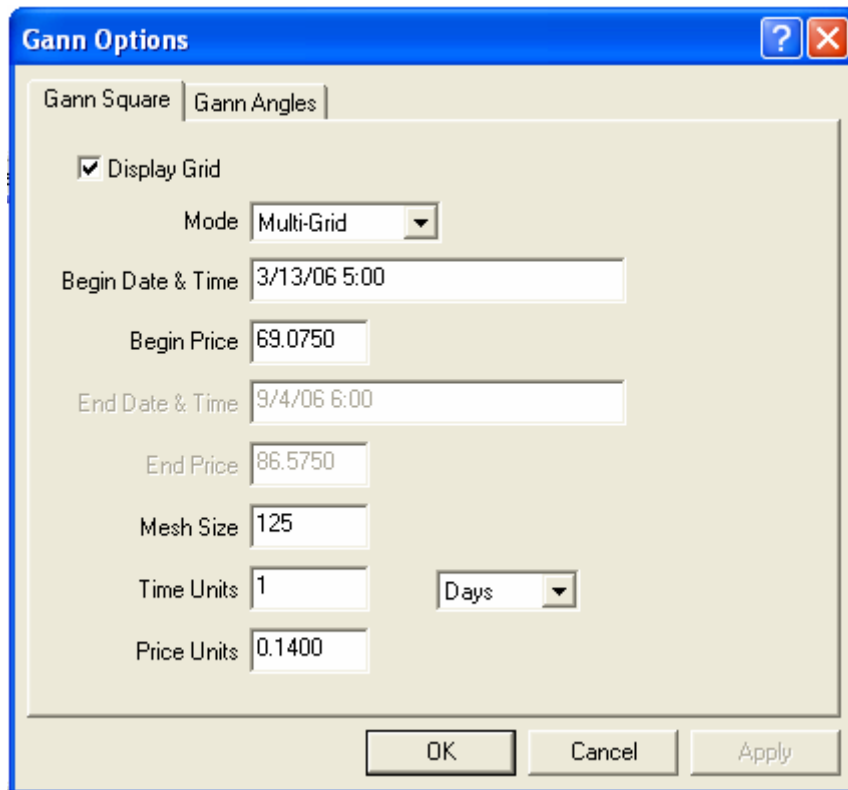
### Using the Main Menu

1. Enter Trend Mode.
2. Left-Click Trendlines in the Main Menu.

3. Left-Click Define Gann Square in the Trendlines Menu.
4. Left-Click a point on the chart to draw the square from.
5. Exit Trend Mode.


## Gann Squares Options Dialog

Use the Gann Squares option to set various Gann Square properties including Display Mode, Mesh Size, Time and Price Units.



Display the Gann Squares Options Dialog using one of the following methods:

### Using Icons

1. Enter Text Mode.
2. Left-Click the Gann Options icon. 
3. Apply changes.
4. Exit Trend Mode.

### Using the Context Sensitive Menu

1. Enter Trend Mode.
2. Right-Click the Chart.
3. Select Options...
4. Select Gann.
5. Apply Changes.



6. Exit Trend Mode.

## Using the Main Menu

1. Enter Trend Mode.
2. Left-Click Trendlines in the Main Menu.
3. Select Options...
4. Left-Click Gann...
5. Apply Changes.
6. Exit Trend Mode.

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## Drawing Andrew's Pitchfork

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Andrew's Pitchfork was developed by Dr. Alan Andrews and employs three points. First, a line is drawn between a significant high and a significant low. This line is bisected, and the median of this line forms a base point for the second line, known as the median line. The fork is completed by identifying the second base point for the median line.



## Using Icons

1. Enter Trend Mode.
2. Left-Click the Andrew's Pitchfork icon. 
3. Left-Click a high point.
4. Left-Click the next low point.
5. Left-Click a previous significant low.
6. Exit Trend Mode.

## Using the Context Sensitive Menu

1. Enter Trend Mode.
2. Right-Click the chart.
3. Left-Click Andrew's Pitchfork.
4. Left-Click a high point.
5. Left-Click the next low point.
6. Left-Click a previous significant low.
7. Exit Trend Mode.

## Using the Main Menu

1. Enter Trend Mode.
2. Left-Click Trendlines in the Main Menu.
3. Left-Click Andrew's Pitchfork in the Trendlines Menu.
4. Left-Click a high point.
5. Left-Click the next low point.
6. Left-Click a previous significant low.
7. Exit Trend Mode.

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## Drawing Thom Demark Relative Retracement

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TD relative Retracement is a purely objective or mechanical method for displaying Fibonacci retracement levels from designated lows and highs. These levels define areas of support or resistance. Retracement levels will appear as dashed lines until price penetrates them and is preceded by a qualified bar. Retracement levels are calculated as follows: from a low bar, refer to the last time a lower bar appeared and select the highest high between these two points and subtract the difference between those two points or from a high bar, refer to the last time a higher bar appeared and select the lowest low between these two points. By placing the cursor on these lows or highs and by selecting the desired Retracement settings, the levels are presented graphically.




The Thom Demark Relative Retracement is an add-on subscription feature. This feature will appear as disabled unless it is purchased.

A Left-Click is assumed to refer to the high, low, open or close of a displayed bar. Aspen locates the nearest such point and uses it as the exact reference point. Aspen finds the horizontally nearest bar column, then chooses the vertically nearest reference point within that column.



## Using Icons

1. Enter Trend Mode.
2. Left-Click the TD Rel icon. 
3. Left-Click the bar to draw the retracement from.
4. Exit Trend Mode.

## Using the Context Sensitive Menu

1. Enter Trend Mode.
2. Right-Click the chart.
3. Left-Click TD Rel Retracement.
4. Left-Click the bar to draw the retracement from.
5. Exit Trend Mode.

## Using the Main Menu

1. Enter Trend Mode.
2. Left-Click Trendlines in the Main Menu.
3. Left-Click TD Rel Retracement in the Trendlines Menu.
4. Left-Click the bar to draw the retracement from.
5. Exit Trend Mode.

## Qualifying Relative Retracement

---

By qualifying a retracement level, the probability of identifying a successful intraday breakout is enhanced if any of the following occur:

1. The close of the prior bar to the upside (downside) penetration is down (up) versus the close two bars ago, **OR**
2. The open of the first bar exceeds upside (downside) the retracement level, **OR**
3. The difference between the previous bar's close and its true low (true high and close) added to (subtracted from) the previous bar's close is less than (greater than) the retracement level. A true high is that bar's high or the close of the previous bar, whichever is greater. A true low is that bar's low or the close of the previous bar, whichever is lesser.

For further information on Thom DeMark Relative Retracement, please refer to Thomas R. DemMark, *The Science of Technical Analysis*, Ney York: John Wiley & Sons, 1994, Chapter 2.

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## Drawing Thom DeMark Absolute Retracement

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Absolute Retracement is applied once a market's price advance is at an all-time high or low. Consequently, Relative Retracement cannot be used since there is no reference point historically. Absolute Retracement is applied to the high bar or low bar. Retracement ratios will be displayed to the downside or upside and are used as support or resistance levels.




The Thom Demark Relative Retracement is an add-on subscription feature. This feature will appear as disabled unless it is purchased.

A Left-Click is assumed to refer to the high, low, open or close of a displayed bar. Aspen locates the nearest such point and uses it as the exact reference point. Aspen finds the horizontally nearest bar column, then chooses the vertically nearest reference point within that column.



## Using Icons

1. Enter Trend Mode.
2. Left-Click the TD Abs icon. 
3. Left-Click an all-time high or all-time low.
4. Exit Trend Mode.

## Using the Context Sensitive Menu

1. Enter Trend Mode.
2. Right-Click the chart.
3. Left-Click TD Abs Retracement.
4. Left-Click an all-time high or all-time low.
5. Exit Trend Mode.


## Using the Main Menu

1. Enter Trend Mode.
2. Left-Click Trendlines in the Main Menu.
3. Left-Click TD Abs Retracement.
4. Left-Click an all-time high or all-time low.
5. Exit Trend Mode.

## Drawing Thom DeMark Trend Factors

Trend Factors is designed to project upside resistance levels and downside support levels by multiplying qualified highs, lows, or closes by series of prescribed ratios.

Once the market has moved up approximately 1.0556 in price from a low, a reference high is identified. Place the study cross-reference on that high or high day close. The Trend Factors projects down to the support area of .9444, as well as secondary levels. Conversely, once a market has moved down to approximately .944 in price from a high, a reference low is identified. Place the study cross-reference on that low or low day close. The Trend Factors will project up to the resistance area of 1.0566, as well as secondary levels.


 The Thom Demark Relative Retracement is an add-on subscription feature. This feature will appear as disabled unless it is purchased.

A Left-Click is assumed to refer to the high, low, open or close of a displayed bar. Aspen locates the nearest such point and uses it as the exact reference point. Aspen finds the horizontally nearest bar column, then chooses the vertically nearest reference point within that column.



### Using Icons

1. Enter Trend Mode.

2. Left Click the TD Fac icon. 
3. Left-Click a qualifying high or low.
4. Exit Trend Mode.

## Using the Context Menu

1. Enter Trend Mode.
2. Right-Click the chart.
3. Left-Click Trend Factor.
4. Left-click a qualifying high or low.
5. Exit Trend Mode.

## Using the Main Menu

1. Enter Trend Mode.
2. Left-Click Trendlines in the Main Menu.
3. Left-Click Trend Factors.
4. Left-Click a qualifying high or low.
5. Exit Trend Mode.

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## Drawing Thom DeMark Retracement Arcs

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TD Retracement Arc displays graphically, support and resistance levels which are defined by incorporating both price and time to establish retracement levels. TD Retracement Arc draws elliptical trendline curves. The anchor point and magnet price are determined in the same way as Relative Retracement. Also, the software calculates the distance (number of bars) from the anchor bar to the high or low bar whose close determines the magnet price. Then, the trendline curve for fraction F is a segment of a quarter ellipse starting horizontally at the anchor point, and ending vertically at price. The trendline curve terminates early if it touches a price bar before reaching the end point.




The Thom Demark Relative Retracement is an add-on subscription feature. This feature will appear as disabled unless it is purchased.

A Left-Click is assumed to refer to the high, low, open or close of a displayed bar. Aspen locates the nearest such point and uses it as the exact reference point. Aspen finds the horizontally nearest bar column, then chooses the vertically nearest reference point within that column.



## Using Icons

1. Enter Trend Mode.
2. Left-Click the TD Arc icon. 
3. Left-Click a bar to use as an anchor point.
4. Exit Trend Mode.

## Using the Context Menu

1. Enter Trend Mode.
2. Right-Click the chart.
3. Left-Click TD Arc.
4. Left-Click a bar to use as an anchor point.
5. Exit Trend Mode.

## Using the Main Menu

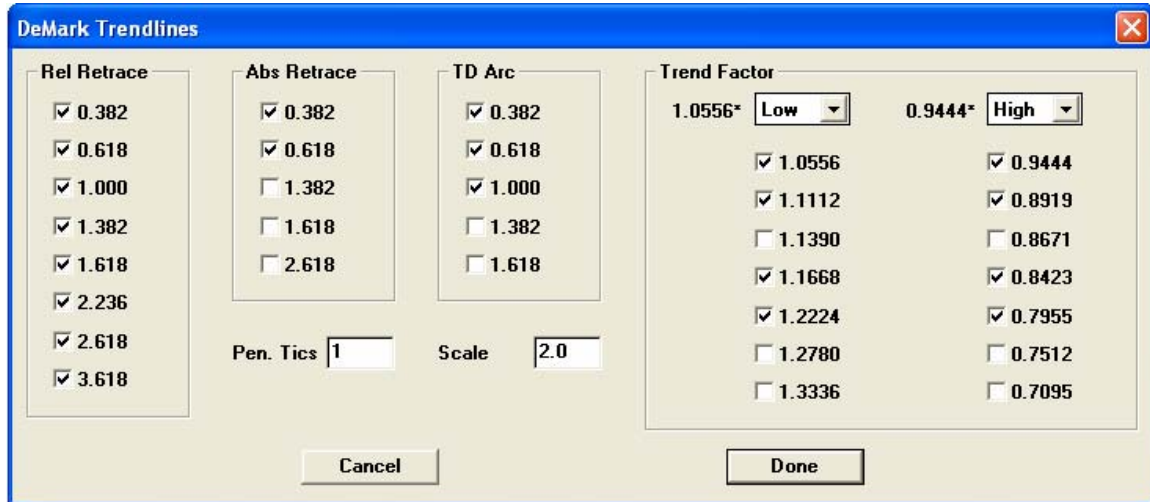
1. Enter Trend Mode.
2. Left-Click Trendlines in the Main Menu.
3. Left-Click TD Arc.
4. Left-Click a bar to use as an anchor point.
5. Exit Trend Mode.



## Thom DeMark Trendline Property Dialog

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The properties for the various DeMark Trendline studies are managed from one dialog. Retracement and Factor values are enabled or disabled from this dialog.



- Rel Retrace – Checking any item in this group enables the retracement level. Removing a check beside any item disables the level.
- Abs Retrace- Checking any item in this group enables the retracement level. Removing a check beside any item disables the level.
- TD Arc – Checking any item in this group enables the retracement level. Removing a check beside any item disables the level.
- TD Factor – The Drop-Down boxes associated with the 1.0556 and .9444 values allows the High, Low, Open or Close price to be specified. Checking any item in this group enables the retracement level. Removing a check beside any item disables the level.

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## Manipulating Trendlines


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Once drawn, Trendlines can be moved, resized and rotated. Paralel lines can be added and associated with a selected trend and Fibonacci lines can be added well.

### Moving Trendlines

---

#### Using Icons

1. Enter Trend Mode.
2. Left-Click a Trendline to select it.
3. Left-Click the Move Line icon. 
4. Use the mouse pointer to reposition the line.
5. Left-Click to place the line.
6. Exit Trend Mode.

## Using the Context Sensitive Menu

1. Enter Trend Mode
2. Right-Click a trendline to select it and display the menu.
3. Left-Click Move.
4. Use the mouse pointer to reposition the line.
5. Left-Click to place the line.
6. Exit trend mode.

## Using the Main Menu

1. Enter Trend Mode.
2. Left-Click a trendline to select it.
3. Left-Click Trendlines in the Main Menu.
4. Select Edit in the Trendlines Menu.
5. Left-Click Move in the new menu.
6. Use the mouse pointer to reposition the line.
7. Left-Click to place the line.
8. Exit Trend Mode.

## Using the Mouse


1. Enter Trend Mode.
2. Place the mouse over the line until the cursor changes into a hand.
3. Left-Click and Drag the line to its new position
4. Release the Left-Mouse button.
5. Exit Trend Mode.

## Pivoting Trendlines

---

Trendlines in Aspen can be rotated about points. This process is called Pivoting.

## Using Icons

1. Enter Trend Mode.
2. Left-Click the Trendline to select it. 
3. Left-Click the Pivot Trend Line icon.
4. Left-Click a new point on the chart to redraw the line.
5. Exit Trend Mode.

## Extending and Retracting Trendlines

---

Trendlines in Aspen can be extended to be drawn indefinitely into the past or future. Trendlines that have been extended may also be retracted. Aspen offers several methods to accomplish both of these tasks. These methods are outlined below:

## Using Icons

1. Left-Click the appropriate line to select it.
2. Left-Click the Extend or Retract Trendline Icon to perform the operation.



## Using the Context Sensitive Menu

1. Enter Trend Mode.
2. Right-Click the Trendline.
3. Select Extend to extend the line.
4. Select Truncate to retract the line.
5. The selection point on the line dictates which side of the line will be changed. If the selection is closer to the right hand point of the line, the right hand side will be extended or retracted. The same is true for selections that are nearer to the left hand side.
6. Right-Click the Chart and Left-Click Exit Trend Mode.
7. Exit Trend Mode.

## Using the Main Menu

1. Enter Trend Mode.
2. Left-Click the appropriate line to select it.
3. Left-Click Trendlines in the Main Menu.
4. Select Edit.
5. Left-Click Extend to extend the line.
6. Left-Click Truncate to retract the line.
7. Left-Click Trendlines in the Main Menu.
8. Left-Click Exit Trend Mode in the Trendlines Menu.
9. Exit Trend Mode.

## Using the Mouse


1. Enter Trend Mode.
2. Double-Click the end of the line you wish to Extend or Truncate.
3. Exit Trend Mode.

## Adding Parallel Lines

---

Using the Parallel Line feature will draw a line parallel to the selected line. These lines *can* be moved independently.

## Using Icons

1. Enter Trend Mode.
2. Left-Click a trendline to select it.
3. Left-Click the Parallel Lines icon to activate it. 
4. Left-Click a position on the chart to draw the new line.
5. Exit Trend Mode.

## Using the Context Sensitive Menu

1. Enter Trend Mode.
2. Right-Click a trendline to select and display the menu.
3. Left-Click Parallel.
4. Left-Click a position on the chart to draw the new line.
5. Exit Trend Mode.

## Using the Main Menu


1. Enter Trend Mode.
2. Left-Click a trendline to select it.
3. Left-Click Trendlines in the Main Menu.
4. Select Edit.
5. Left-Click Parallel.
6. Left-Click a position on the chart to draw the new line.
7. Exit Trend Mode.

## Adding Linked Parallel Lines

---

Using the Linked Parallel Line feature will draw a line parallel to the selected line. These lines *cannot* be moved independently.

## Using Icons

1. Enter Trend Mode.
2. Left-Click a trendline to select it.
3. Left-Click the Parallel Lines icon to activate it. 
4. Left-Click a position on the chart to draw the new line.
5. Exit Trend Mode.

## Using the Context Sensitive Menu

1. Enter Trend Mode.
2. Right-Click a trendline to select and display the menu.
3. Left-Click Parallel.
4. Left-Click a position on the chart to draw the new line.
5. Exit Trend Mode.

## Using the Main Menu

1. Enter Trend Mode.
2. Left-Click a trendline to select it.
3. Left-Click Trendlines in the Main Menu.
4. Select Edit.
5. Left-Click Parallel.
6. Left-Click a position on the chart to draw the new line.
7. Exit Trend Mode.

---

## Deleting Lines

---

Aspen Graphics offers a number of techniques for removing trendlines. Both individual and groups of trendlines may be removed. This allows the user to have both control and efficiency.

### Deleting a Single Line

---

This command deletes the selected trendline. In the case of grouped lines such as Fibonacci or Speed Lines, the selected line is deleted, not the entire group.

#### Using Icons

1. Enter Trend Mode.
2. Left-Click the trendline to select it.
3. Left-Click the Delete Line Icon.
4. Exit Trend Mode.

#### Using the Context Sensitive Menu

1. Enter Trend Mode.
2. Right-Click the trendline to select it and display the menu.
3. Left-Click Delete Line.
4. Exit Trend Mode.

#### Using the Main Menu

1. Enter Trend Mode.
2. Left-Click Trendlines in the Main Menu.
3. Select Edit in the Trendlines Menu.
4. Left-Click Delete from the new menu.
5. Exit Trend Mode.

### Delete a Group of Lines

---

This command deletes an entire group of lines. This is useful for removing entire Fibonacci retracements, speed lines and any trendline that is displayed as a group of lines.

#### Using Icons

1. Enter Trend Mode.
2. Left-Click a trendline in the group to select it.
3. Left-Click the Delete Trend Lines in a Group icon.
4. Exit Trend Mode.

#### Using the Context Sensitive Menu

1. Enter Trend Mode.

2. Right-Click a line in the group to select it and display the menu.
3. Left-Click Delete Trend Group.
4. Exit Trend Mode.

## Delete All Trend Lines

---

This command quickly removes all the trendlines currently displayed on the chart.

## Using Icons

1. Enter Trend Mode.
2. Left-Click the Delete All Lines icon.
3. Exit Trend Mode.

## Using the Context Sensitive Menu

1. Enter Trend Mode.
2. Right-Click the chart.
3. Left-Click Delete All.
4. Exit Trend Mode.

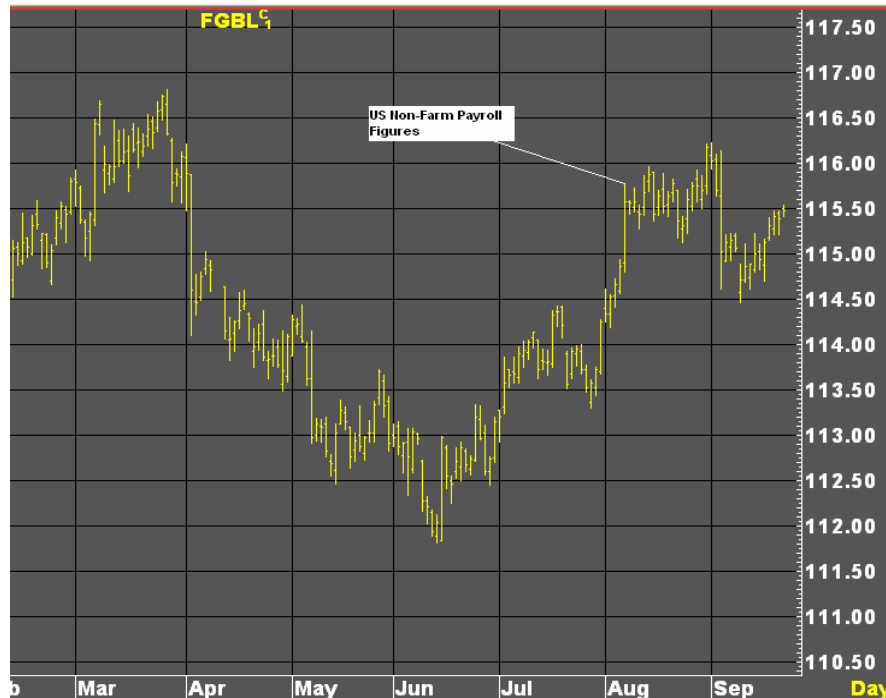
## Using the Main Menu

1. Enter Trend Mode.
2. Left-Click Trendlines in the Main Menu.
3. Left-Click Delete All in the Trendlines Menu.
4. Exit Trend Mode.

# Annotating Charts

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Aspen Graphics allows users to add their own annotations to charts. This is particularly useful if the charts are being used for publication or distribution. Aspen offers a number of options when displaying text on a chart. These include textbox graphics, font colors and more.



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## Entering Text Mode

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In the same way that Aspen needs to be in trend mode to add trendlines, Aspen also needs to be in text mode to add text.

### Using the Context Sensitive Menu

1. Right-Click the chart.
2. Select Draw Text.
3. Left-Click Text Mode.

### Using the Main Menu

1. Left-Click Text in the Main Menu.
2. Left-Click Text Mode in the Text Menu.

---

## Adding Text

---

Text Mode in Aspen Graphics will place the text inside a textbox. The textbox is anchored to a position in the chart during creation. The position may be on a bar or any other position in the chart.

### Using the Context Sensitive Menu

1. Enter Text Mode.
2. Right-Click the chart.

3. Left-Click Add Text.
4. Left-Click a bar to attach the text to.
5. Enter the Text.
6. Press the Enter key to add the text.
7. Exit Text Mode.
8. Right-Click the chart.
9. Select Draw Text.
10. Left-Click Show Text.

## Using the Main Menu

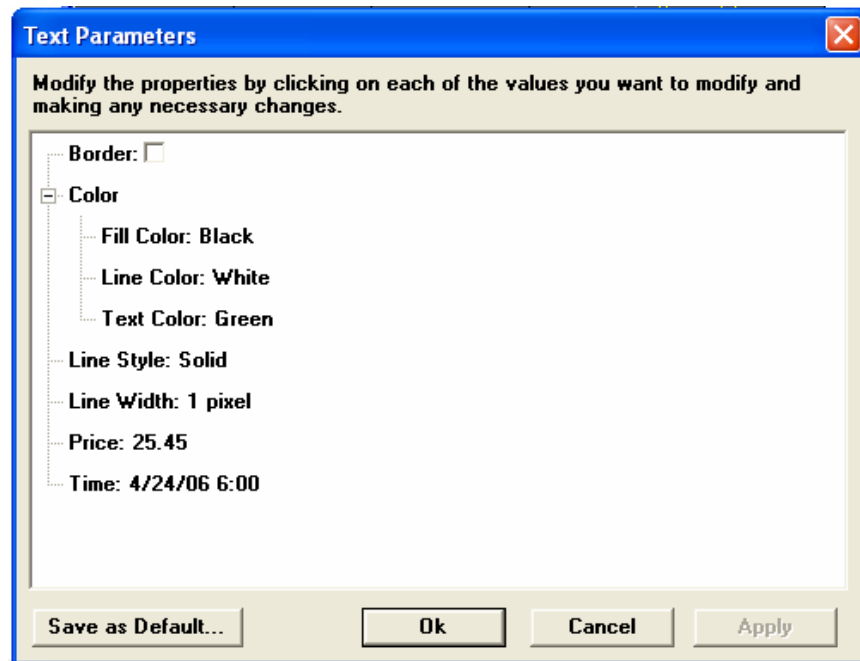
1. Enter Text Mode.
2. Left-Click Text in the Main Menu.
3. Left-Click Add Text in the Text Menu.
4. Left-Click a bar to attach the text to.
5. Enter the Text.
6. Press the Enter key to add the text.
7. Exit Trend Mode.
8. Left-Click Text in the Main Menu.
9. Left-Click Show Text.

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## Changing Text Parameters

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The Text Parameters Dialog is used to control the look of text annotations on a chart.



- Border – Toggles the display of a border around the textbox.



- Fill Color – Sets the background color for the textbox.
- Line Color- Sets the color for the line attached to a point.
- Text Color – Sets the color for the text.
- Line Style – Sets the display format of the line.
- Line Width – Sets the Width of the line in pixels.
- Price – Indicates the price at the point the textbox was initially positioned. This price may be changed here.
- Time – Indicates the time at the point the textbox was initially positioned. This time may be changed here.
- Save As Default - Sets the current options as the default display for each new chart created.

## Displaying the Text Parameters

---

### Using the Context Sensitive Menu

1. Enter Text Mode.
2. Right-Click a Text item.
3. Left-Click Parameters...
4. Apply changes.
5. Exit Text Mode.

### Using the Main Menu

1. Enter Trend Mode.
2. Left-Click a Text item to select it.
3. Left-Click Text in the Main Menu.
4. Left-Click Parameters... in the Text Menu.
5. Apply changes.
6. Exit Trend Mode.

## Quotes

---

Quotes differ from charts in that they offer no historical data. Unlike charts however, quotes are capable of displaying more information than simple high, low, open and close values. Quotes can also be configured to display in a ticker type display. Quotes are not limited to the codes directly supported by Aspen. Formulas can also be displayed in quote windows.

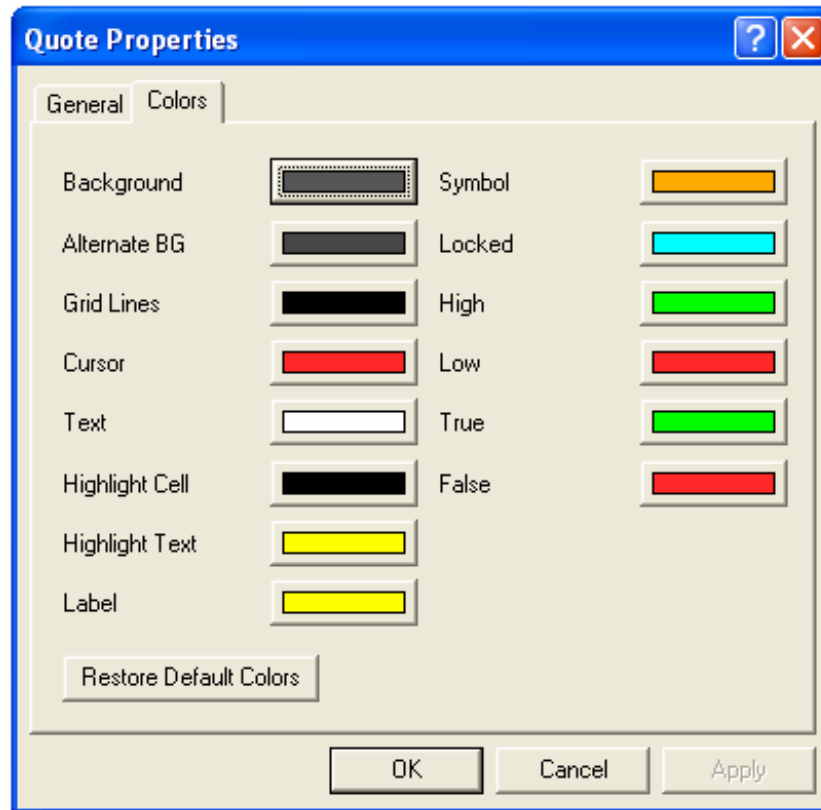
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## Quote Properties Dialog

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- Display Title Bar – Toggles the display of the Title Bar for the selected Quote Window.



- Background – Displays the Color Picker for changing the Background color of the Quote Window.
- Alternate BG – Displays the Color Picker for changing the Alternate Background color of the Quote Window.
- Grid Lines – Displays the Color Picker for changing the Grid Lines color when in Modify Layout mode.
- Cursor – Displays the Color Picker for changing the Cursor color.
- Text – Displays the Color Picker for changing the Text color.
- Highlight Cell – Displays the Color Picker for changing the Highlight Cell color. Cells are highlighted when values change.
- Highlight Text – Displays the Color Picker for changing the Highlight Text color. Text is highlighted when the associated value changes.
- Label – Displays the Color Picker for changing the Label color.
- Symbol – Displays the Color Picker for changing the Symbol color.
- Locked – Displays the Color Picker for changing the Locked color. Locked fields cannot be changed by a user.
- High – Displays the Color Picker for changing the High color. Fields such as Net Change use High to indicate a positive change in value.

- Low – Displays the Color Picker for changing the Low color. Fields such as Net Change use Low to indicate a negative change in value.
- True – Displays the Color Picker for changing the True color.
- True – Displays the Color Picker for changing the False color.
- Restore Default Colors – Returns all changed color parameters to the system defaults.

---

## Understanding Quotes in Aspen

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Quotes in Aspen are usually displayed in white. When quotes appear in another color, it is a signal that something is special about that quote.

Quote Type	Description
<b>Yellow</b>	<b>New Tick</b>
<b>A Red Last Price</b>	<b>A New Daily Low</b>
<b>A Green Last Price</b>	<b>A New Daily High</b>
<b>A Red Net Change</b>	<b>Down from yesterday's close</b>
<b>A Green Net Change</b>	<b>Up from yesterday's close</b>
<b>Highlighted (displayed on a black background)</b>	<b>New or just recalculated</b>

Last prices are followed by symbols that provide additional information about the price:

Symbol	Example	Definition
<b>A</b>	<b>98.60a</b>	<b>Ask</b>
<b>B</b>	<b>98.60b</b>	<b>Bid</b>
<b>↑</b>	<b>98.60↑</b>	<b>Up Tick</b>
<b>↓</b>	<b>98.60↓</b>	<b>Down Tick</b>

## Quote Code Variables

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Aspen Graphics uses Quote Code Variables as place holders. These variables appear in the \$1, \$2, \$3... format. A variable in Aspen is a reference to the symbol. Code Codes can be used to pull specific information from the underlying symbol. The variable \$1 and the Code .Last, used as \$1.Last, will display the price for the last trade on the symbol.

Quote pages are used to display information relating to multiple symbols simultaneously. The Quote Code Variables facilitate this behavior. These variables, or place holders, may only be seen in Free Form Quote Window while in Modify Layout mode. A variable is usually associated with a row or a column in a Quote Window. Each Row or Column is associated with a Quote Code Variable.

<b>SYMB</b>	<b>OPEN</b>	<b>CLOSE</b>	<b>NET</b>	<b>LAST</b>	
\$1.SYMB	\$1.OPEN	\$1.CLOSE	\$1.NET	\$1.LAST	
\$2.SYMB	\$2.OPEN	\$2.CLOSE	\$2.NET	\$2.LAST	
\$3.SYMB	\$3.OPEN	\$3.CLOSE	\$3.NET	\$3.LAST	
\$4.SYMB	\$4.OPEN	\$4.CLOSE	\$4.NET	\$4.LAST	
\$5.SYMB	\$5.OPEN	\$5.CLOSE	\$5.NET	\$5.LAST	
\$6.SYMB	\$6.OPEN	\$6.CLOSE	\$6.NET	\$6.LAST	
\$7.SYMB	\$7.OPEN	\$7.CLOSE	\$7.NET	\$7.LAST	
\$8.SYMB	\$8.OPEN	\$8.CLOSE	\$8.NET	\$8.LAST	
\$9.SYMB	\$9.OPEN	\$9.CLOSE	\$9.NET	\$9.LAST	
\$10.SYMB	\$10.OPEN	\$10.CLOS	\$10.NET	\$10.LAST	
\$11.SYMB	\$11.OPEN	\$11.CLOS	\$11.NET	\$11.LAST	

<b>SYMB</b>	<b>\$1.SYMB</b>	<b>\$2.SYMB</b>	<b>\$3.SYMB</b>	<b>\$4.SYMB</b>
<b>OPEN</b>	\$1.OPEN	\$2.OPEN	\$3.OPEN	\$4.OPEN
<b>CLOSE</b>	\$1.CLOSE	\$2.CLOSE	\$3.CLOSE	\$4.CLOSE
<b>NET</b>	\$1.NET	\$2.NET	\$3.NET	\$4.NET
<b>LAST</b>	\$1.LAST	\$2.LAST	\$3.LAST	\$4.LAST


---

## Opening Pre-Defined Quote Windows

---

A number of pre-defined quote windows ship with Aspen Graphics. These windows are data vendor specific and relate to specific industries. Aspen also offers methods for creating blank Quote Windows pre-formatted with popular fields. Aspen features three types of quote windows: Quote Grids, Quote Boards and Free Form Quote Windows. Quotes Grids and Quote Boards are preconfigured with elements that are commonly used in Quote Windows. Outside of symbols, Quote Grids and Quote Boards cannot be modified.

### Using Icons

1. Left-Click the Open Window Icon. 
2. Left-Click the Quotes folder in the Window Manager to open it.
3. Double-Click the appropriate Aspen Window file to open it.
4. Close the Window Manager.

### Using the Context Sensitive Menu


1. Clear the screen by Left-Clicking the Clear Screen icon. 
2. Right-Click the Aspen Workspace.

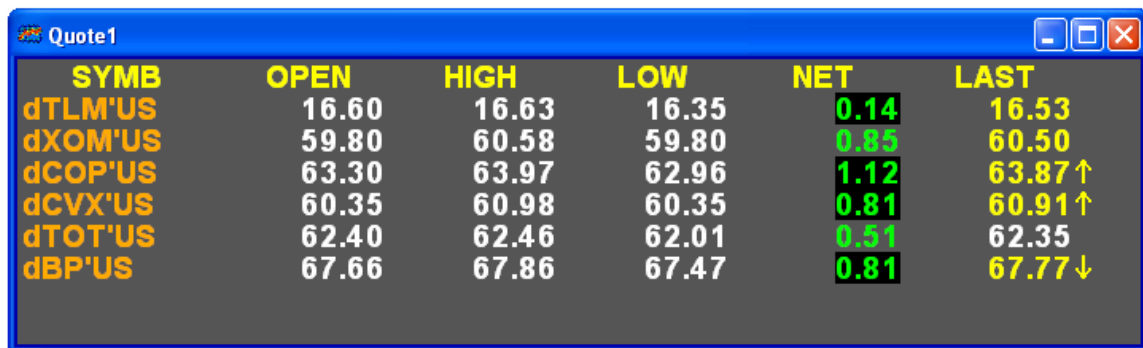
3. Left-Click Open Window...
4. Left-Click the Quotes folder in the Window Manager to open it.
5. Double-Click the appropriate Aspen Window file to open it.
6. Close the Window Manager.

## Using the Main Menu

1. Left-Click File on the Main Menu.
2. Left-Click Open Window...
3. Left-Click the Quotes folder in the Window Manager to open it.
4. Double-Click the appropriate Aspen Window file to open it.
5. Close the Window Manager.

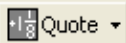
## Displaying a Quote Grid Window

Quote Grid Windows displays quote information in rows. Each row contains the Open, High, Low, Net Change and Last for each symbol entered. A Quote Grid Window uses the Format Rows format. 



SYMB	OPEN	HIGH	LOW	NET	LAST
dTLM'US	16.60	16.63	16.35	0.14	16.53
dXOM'US	59.80	60.58	59.80	0.85	60.50
dCOP'US	63.30	63.97	62.96	1.12	63.87↑
dCVX'US	60.35	60.98	60.35	0.81	60.91↑
dTOT'US	62.40	62.46	62.01	0.51	62.35
dBP'US	67.66	67.86	67.47	0.81	67.77↓

## Using Icons

1. Left-Click the Quote icon. 
2. Left-Click Quote Grid from the Quote Drop-Down Menu.

## Using the Context Sensitive Menu


1. Right-Click a portion in the Aspen Graphics Workspace that does not currently contain an Aspen Window.
2. Select New Window...
3. Select Quote...
4. Left-Click Quote Grid.

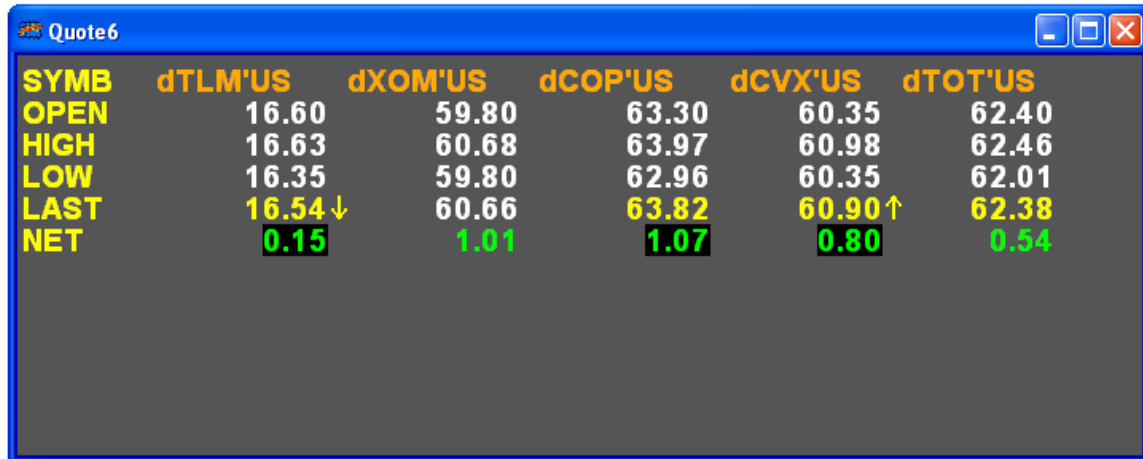
## Using the Main Menu

1. Left-Click File from the Main Menu.
2. Select New Window...
3. Select Quote...
4. Left-Click Quote Grid.

## Displaying a Quote Board Window

---

Quote Grid Windows displays quote information in columns from left to right. Each column displays the symbol's Open, High, Low, Net Change and Last for each symbol entered. A Quote Board Window uses the Format Columns format. 



SYMB	dTLM'US	dXOM'US	dCOP'US	dCVX'US	dTOT'US
OPEN	16.60	59.80	63.30	60.35	62.40
HIGH	16.63	60.68	63.97	60.98	62.46
LOW	16.35	59.80	62.96	60.35	62.01
LAST	16.54↓	60.66	63.82	60.90↑	62.38
NET	0.15	1.01	1.07	0.80	0.54

## Using Icons

1. Left-Click the Quote icon. 
2. Left-Click Quote Board from the Drop-Down Menu.

## Using the Context Sensitive Menu

1. Right-Click a portion in the Aspen Graphics Workspace that does not currently contain an Aspen Window.
2. Select New Window...
3. Select Quote...
4. Left-Click Quote Board.

## Using the Main Menu

1. Left-Click File from the Main Menu.
2. Select New Window...
3. Select Quote...
4. Left-Click Quote Board.

---


## Entering Symbols

---

Adding symbols to an Aspen Quote Window works similarly to the methods used to add symbols to a chart. The exception is that a .Symbol field must be selected and the Quote Window must not be in Modify Layout mode.

SYMB	OPEN	LAST	NET	TREND
MMM	80.87	80.60b	0.50	=====>↓
AA	33.10	33.60a	0.75	==↓==>↓↑
MO	73.50	77.55	4.22	=↓=====
AXP	52.55	51.77b	0.26	↓=====↓=
AIG	59.34	58.57b	0.22	=====>↓=↑
T	27.60	27.65a	0.05	↑=====↓
BA	77.54	80.06a	-0.11	=====>↓↓↑
c	73.50	73.89a	0.77	=↑=↑=↓↑

## Using Icons

1. Left-Click the Edit Symbols icon. 
2. Type the symbol.
3. Press the <Enter> key on the keyboard to add the symbol and automatically move to the next row or column.


## Using the Context Sensitive Menu

1. Right-Click a quote window.
2. Left-Click Edit Symbols.
3. Type the symbol.
4. Press the <Enter> key on the keyboard to add the symbol and automatically move to the next row or column.


## Using the Main Menu

1. Left-Click Quote in the Main Menu.
2. Left-Click Edit Symbols in the Quote Window.
3. Type the symbol.
4. Press the <Enter> key on the keyboard to add the symbol and automatically move to the next row or column.

## Using the Mouse

- If the format is Format Columns: 
  1. Left-Click a row under a Symbol column to select the row to edit.
  2. Type the symbol.
  3. Press the <Enter> key on the keyboard to add the symbol and automatically move to the next row.



- If the format is Format Rows: 
  1. Left-Click a column beside a Symbol row to select the column to edit.
  2. Type the symbol.
  3. Press the <Enter> key on the keyboard to add the symbol and automatically move to the next column.

---

## Creating a Free Format Quote Window

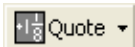
---

Aspen Free Format Quote Windows offer the most control of the Quote Window types. Aspen Fee Format offers greater flexibility in the arrangement of data and offers fields that are not available in Quote Grid or Quote Board Windows.

Free Form Quote Windows are initially displayed in Modify Mode. Cells in a Free Format Quote Window are represented by a grid. Left-Click a square in the grid to select a cell to select it.



## Using Icons

1. Left-Click the Quote icon. 
2. Left-Click Free Format Quote from the Drop-Down Menu.

## Using the Context Sensitive Menu

1. Right-Click a portion in the Aspen Graphics Workspace that does not currently contain an Aspen Window.
2. Select New Window...
3. Select Quote...
4. Left-Click Free Format Quote.

## Using the Main Menu

1. Left-Click File from the Main Menu.
2. Select New Window...
3. Select Quote...
4. Left-Click Free Format Quote.

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## The Quote Code Dialog

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The Quote Code Dialog contains the quote codes that are appended to a symbol place holder. The Quote Code Dialog features a Windows Explorer like Pane and Description Panel. The Quote Code Dialog may include codes that are vendor specific.

## Displaying the Quote Code Dialog

---

The Quote Code Dialog automatically displays when creating a Free Form Quote Window. The methods below can be used to display the Quote Code Dialog when modifying an existing Free Form Quote Window. Quote Grid and Quote Board Windows cannot be modified.

### Using Icons

1. Left-Click the Modify Layout icon. 
2. Left-Click the Quote Codes icon. 

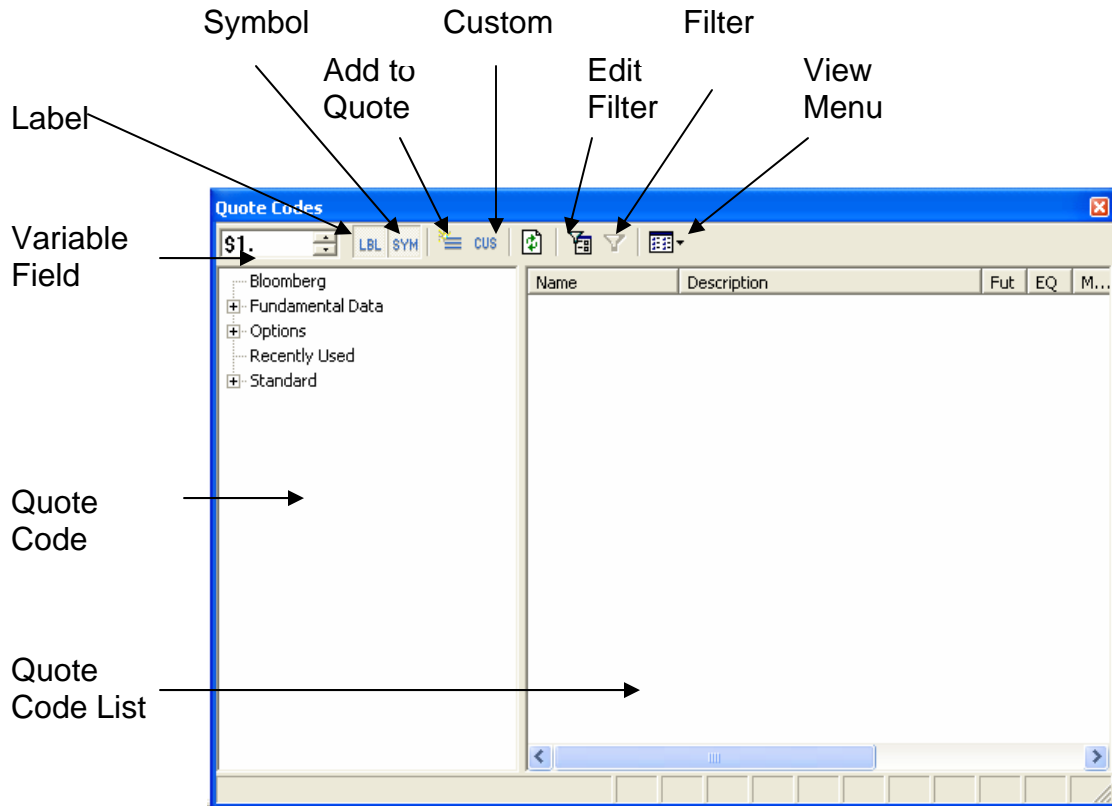
### Using the Context Sensitive Menu

1. Right-Click the Free Form Quote Window.
2. Left-Click Modify Layout.
3. Right-Click the Free Form Quote Window.
4. Left-Click Quote Code List...

### Using the Main Menu

1. Left-Click Quote in the Main Menu.
2. Left-Click Modify Layout in the Quote Menu.
3. Left-Click Quote in the Main Menu.
4. Select Modify Layout in the Quote Menu.
5. Left-Click Quote Code List... in the new menu.


## Using the Quote Code Dialog



- Quote Code List – Displays the Quote Codes associated with a selected category in the Quote Code Explorer.
- Quote Code Explorer – Displays a list of Quote Code Categories. Categories may be data vendor specific.
- Variable Field – Increments or decrements the variable place holder for symbols.
- Label – Toggles adding a label when adding a quote code.
- Symbol – Toggles adding a symbol when adding a quote code.
- Custom – Adds a custom label or formula.
- Edit Filter – Enables a field for filtering quote codes in the Quote Code Explorer using text.
- Filter – Enables or disables filtering of the items in the Quote Code Explorer.

## Using Icons

1. Left-Click a Cell on the Free Form Quote Window to select the cell.
2. Left-Click a Category in the Quote Code Explorer to display a list of Quote Codes.

3. Left-Click a Quote Code in the Quote Code List Panel to select a code.
4. Left-Click the Add to Quote icon. 

## Using the Context Sensitive Menu

1. Left-Click a Cell on the Free Form Quote Window to select the cell.
2. Left-Click a Category in the Quote Code Explorer Panel.
3. Right-Click a Quote Code from the Quote List Panel.
4. Left-Click Add Symbol or Add Label & Symbol

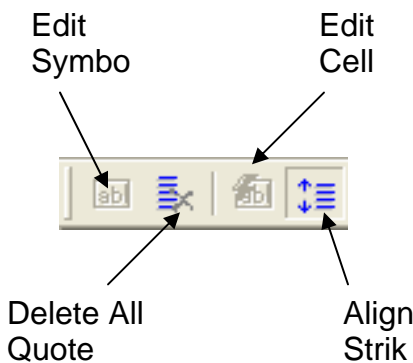
## Using Point and Click

1. Left-Click a Cell on the Free Form Quote Window to select the cell.
2. Left-Click a Category in the Quote Code Explorer Panel.
3. Double Left-Click the appropriate Study in the Study List to add it.

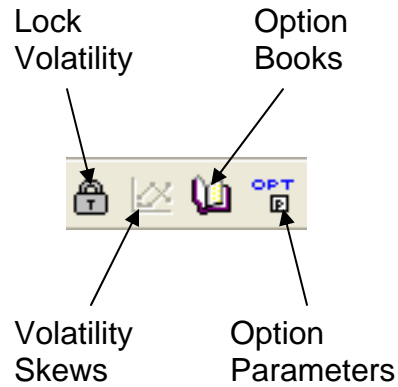
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## The Quote Window Toolbar

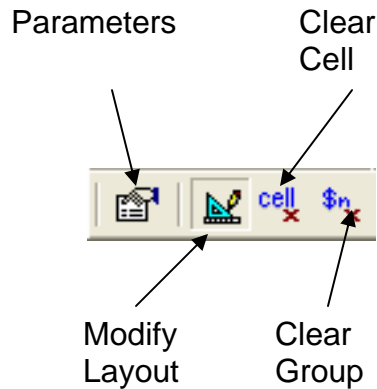
---



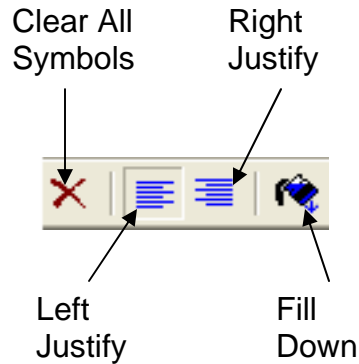
- Edit Symbols – Opens the first cell in the page for symbol editing. Available outside of Modify Layout mode.
- Delete All Quote Codes – Removes all the Quote Codes on the window. Available in Modify Layout mode.
- Edit Cells – Selects and opens the first cell for editing. Available outside of Modify Layout Mode.
- Align Strikes – Centers Option Strike prices At the Money. Available outside of Modify Layout Mode.



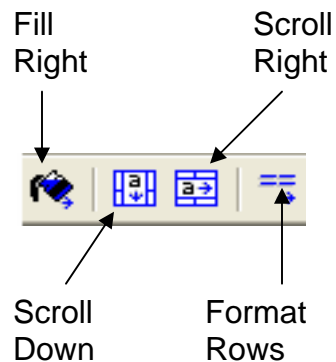
- Lock Volatility –
- Volatility Skews–
- Options Books – Opens the Options Books Dialogs. Available in all Quote modes.
- Option Parameters – Opens the Options Parameters Dialog. Available in all Quote modes.



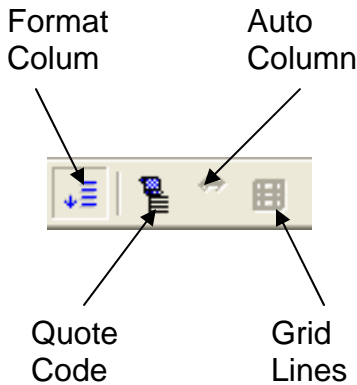
- Parameters – Opens the Parameters Dialog. Available in all Quote modes.
- Modify Layout – Toggles Modify Layout mode. Available only for Free Form Quote Windows.
- Clear Cell – Deletes the cell contents. Available only in Modify Layout mode.
- Clear Group– Deletes a related set of cell contents. Available only in Modify Layout mode.



- Clear All Symbols – Removes all symbols from the window. Available outside of Modify Layout mode.
- Right Justify – Aligns codes to the left. Available in Modify Layout mode.
- Left Justify – Aligns codes to the right. Available in Modify Layout mode.
- Fill Down – Creates new rows below the lowest numerically valued variable. Available in Modify Layout mode.



- Fill Right – Creates new columns to the right of the lowest numerically valued variable. Available in Modify Layout mode.
- Scroll Down – Creates a ticker like vertical scrolling action. Available in Modify Layout mode.
- Scroll Right – Creates a ticker like horizontal scrolling action. Available in Modify Layout mode.
- Format Rows – Newly added Quote Codes will be added from top to bottom. Available in Modify Layout mode.



- Format Columns – Newly added Quote Codes will be added from left to right. Available in Modify Layout mode.
- Quote Code List – Toggles displaying the Quote Codes Dialog. Available only in Modify Layout mode.
- Auto Column Width – Automatically formats column widths. Available in Quote Grid and Quote Board Windows.
- Grid Lines – Displays a grid outlining row and column borders. Available in Quote Grid and Quote Board Windows.

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## Adding Formulas or Text to a Quote Window


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Free Format Quote Windows are not limited to the quote codes found in the Quote Code Dialog. User defined text and formulas may also be displayed in a cell. Custom text based headers must be wrapped in quotation marks. Formulas must be wrapped in a chart() function. More information concerning the chart() function can be found in the chapter on Formulas. Text and Formulas are entered into a cell using the Cell Insert Window.

The screenshot shows a window titled "Quote1" with a formula bar containing the formula: `CELL = chart(rsi($2, 14)[-1],1,2,100,1,1)`. Below the formula bar is a table with columns for stock symbols, prices, and RSI values. The RSI column has a red box around the text "chart(rs".

				RSI
<b>CN6</b>	242	245 <sup>1</sup> <sub>4</sub> ↓	5 <sup>3</sup> <sub>4</sub>	56.659
\$2.SYMB	\$2.OPEN	\$2.LAST	\$2.NET	chart(rs
\$3.SYMB	\$3.OPEN	\$3.LAST	\$3.NET	chart(rsi(\$
\$4.SYMB	\$4.OPEN	\$4.LAST	\$4.NET	chart(rsi(\$
\$5.SYMB	\$5.OPEN	\$5.LAST	\$5.NET	chart(rsi(\$
\$6.SYMB	\$6.OPEN	\$6.LAST	\$6.NET	chart(rsi(\$
\$7.SYMB	\$7.OPEN	\$7.LAST	\$7.NET	chart(rsi(\$
\$8.SYMB	\$8.OPEN	\$8.LAST	\$8.NET	chart(rsi(\$
\$9.SYMB	\$9.OPEN	\$9.LAST	\$9.NET	chart(rsi(\$

## Using Icons

1. Enter Modify Layout mode.
2. Left-Click the cell in which the field should appear.
3. Left-Click the Custom icon. 
4. Enter the custom text header or formula.
5. Press the <enter> key on the keyboard.
6. Exit Modify Layout mode.

## Using the Keyboard

1. Enter Modify Layout mode.
2. Left-Click the cell in which the field should appear.
3. Press the <enter> key on the keyboard.
4. Enter the custom text header or formula.
5. Press <enter> on the keyboard.
6. Exit Modify Layout mode.

---

## Fill Down and Fill Right

The Fill Down and Fill Right commands populate the remaining portions of a Free Form Quote window. By default these commands begin the process with the lowest valued variable and fill the page down or to the right. A Fill Down or Fill Right duplicates an row or column (typically the \$1 variable) until the window is full.

These commands only fill the window according to its dimensions. Resizing a window will not automatically fill the rows or columns. The layout created using the Fill Down or Fill Right commands will be preserved. Likewise, Fill Down and Fill Right commands will duplicate information until the entire window is full. For windows using the Format




Columns format, if there is enough space, all of the columns will be duplicated to the right of the original row. Fill Right has similar behavior, but with rows. Therefore, the dimensions of a window are important when applying a Fill Down or Fill Right command. In the window below, the rows from \$12 thru \$22 are continued to the right of the intended layouts dimensions.


SYMB	OPEN	CLOSE	NET	LAST						
\$1.SYMB	\$1.OPEN	\$1.CLOSE	\$1.NET	\$1.LAST	\$12.SYMB	\$12.OPEN	\$12.CLOS	\$12.NET	\$12.LAST	
\$2.SYMB	\$2.OPEN	\$2.CLOSE	\$2.NET	\$2.LAST	\$13.SYMB	\$13.OPEN	\$13.CLOS	\$13.NET	\$13.LAST	
\$3.SYMB	\$3.OPEN	\$3.CLOSE	\$3.NET	\$3.LAST	\$14.SYMB	\$14.OPEN	\$14.CLOS	\$14.NET	\$14.LAST	
\$4.SYMB	\$4.OPEN	\$4.CLOSE	\$4.NET	\$4.LAST	\$15.SYMB	\$15.OPEN	\$15.CLOS	\$15.NET	\$15.LAST	
\$5.SYMB	\$5.OPEN	\$5.CLOSE	\$5.NET	\$5.LAST	\$16.SYMB	\$16.OPEN	\$16.CLOS	\$16.NET	\$16.LAST	
\$6.SYMB	\$6.OPEN	\$6.CLOSE	\$6.NET	\$6.LAST	\$17.SYMB	\$17.OPEN	\$17.CLOS	\$17.NET	\$17.LAST	
\$7.SYMB	\$7.OPEN	\$7.CLOSE	\$7.NET	\$7.LAST	\$18.SYMB	\$18.OPEN	\$18.CLOS	\$18.NET	\$18.LAST	
\$8.SYMB	\$8.OPEN	\$8.CLOSE	\$8.NET	\$8.LAST	\$19.SYMB	\$19.OPEN	\$19.CLOS	\$19.NET	\$19.LAST	
\$9.SYMB	\$9.OPEN	\$9.CLOSE	\$9.NET	\$9.LAST	\$20.SYMB	\$20.OPEN	\$20.CLOS	\$20.NET	\$20.LAST	
\$10.SYMB	\$10.OPEN	\$10.CLOS	\$10.NET	\$10.LAST	\$21.SYMB	\$21.OPEN	\$21.CLOS	\$21.NET	\$21.LAST	
\$11.SYMB	\$11.OPEN	\$11.CLOS	\$11.NET	\$11.LAST	\$22.SYMB	\$22.OPEN	\$22.CLOS	\$22.NET	\$22.LAST	

Fill Down and Fill Right commands can be repeated. Each subsequent command overwrites previous layouts. Sizing of windows and display issues are easily remedied using these commands. Simply reissue the Fill Down or Fill Right command after resizing a window to correct these issues. The window below shows the bad Fill Down from above after resizing the window and repeating the Fill Down.

SYMB	OPEN	CLOSE	NET	LAST
\$1.SYMB	\$1.OPEN	\$1.CLOSE	\$1.NET	\$1.LAST
\$2.SYMB	\$2.OPEN	\$2.CLOSE	\$2.NET	\$2.LAST
\$3.SYMB	\$3.OPEN	\$3.CLOSE	\$3.NET	\$3.LAST
\$4.SYMB	\$4.OPEN	\$4.CLOSE	\$4.NET	\$4.LAST
\$5.SYMB	\$5.OPEN	\$5.CLOSE	\$5.NET	\$5.LAST
\$6.SYMB	\$6.OPEN	\$6.CLOSE	\$6.NET	\$6.LAST
\$7.SYMB	\$7.OPEN	\$7.CLOSE	\$7.NET	\$7.LAST
\$8.SYMB	\$8.OPEN	\$8.CLOSE	\$8.NET	\$8.LAST
\$9.SYMB	\$9.OPEN	\$9.CLOSE	\$9.NET	\$9.LAST
\$10.SYMB	\$10.OPEN	\$10.CLOS	\$10.NET	\$10.LAST
\$11.SYMB	\$11.OPEN	\$11.CLOS	\$11.NET	\$11.LAST
\$12.SYMB	\$12.OPEN	\$12.CLOS	\$12.NET	\$12.LAST

 Simply resizing a window with too many quote code codes can affect the performance of Aspen. This is especially true when using Futures or Options macros. Instruments may be hidden from view due to the resize. Despite this, Aspen still downloads all the information for the instruments. To prevent this behavior, Resize the window and repeat the Fill Down or Fill Right command.

## Fill Down – Using Icons

1. Create a Free Form Quote Window.
2. Enter Modify Layout mode.
3. Populate a Free Form Quote Window row with the appropriate Quote Codes.
4. Left-Click the Fill Down Icon. 
5. Exit Modify Layout mode.

## Fill Down – Using the Context Sensitive Menu

1. Create a Free Form Quote Window.
2. Enter Modify Layout mode.
3. Populate a Free Form Quote Window row with the appropriate Quote Codes.
4. Right-Click the Quote Window
5. Left-Click Fill Down in the menu.
6. Exit Modify layout mode.


## Fill Down – Using the Main Menu

1. Create a Free Form Quote Window.
2. Enter Modify Layout mode.
3. Populate a Free Form Quote Window row with the appropriate Quote Codes.
4. Left-Click Quote in the Main Menu.
5. Select Modify Layout in the Quote Menu.
6. Left-Click Fill Down in the new menu.
7. Exit Modify mode.

## Fill Down – Using Dot Commands

1. Create a Free Form Quote Window.
2. Enter Modify Layout mode.
3. Populate a Free Form Quote Window row with the appropriate Quote Codes.
4. Type `.filldn`
5. Press the <Enter> key.
6. Exit Modify mode.

## Fill Right – Using Icons

1. Create a Free Form Quote Window.
2. Populate a Free Form Quote Window column with the appropriate Quote Codes.
3. Enter Modify Layout Mode.
4. Left-Click the Fill Right icon. 
5. Exit Modify layout mode.

## Fill Right – Using the Context Sensitive Menu

1. Create a Free Form Quote Window.
2. Enter Modify Layout Mode.

3. Populate a Free Form Quote Window Column with the appropriate Quote Codes.
4. Right-Click the Quote Window.
5. Left-Click Fill Right.
6. Exit Modify Mode.

## Fill Right – Using the Main Menu

1. Create a Free Form Quote Window.
2. Enter Modify Layout Mode.
3. Populate a Free Form Quote Window column with the appropriate Quote Codes.
4. Left-Click Quote in the Main Menu.
5. Select Modify Layout in the Quote Menu.
6. Left-Click Fill Right.
7. Exit Modify Mode.

## Fill Right – Using Dot Commands.

1. Create a Free Form Quote Window.
2. Enter Modify Layout Mode.
3. Populate a Free Form Quote Window column with the appropriate Quote Codes.
4. Type `.fillrt`
5. Press the <Enter> key.
6. Exit Modify Mode.

## Filling a Specified Range

---

Many common formats require Fill Down and Fill Right to specify a range of values. Filling a specified range is useful for breaking up information and arranging it logically. The following window illustrates filling a specified range when displaying NYSE issues and NASDAQ issues. Notice how the numerical sequence between variables is broken between text labels and column headers. If a regular Fill Down were used, all of the text labels and symbol headers appearing after the \$1 variable would be replaced with variables.

				NASDAQ Gainers			
SYMB	OPEN	CLOSE	NET	SYMB	OPEN	CLOSE	NET
\$1.SYMB	\$1.OPEN	\$1.CLOSE	\$1.NET	\$11.SYMB	\$11.OPEN	\$11.CLOS	\$11.NET
\$2.SYMB	\$2.OPEN	\$2.CLOSE	\$2.NET				
\$3.SYMB	\$3.OPEN	\$3.CLOSE	\$3.NET				
\$4.SYMB	\$4.OPEN	\$4.CLOSE	\$4.NET				
\$5.SYMB	\$5.OPEN	\$5.CLOSE	\$5.NET				
				NYSE Losers			
SYMB	OPEN	CLOSE	NET				
\$6.SYMB	\$6.OPEN	\$6.CLOSE	\$6.NET				
\$7.SYMB	\$7.OPEN	\$7.CLOSE	\$7.NET				
\$8.SYMB	\$8.OPEN	\$8.CLOSE	\$8.NET				
\$9.SYMB	\$9.OPEN	\$9.CLOSE	\$9.NET				
\$10.SYMB	\$10.OPEN	\$10.CLOS	\$10.NET				

This layout was created by specifying starting and ending variable values when executing the Fill Down command. The portion dedicated to the NYSE Gainers was filled using the `.filldn 1 5` command. For the remaining sections the Quote codes were created normally. However, the new Quote Codes begin with the variable \$1 by default. These values were edited by Left-Clicking the cell and replacing each \$1 with \$6 for the new section. Then the `.filldn` command was called specifying variables 6 and 10. The sequence is similar to continue the Nasdaq Gainers and Losers.

## Using a Dot Command – Fill Down

1. Create a Free Form Quote Window.
2. Enter Modify Layout Mode.
3. Populate a Free Form Quote Window row with the appropriate quote codes.
4. Type the following command. Where n represents the starting number and m represents the ending number.  

```
.filldn n m
```
5. Press the <Enter> key on the keyboard.
6. Exit Modify Layout mode.

## Using a Dot Command – Fill Right

1. Create a Free Form Quote Window.
2. Enter Modify Layout Mode.
3. Populate a Free Form Quote Window column with the appropriate quote codes.
4. Type the following command. Where n represents the starting number and m represents the ending number.  

```
.fillrt n m
```

---

## Quote Code Definitions

---

Code	Description
.Ask	The most recent Ask.
.Ask2 - .Ask7	Ask2 is the second most recent Ask. Ask7 is the seventh most recent Ask.
.Asksize	The volume size of the most recent Ask.
.Asksize2 - .Asksize7	Asksize2 is the volume of the second most recent Ask. Asksize7 is the volume of the seventh most recent Ask.
.Asktime	The time of the Ask.
.Asktime2 - .Asktime7	Asktime2 is the time of the second most recent Ask. Asktime7 is the time of the seventh most recent Ask.
.Askx	The source of the Ask.
.Askx2 - .Askx7	Askx2 is the source of the second most recent Ask. Askx7 is the source of the seventh most recent Ask.
.Bask	Best Ask of the day.
.Basksize	Volume of the Best Ask.
.Basktime	Time of the Best Ask.
.Baskx	Source of the Best Ask.
.Bate	Bid, Ask, Trade, Exception. A single letter identifier. <ul style="list-style-type: none"> <li>○ B = bid</li> <li>○ R = recent</li> <li>○ S = settle</li> <li>○ L = last</li> <li>○ Mm = midpoint</li> <li>○ P = prev</li> <li>○ O = open</li> <li>○ H = high</li> <li>○ C = close</li> </ul>
.Bbid	Best Bid of the day.
.Bbidsize	Volume of the Best Bid.
.Bbidtime	Time of the Best Bid.
.Bbidx	Source of the Best Bid.
.Bid	The most recent Bid.
.Bid2 - .Bid7	Bid is the second most recent Bid. Bid7 is the seventh most recent Bid.
.Bidsize	Volume of the most recent Bid.
.Bidsize2 - .Bidsize7	Bidsize2 is the volume of the second most recent Bid. Bidsize7 is the seventh most recent Bid.
.Bidx	Source of the most recent Bid.

.Bidx2 - .Bidx7	Bidx2 is the source of the second most recent Bid. Bidx7 is the source of the seventh most recent Bid.
.Change	The trend of the most recent trade.
.Close	The closing price of the day.
.Close1 - .Close2	Close1 is the close of the previous day. Close2 is the close of the second previous day.
.Clr1 - .Clr2	Clr1 is the initial closing range. Clr2 is the initial closing range of the previous day.
.Cltime	Time of the closing price.
.Cltime1- .Cltime4	Cltime1 is the closing time of the previous day. Cltime4 is the closing time of the fourth previous day.
.Cond	Trade condition.
.Currency	Type of currency the instrument trades in.
.Desc	A description of the symbol as sent down by the data feed.
.Dollars	Currency value for one full point.
.Dvol	Number of down tics or stock volume on down trades.
.Exch	The exchange on which the instrument trades.
.Exdesc	The full name of the exchange.
.Expire	Contract expiration date.
.High	The high price of the day.
.Last	The price of the last trade.
.Last1 - .Last8	Last1 is the price of the previous trade. Last8 is the price of the eight previous trade.
.Lastx	Source of the last price.
.Low	The low price of the day.
.Net	The net change value for the day.
.OI	Open Interest.
.Open	The opening price of the day.
.Open1 and .Open2	Open1 is the opening price of the previous day. Open2 is the adjusted opening price (if any).
.Opr1 and .Opr2	Opr1 is the initial opening range. Opr2 is the secondary opening range.
.Optime	The time of the opening.
.Optime1 - .Optime4	Optime1 is the time of the previous opening. Optime4 is the time of the fourth previous opening.
.Prev	The previous day's settle price.
.Recent	The most recent trade.

.Sbase	Instrument symbol Base or Root.
.Sext	Instrument symbol Extension.
.Strike	Option strike price.
.Symb	The instrument you are quoting on the quote page.
.TicVol	Volume of the last tic.
.TicVol1 -.TicVol8	TicVol1 is the volume of the previous tic. TicVol8 is the volume of the eighth most previous tic.
.Time	Time of the last trade.
.Time1 - .Time8	Time1 is the time of the previous trade. Time8 is the time of the eight most previous trade.
.Trade	Value of the last trade.
.TradeSize	Volume of the last trade.
.Tradetime	Time of the last trade.
.Tradex	Source of the last trade.
.Trend	Trend of the last trade.
.Tvol	Total volume of the instrument today.
.Type	Instrument type.
.Tzone	Time zone in which the instrument trades.
.Units	Trading units of the instrument.
.Uvol	Number of upticks or stock volume on up trades.
.Volume	Number of tics or shares of stock traded during the period.
.XMonth	The month the contract expires.

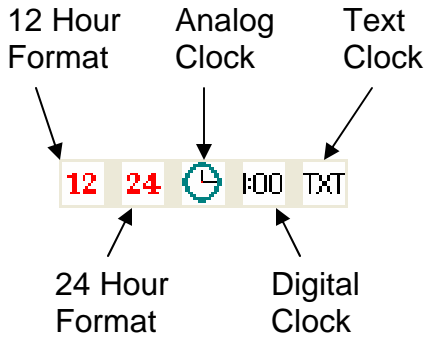
## Clocks

Aspen offers sever clock features. Clocks in Aspen are treated as any other Aspen Window and can be displayed in Analog, Digital and Text modes.

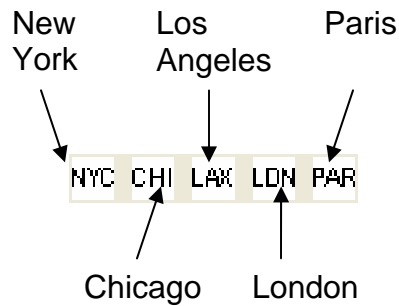
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### Clock Toolbar

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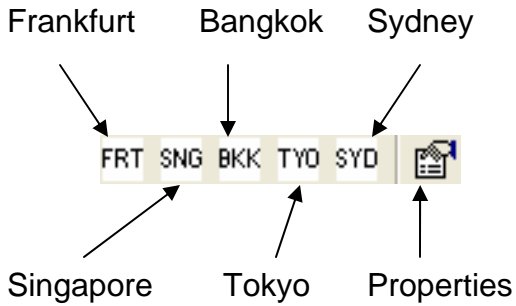


- 12 Hour Format – Modifies the selected clock to display in a 12 hour format.
- 24 Hour Format – Modifies the selected clock to display in a 24 hour format.
- Analog Clock – Modifies the selected to clock to display as an analog clock with hands.
- Digital Clock – Modifies the selected clock to display as a digital clock.
- Text Clock – Modifies the selected clock to display using the default font.



- New York – Sets the selected clock’s time zone to New York time.
- Chicago – Sets the selected clock’s time zone to Chicago time.
- Los Angeles – Sets the selected clock’s time zone to Los Angeles time.
- London – Sets the selected clock’s time zone to London time.
- Paris - Sets the selected clock’s time zone to Paris time.



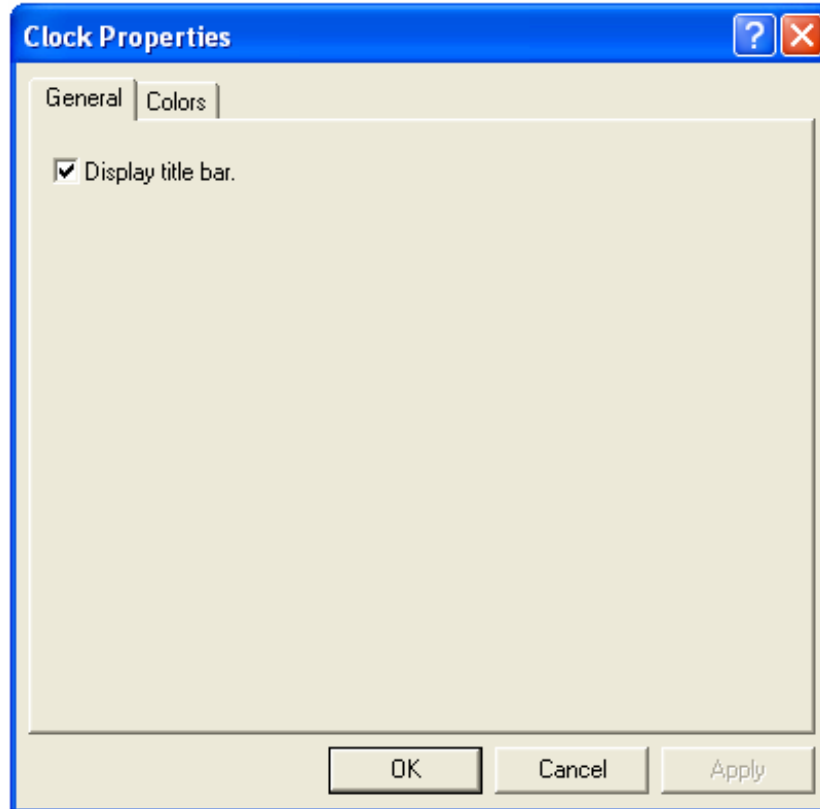


- Frankfurt – Sets the selected clock’s time zone to Frankfurt time.
- Singapore – Sets the selected clock’s time zone to Singapore time.
- Bangkok – Sets the selected clock’s time zone to Bangkok time.
- Tokyo – Sets the selected clock’s time zone to Tokyo time.
- Sydney – Sets the selected clock’s time zone to Sydney time.
- Properties – Displays the Clock Properties dialog.

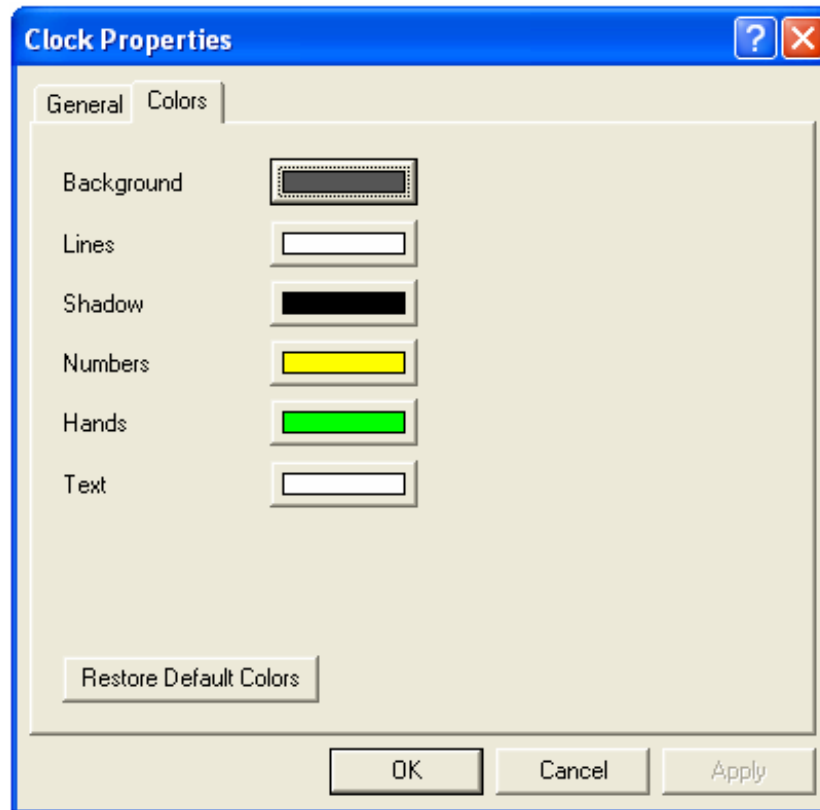
---

## Clock Properties Dialog

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- Display title bar – toggles the display of title bars for the selected clock.



- Background – Displays the Color Picker for changing the Background color.
- Lines – Displays the Color Picker for changing the line color.
- Shadow – Displays the Color Picker for changing the color of the Shadow.
- Numbers – Displays the Color Picker for changing the color of the numbers for Analog clocks.
- Hands – Displays the Color Picker for changing the color of the clock hands for Analog clocks.
- Text – Displays the Color Picker for changing the text floor for digital and text clocks.

---

## Changing the Time Zone

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### Using Icons

1. Left-Click the Clock Window to select it.
2. Left-Click the appropriate Time Zone icon in the Clock Toolbar.

## Using the Context Sensitive Menu

1. Right-Click the Clock Window.
2. Select the Time Zone from the new menu.

## Using Dot Commands

1. Left-Click the Clock Window to select it.
2. Type z and the Time Zone Code. (example: z32)
3. Press Enter.

---

## Time Zone Codes

---

Code	Time Zone	Code	Time Zone
1	Honolulu, Anchorage	21	Hong Kong
2	Yakutat Bay, Alaska	22	Tokyo
3	Los Angeles	23	Darwin, Australia
4	Denver	24	Sydney
5	Chicago	25	New Caledonia
6	New York	26	Wellington, New Zealand
7	Caracas	27	Samoa
8	Rio De Janeiro	28	PST/PDT
9	Eastern Brazil	29	MST/MDT
10	Reykjavik	30	CST/CDT
11	London	31	EST/EDT
12	Paris	32	AST/ADT
13	Spitzbergen	33	GMT/BST
14	Moscow	34	Europe
15	Tehran	35	Western Australia
16	Baghdad	36	Central Australia
17	Dubai	37	Sydney, Australia
18	Bombay	38	Paris

19  
20

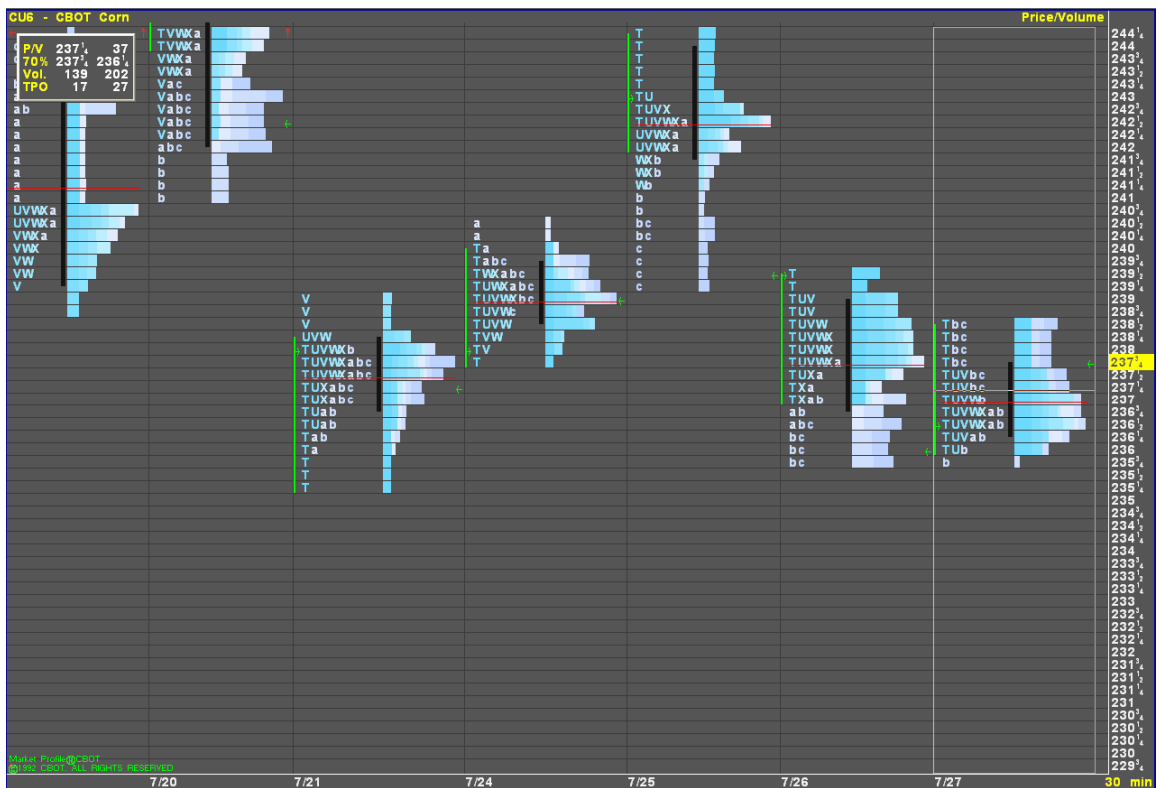
Calcutta  
Bangkok

39  
40

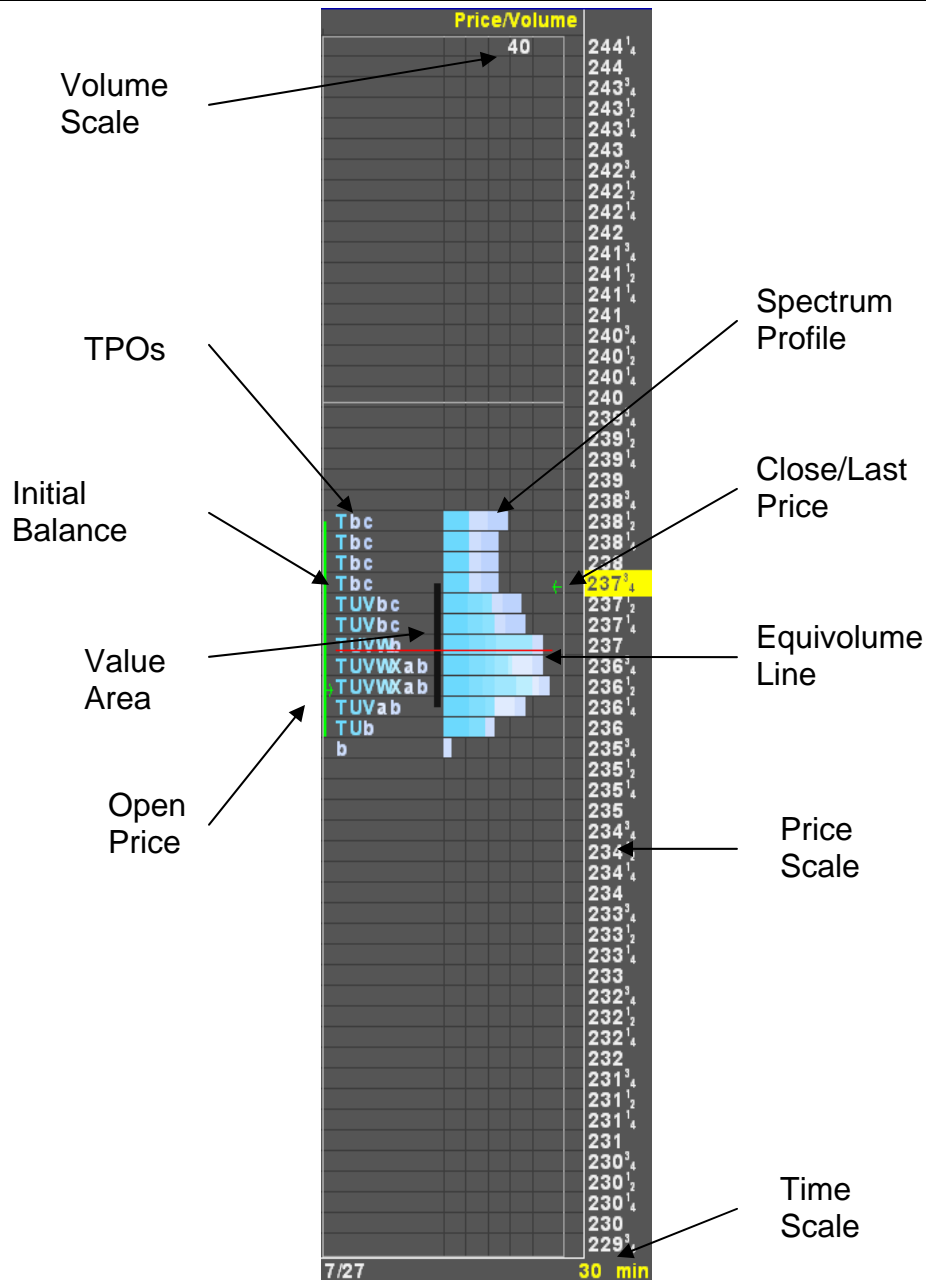
Amsterdam  
Customer Defined

# Price/Volume

Price/Volume is Aspen's implementation of Market Profile. Price/Volume requires a subscription. This fee is charged by the CBOT for use of Market Profile. Market Profile + includes volume bars as well as TPOs. Please contact your Aspen Sales representative for information regarding Market Profile subscription fees.



# Market Profile Anatomy



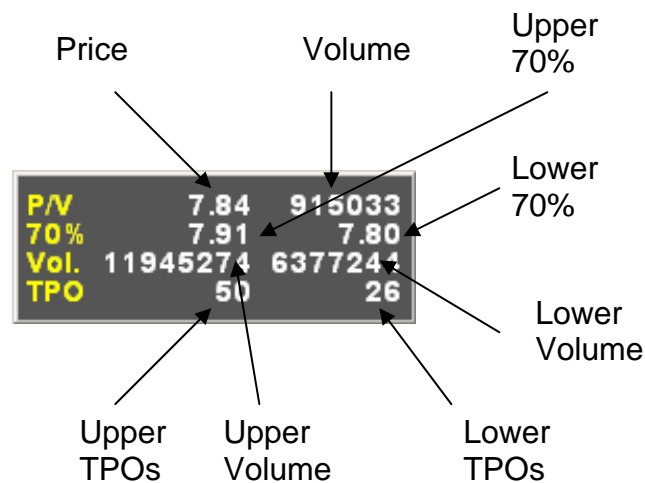
- Close/Last Price – This green arrow indicates the close or last price.
- Equivolume Line – Represents the halfway point in the profile's volume.
- Initial Balance Range – Indicates the first two half-hour periods. The result of the pit exploring a range within which trade will take place. This is configurable in the Price/Volume Properties.
- Open Price – This green arrow indicates the daily open price.

- Price Scale – Indicates the trading values for the symbol.
- Spectrum Profile – Histogram indicating the percentage of ticks at each price within the trading range of the instrument. A horizontal bar is drawn at each price level. The total length of this bar reflects the total tick volume at a price.
- Value Area – Represents the prices at which approximately seventy percent of the volume of the completed day’s activity occurred.
- Volume Scale – Indicates the number of ticks relative to the nearest grid line.

---

## Price Volume Cursor

---



- Price – Indicates the price at the cursor’s location.
- Volume – Indicates the volume at the cursor’s location.
- Upper 70% - Indicates the upper limit 70% value area.
- Lower 70% - Indicates the lower limit 70% value area.
- Lower Volume – Indicates the tick volume below the cursor location.
- Upper Volume – Indicates the tick volume above the cursor location.
- Lower TPOs – Indicates the number of TPOs below the cursor location.
- Upper TPOs – Indicates the number of TPOs above the cursor location.

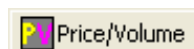
---

## Displaying a Market Profile

---

### Using Icons

1. Left-Click the Time and Sales icon.



2. Left-Click the Market Profile window and enter the symbol.

## Using the Context Sensitive Menu

1. Right-Click in an empty Aspen workspace.
2. Left-Click Price/Volume in the new menu.
3. Left-Click the Market Profile window and enter the symbol.

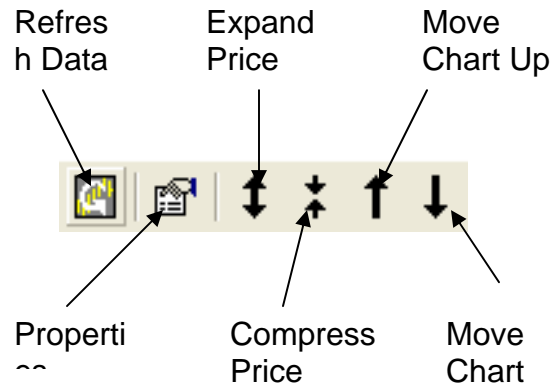
## Using the Main Menu

1. Left-Click File in the Main Menu.
2. Select New Window.
3. Left-Click Price/Volume in the new window.
4. Left-Click the Market Profile window and enter the symbol.

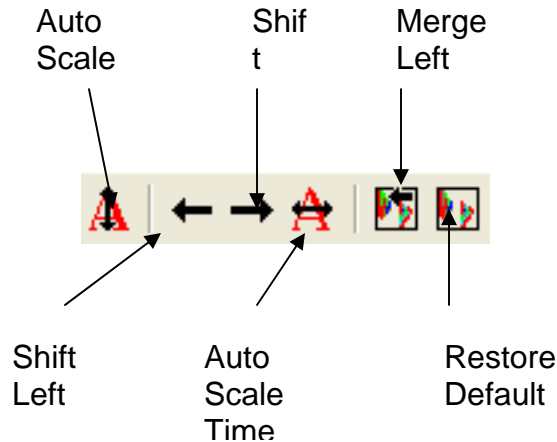
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## Market Profile Toolbar

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- Refresh Data – Refreshes historical data for sites running an Aspen server.
- Properties – Displays the Market Profile Properties dialog.
- Expand Price Scale – Increases the number of digits between prices.
- Compress Price Scale – Decreases the number of digits between prices.
- Move Chart Up – Moves the entire chart up.
- Move Chart Down – Moves the entire chart down.

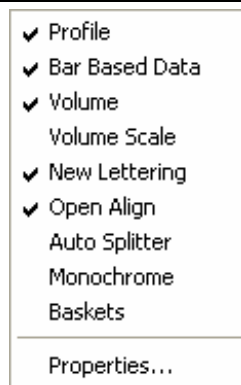


- Auto Scale Price – Returns the price scale to the default scaling.
- Shift Left – Moves the chart to the left.
- Shift Right – Moves the chart to the right.
- Auto Scale Time – Returns the time scale to the default scaling.
- Merge Left – Merges the selected Profile to the next profile to the left.
- Restore Default Splits – Removes any splits or merges and returns the profiles to the default view.

---

## The Market Profile Menu

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- Profile – Toggles the display of the Profile
- Bar Based Data –
- Volume – If checked, Spectrum Profile is displayed. The Spectrum Profile displays the tick volume at each price.
- Volume Scale – Toggles the display of the Volume Scale.
- New Lettering – Toggles between the New and Old CBOT TPO schemes.
- Open Align – Toggles between Open Market align and the default alignment on the half hour.

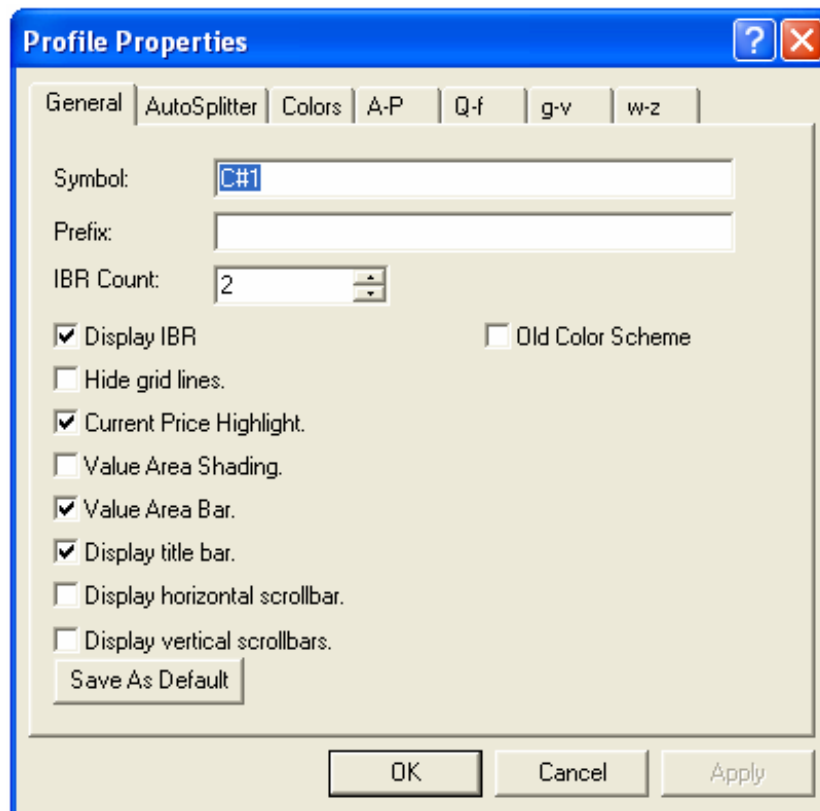


- Auto Splitter – Enables or disables the use of the Auto Split feature. The Auto Split feature may be configured in the Market Profile Properties dialog.
- Monochrome – Toggles between a multi-color and single color display.
- Baskets – Displays the Market Profile+ Basket menu.
- Properties... - Displays the Market Profile Properties dialog.

---

## Profile Properties Dialog

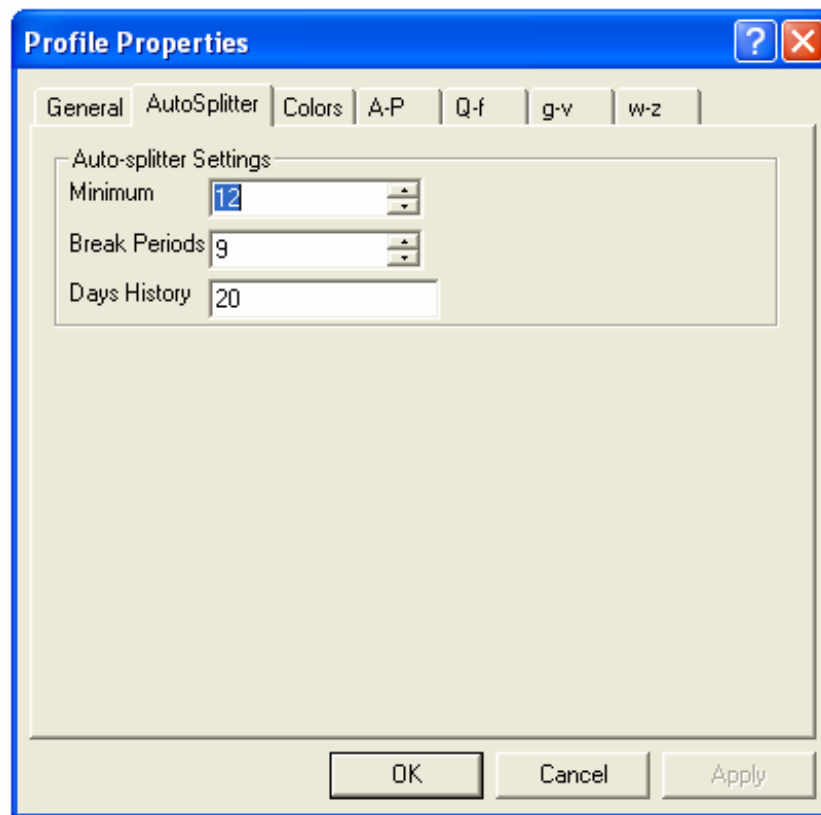
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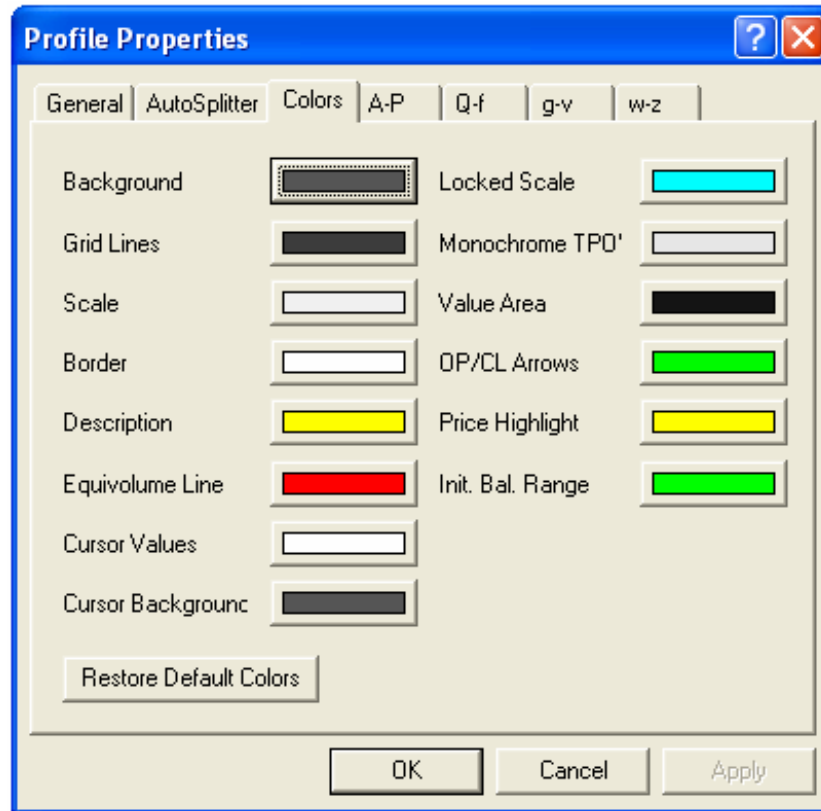
- Symbol – Contains the current symbol for the profile. The symbol may also be changed here.
- Prefix – Contains any feed specific country prefixes. Not applicable for all for all feeds.
- IBR Count – Initial Balance Range. The number of TPO's used to calculate the Initial Balance.
- Display IBR – Toggles the display of the line that indicates the Initial Balance.
- Hide Grid Lines – Toggles the display of the profile's grid lines.
- Current Price Highlight – Toggles the display of the Current Price Highlight.
- Value Area Shading – Toggles the display of Value Area Shading. Includes the

TPO's and Market Spectrum.

- Display Title Bar – Toggles the display of the Windows Title Bar.
- Display horizontal scrollbar – Toggles the display of the horizontal scrollbars.
- Display vertical scrollbars – Toggles the display of the vertical scrollbars.
- Save As Default - Sets the current options as the default display for each new chart created.
- Old Color Scheme – Toggles the TPO and Market Spectrum colors between the old and new color schemes.



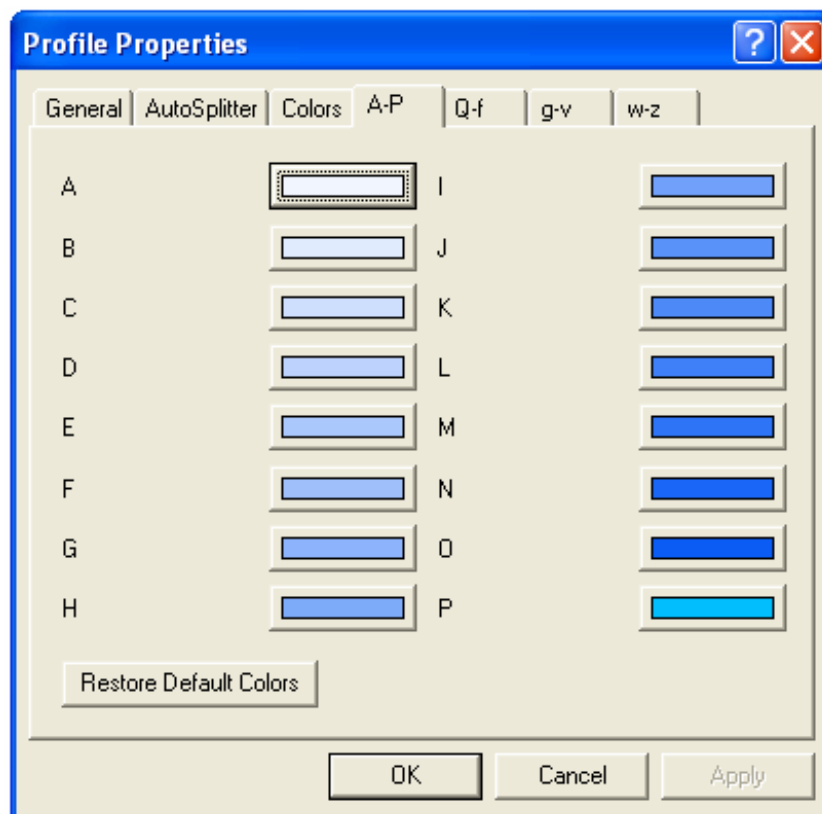
- Minimum – Specifies the minimum size (number of bars of some time unit) for each profile. Any profile formed will have at least this many bars. The Minimum parameter must be greater than zero.
- Break Periods - Specifies the number of periods back from the most recent bar to consider to determine if a new profile has formed, and the current profile is complete.
- Days History - The Minimum Increment value determines what is a valid price for the contract.



- Background – Displays the Color Picker for changing the Market Profile Background color.
- Grid Lines – Displays the Color Picker for changing the background Grid Lines for the Market Profile.
- Scale – Displays the Color Picker for changing the colors of the numerical and time scales.
- Border – Displays the Color Picker for changing the color of the borders.
- Description – Displays the Color Picker for changing the color of the symbol description.
- Equivolume Line – Displays the Color Picker for changing the color of the Equivolume Line.
- Cursor Values – Displays the Color Picker for changing the color of the values displayed in the Market Profile cursor window.
- Cursor Background – Displays the Color Picker for changing the color of the Market Profile cursor window.
- Locked Scale – Displays the Color Picker for changing the color of the numerical scales when the scales have been changed from their default values.
- Monochrome TPO's – Displays the Color Picker for changing the color when

displaying Monochrome (single color) TPO's.

- Value Area – Displays the Color Picker for changing the color of the Value Area shading.
- OP/CL Arrows – Displays the Color Picker for changing the color of the Open and Close price arrow indicators.
- Price Highlight – Displays the Color Picker for changing the color of the Current Price Highlight.
- Init. Bal. Range – Displays the Color Picker for changing the color of the Init. Bal. Range indicator.
- Restore Default Colors – Returns the color configurations to the system defaults.




- A-z – Selecting any lettered box will display the Color Picker for changing the color of the related TPO.
- Restore Default Colors – Returns the color configurations to the system defaults.

## Displaying the Market Profile Properties Dialog

---

### Using Icons

1. Left-Click a Market Profile window to select it.
2. Left-Click the Properties icon. 

### Using the Context Sensitive Menu

1. Right-Click a Market Profile window.
2. Left-Click Properties... in the new menu.

### Using the Main Menu

1. Left-Click a Market Profile window to select it.
2. Left-Click Price/Volume in the Main Menu.
3. Left-Click Properties...

---

## Merging Profiles

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Daily profiles can be Merged to create multi-day profiles. There is no limit to the number of merges that can be used to create a profile. This feature is useful when analyzing a market over several days in a single profile.

### Using Icons

1. Left-Click the profile that will be merged to select it.
2. Left-Click the Merge Left icon to merge the selected profile to the left.

### Using the Mouse


1. Left-Click a profile.
2. Hold the Left mouse button until a box appears.
3. Drag the mouse onto another profile.
4. Release the mouse button to merge the profiles.

---

## Removing Merged Profiles

---

### Using Icons

1. Left-Click a Merged profile to select it.
2. Left-Click the Restore default splits icon to return the profiles to their default state. 

---

## TPO's

---

Letters appearing on a profile are assigned to each half-hour period of trading time during the day. A profile is created as letters appear at the prices traded during each of the respective time periods. Each letter within the profile is referred to as a Time Price Opportunity, or TPO. As the day progresses the letters form a profile of the acceptance and rejection of prices by buyers and sellers. Aspen offers two TPO naming schemes.

## Old TPO Alphanumeric Assignments

---

Letter	Time	Color	Letter	Time	Color
A	09:00	Yellow	a	20:00	Yellow
B	09:30	Dark Blue	b	20:30	Dark Blue
C	10:00	Pink	c	21:00	Pink
D	10:30	Green	d	21:30	Green
E	11:00	Orange	e	22:00	Orange
F	11:30	Light Blue	f	22:30	Light Blue
G	12:00	Dark Purple	g	23:00	Dark Purple
H	12:30	White	h	23:30	White
I	13:00	Red	i	24:00	Red
J	13:30	Light Grey	j	24:30	Light Grey
K	14:00	Light Purple	k	01:00	Light Purple
L	14:30	Yellow	l	01:30	Yellow
M	15:00	Dark Blue	m	02:00	Dark Blue
N	15:30	Pink	n	02:30	Pink
O	16:00	Green	o	03:00	Green
P	16:30	Orange	p	03:30	Orange
Q	17:00	Light Blue	q	04:00	Light Blue
R	17:30	Purple	r	04:30	Dark Purple
S	N/A	N/A	s	05:00	White
T	N/A	N/A	t	05:30	Red
U	N/A	N/A	u	06:00	Light Grey
V	N/A	N/A	v	06:30	Light Purple
W	18:00	White	w	07:00	Yellow
X	18:30	Red	x	07:30	Dark Blue
Y	19:00	Light Grey	y	08:00	Pink
Z	19:30	Purple	z	08:30	Green

## New TPO Alphanumeric Assignments

---

Letter	Time	Color	Letter	Time	Color
A	01:00	Yellow	a	13:00	Pink
B	01:30	Dark Blue	b	13:30	Green
C	02:00	Pink	c	14:00	Orange

D	02:30	Green	d	14:30	Light Blue
E	03:00	Orange	e	15:00	Dark Purple
F	03:30	Light Blue	f	15:30	White
G	04:00	Dark Purple	g	16:00	Red
H	04:30	White	h	16:30	Light Grey
I	05:00	Red	i	17:00	Light Purple
J	05:30	Light Grey	j	17:30	Yellow
K	06:00	Light Purple	k	18:00	Dark Blue
L	06:30	Yellow	l	18:30	Pink
M	07:00	Dark Blue	m	19:00	Green
N	07:30	Pink	n	19:30	Orange
O	08:00	Green	o	20:00	Light Blue
P	08:30	Orange	p	20:30	Dark Purple
Q	09:00	Light Blue	q	21:00	White
R	09:30	Dark Purple	r	21:30	Red
S	10:00	White	s	22:00	Light Grey
T	10:30	Red	t	22:30	Light Purple
U	11:00	Light Grey	u	23:00	Yellow
V	11:30	Light Purple	v	23:30	Dark Blue
W	12:00	Yellow	w	24:00	Pink
X	12:30	Dark Blue	x	24:30	Green

## News


Aspen News windows offer real time breaking news stories. Aspen News windows are searchable and incoming stories may be filtered to display items relating to specific markets and/or issues. Aspen works with several data vendors who offer news services. Contact your Aspen Sales representative for pricing and subscription information.

1 of 8010		<b>Index of ALL Stories</b>	
	10:04	<b>*DJ Dutch Foreign Min Seeks Russia Mtg On Sakhalin-Spokesman</b>	
	10:04	*DJ Dutch Foreign Min Seeks Russia Mtg On Sakhalin-Spokesman	
1	10:04	DJ, - *DJ Dutch Foreign Min Seeks Russia Mtg On Sakhalin-Spok →	
1	10:04	DJ, - *DJ Dutch Foreign Min Seeks Russia Mtg On Sakhalin-Spok →	
1	10:04	DJ, - *DJ Deutsche Boerse Still Targets Euronext Merger - CEO	
1	10:04	DJ, - *DJ Deutsche Boerse Still Targets Euronext Merger - CEO	
1226	10:04	COMEX gold, silver under selling pressure	
222	10:04	222--COMEX gold, silver under selling pressure	
	10:04	Arts Walk lights up downtown	
	10:04	Russian premier vows support for entrepreneurs	
1	10:04	DJ, - DJ MARKET TALK: August Leaders Down 0.2%	
	10:04	Homeland Security Group International's Jeff Powers to Introduce..	
1	10:04	DJ, - DJ MARKET TALK: August Leaders Down 0.2%	
	10:04	Homeland Security Group International's Jeff Powers to Introduce..	
	10:04	PDL BioPharma Announces Participation at Upcoming Investor..	
	10:04	A show of progress at the M E T: Heritage Festival highlights..	
	10:04	USA TODAY and OLN Partner on USA TODAY Soul of a Champion	
	10:04	Ultimate Franchise Systems, Inc. Releases Statement Concerning..	
	10:04	Ultimate Franchise Systems, Inc. Releases Statement Concerning..	
1	10:04	DJ, - DJ Cisco Systems (CSCO) Block: 902,024 Shrs At 23.20	
1	10:04	DJ, - PRESS RELEASE: Philippine National Power Corporation Proc →	

## Displaying a News Window

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### Using Icons

1. Left-Click the New News Window Icon. 
2. Left-Click a Headline to display the full story.

### Using the Context Sensitive Menu

1. Right-Click a blank Aspen Workspace.
2. Select New Window.
3. Left-Click News.
4. Left-Click a Headline to display the full story.

### Using the Main Menu

1. Left-Click File in the Main Menu.
2. Select New Window.
3. Left-Click News.
4. Left-Click a Headline to display the full story.

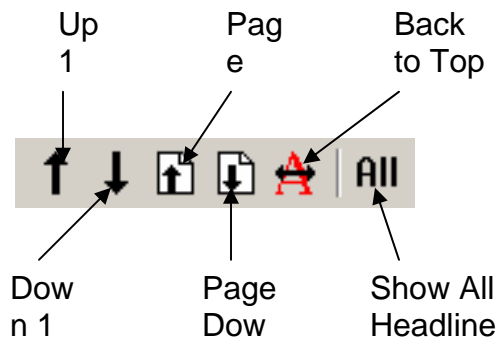
### Using Dot Commands

1. Type `.news <enter>`

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## News Window Toolbar

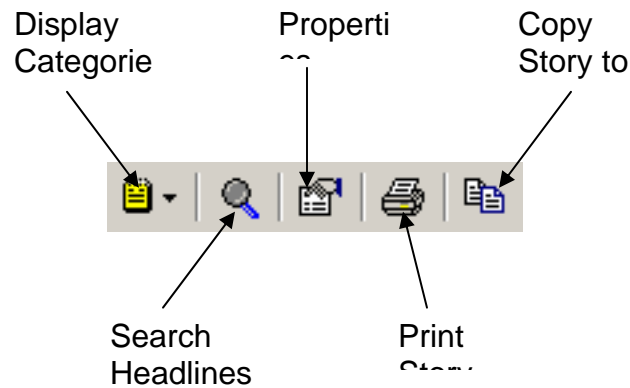
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- Up 1 Line – Moves the News Window text up one line.
- Down 1 Line – Moves the News Window text down one line.



- Page Up – Moves the News Window text up one page.
- Page Down – Moves the News Window text down one page.
- Back to Top – Moves the News Window text to the top where the most current News Headlines are displayed.
- Show All Headlines – Disables any categorical or keyword searches.



- Display Categories – Displays a list of News Categories. Categories limit the incoming News to Headlines related to the category.
- Search Headlines – Opens a textbox for searching News Stories for specified text.
- Properties – Displays the News Window Properties Dialog.
- Print Story – Sends the current news story to the default printer for printing.
- Copy Story to Clipboard – Copies the current news story to the clipboard for pasting in other applications.

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## News Search

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Your data provider may send down thousands of news headlines during the course of a day. To scroll through these looking for a particular subject could take a long time. The Aspen Graphics News Search function allows you to streamline the search process.


### Display by Category

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All headlines are displayed in the News Window when it is created. The list of headlines can be narrowed to specific topics by right-clicking to display a News Menu, selecting `Categories` and choosing a subject from this list.

Note: The list of Categories available is dependent upon the news services supplied by your data provider

## Using Icons


1. Left-Click the Display Category Icon in the News Toolbar. 
2. Left-Click a Category to filter the News.

## Using the Context Sensitive Menu


1. Open a News Window.
2. Right-Click the News Window.
3. Select Categories.
4. Left-Click the Category in the new menu to filter the News.

## Keyword Search

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Searching the list of headlines for specific words or symbols is also possible, by executing a keyword query. The search is literal. If you ask for headlines with the symbol MSFT by typing `msft` in the “Search For:” window you will receive only those news stories that contain MSFT, not those that refer to the entire company name of Microsoft. To remove the query and return to the entire list of headlines, select the  button on the toolbar.

## Using Icons

1. Left-Click the Search Headlines Icon. 
2. In the Search For text box, enter the keyword(s) you wish to search for.

## Using the Mouse

1. Select the word in the headline that you want to search for with your mouse.
2. Hold the left mouse button down on the word until a rectangle appears next to the mouse pointer.
3. Release the mouse button and the query will be performed.

## Multiple Keyword Queries

Queries can include multiple keywords using the following operators:

**&** - Separating keywords with an ampersand will list headlines which include all keywords. For example, typing `soybean&meal` will list all news headlines which contain both the word soybean and the word meal.

**,** - A comma will list any headline that contains either keyword. For example, typing `soybean,oil,meal` will list all headlines which contain the word soybean, or the word oil, or the word meal.

% - The percent sign will list headlines which have one word but not another. For example, typing the query `oil%crude` will list all headlines which contain the word oil but not the word crude.

## Combine Operators for Multiple Keyword Queries

These operators can be combined to do more complex searches:

Example: `bean&oil%crude` will list all headlines which contain the words bean and oil but not the word crude.

Using parentheses will establish priority in calculating, just as in math operations.

Example: `bean&oil%crude)` would first evaluate the command “oil but not crude”, then add bean to that subcategory.

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## Additional News Window Tips

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- When using abbreviations or incomplete words in your search, Aspen Graphics will return all occurrences of the textual string. For example, if you wanted to search for any headlines which referenced the month of December and typed in `Dec`, you may get a list containing decline, decimate, decry as well as December or Dec. To limit your list, use the exclamation point (!) limiter after your query. `Dec!` returns a list of which includes only the occurrences of Dec.
- You can recall your previous queries by entering `//` at the command line.
- News queries are not case sensitive. `ENERGY` would yield the same results as `energy`.
- Terms which include the ampersand character must be enclosed in double quotes to be used in a keyword search. Ex: `"S&P"`. Otherwise, it will be interpreted as the logical AND operator.
- There are certain keywords on which Aspen Graphics will not perform a search. This exclusion list includes all pure numeric characters, common words, adverbs and prepositions that generally would not be used as keywords. Removing these from consideration saves an enormous amount of processing time and disk space usage.

### Exclusions:

a.m.	Bln	ago	etc	if	said	up
am	Inc	all	etc.	in	say	use
cdt	inc.	an	for	into	says	versus
cst	Ltd	and	from	is	she	was
edt	ltd.	as	go	it	some	what
est	Min	at	goes	its	than	when

et	Pct	be	had	might	that	where
mdt	Per	but	has	not	the	while
mst	Pts	by	he	of	them	why
p.m.	via	can	her	off	they	will
pdt	vs.	did	his	only	till	yes
pst	down	how	or	to	told	

There is also an inclusion list for keyword searches, which is composed primarily of alphanumeric combinations that would normally be excluded from indexing.

### Inclusions:

1day	28day	1week	3mo	1year	10year	1 <sup>st</sup>
2day	30day	1wk	3month	1yr	10yr	2 <sup>nd</sup>
3day	45day	2week	6mo	2year	15year	3 <sup>rd</sup>
4day	60day	2wk	6month	2yr	15yr	4 <sup>th</sup>
5day	90day	4week	9mo	3year	20year	5 <sup>th</sup>
6day	91day	4wk	9month	3yr	20yr	10 <sup>th</sup>
7day	120day	6week	12mo	4year	30year	13 <sup>th</sup>
10day	180day	6wk	12month	4yr	30yr	15 <sup>th</sup>
14day	270day	8week	18mo	5year		20 <sup>th</sup>
15day		8wk	18month	5yr		25 <sup>th</sup>
			24mo	7year	401	30 <sup>th</sup>
			24month	7yr	401k	

## Time and Sales

The Time and Sales Windows in Aspen Graphics displays the individual incoming, Bids, Asks, Trades and Settles for an instrument.

DJI- Dow Jones Industrials Index Time & Sales						
BATSV	9/27/06 11:46					
↑↑↑	11708.53	11708.45	11708.21	11707.49		
11:47	11708.53	11708.77	11709.57	11710.13	11709.97	11710.29
	11710.45	11710.53	11710.61	11710.77	11710.37	11709.89
	11709.73	11709.57	11709.49	11709.89	11709.57	11709.65
	11709.17	11709.09	11708.93	11709.09	11709.01	11708.85
	11708.77	11708.69				
11:48	11708.77	11708.53	11708.61	11708.69	11708.85	11709.89
	11711.81	11712.69	11713.73	11714.69	11714.85	11715.17
	11715.25	11714.93	11714.21	11714.61	11715.09	11715.33
	11715.73	11715.97	11715.89	11716.21	11716.29	11716.53
	11716.61	11716.69				
11:49	11716.85	11716.61	11716.85	11716.77	11716.93	11716.85
	11716.77	11717.65	11717.57	11717.49		

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## Displaying a Time and Sales Window

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### Using Icons

1. Left-Click the Time and Sales Icon.
2. Enter a valid symbol.

### Using the Context Sensitive Menu

1. Right-Click an *empty* Aspen Workspace.
2. Select New Window.
3. Left-Click Time and Sales.
4. Enter a valid symbol.

### Using the Main Menu

1. Left-Click File in the Main Menu.
2. Select New Window.
3. Left-Click Time and Sales.
4. Enter a valid symbol.

### Using Dot Commands

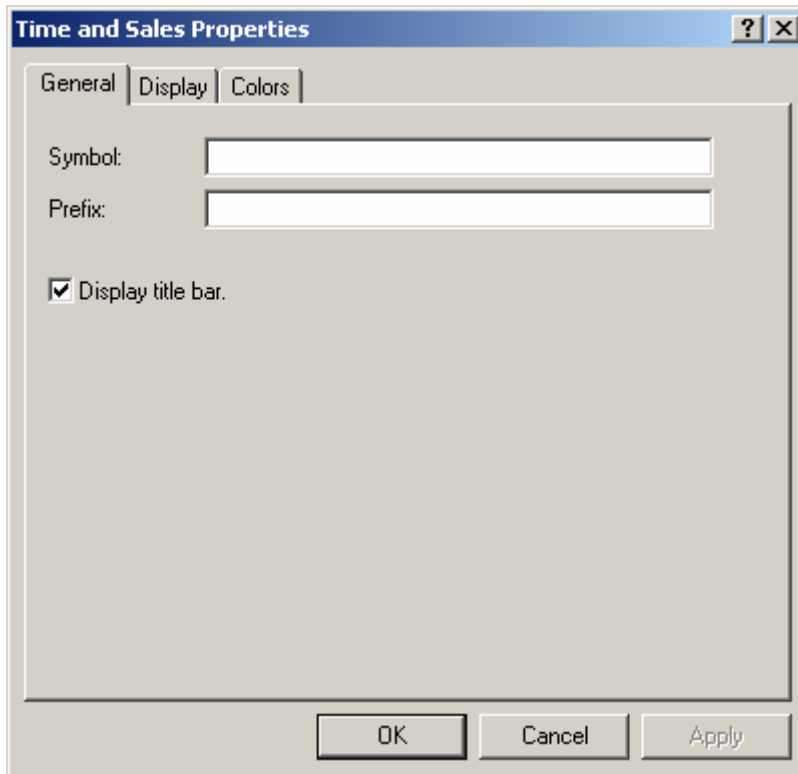
1. Type `.t&s <enter>`
2. Enter a valid symbol.

---

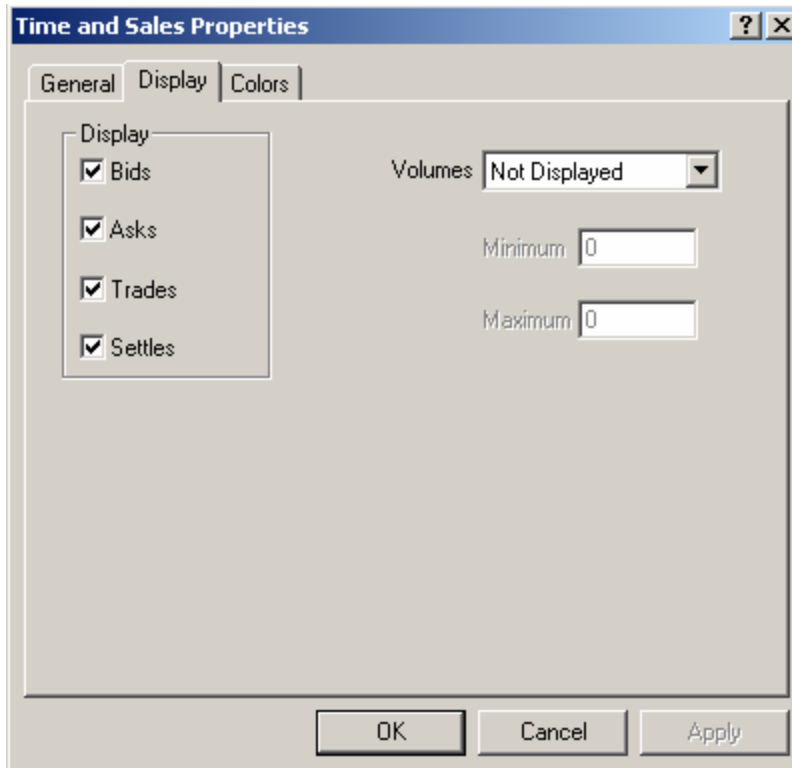
## Time and Sales Property Dialog

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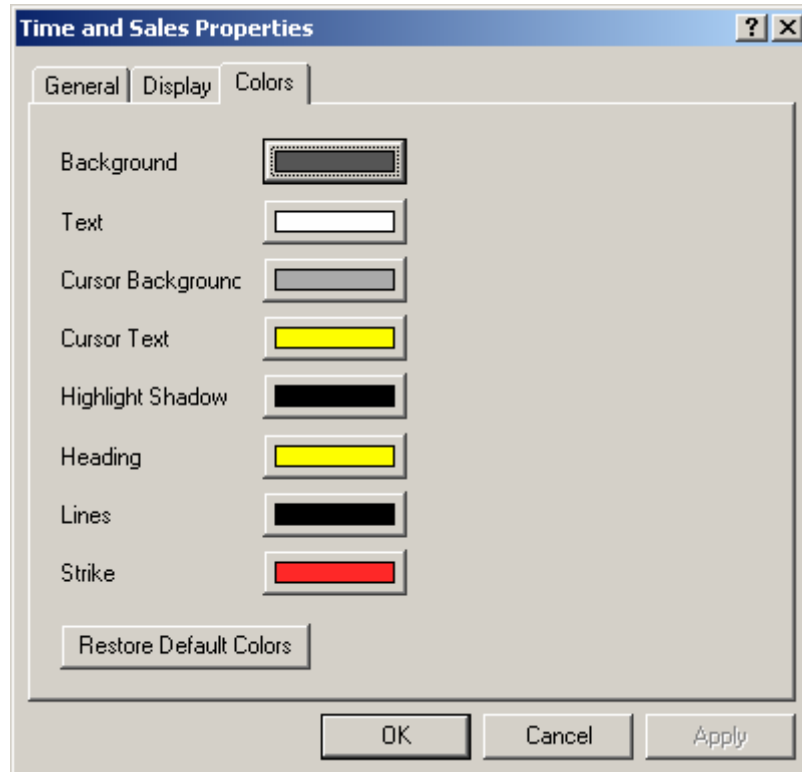
The Time and Sales Property Dialog configures properties such as colors, symbols and the types of transactions to display.



- Symbol – Displays the symbol monitored by the Time and Sales Window. The symbol may be changed here.
- Prefix – Used for data vendors that require a prefix based on the country the market is located in. The prefix may be changed here.
- Display title bar – Toggles the display of Title Bars on the Time and Sales Window.



- Bids – Toggles the display of Bids.
- Asks – Toggles the display of Asks.
- Trades – Toggles the display of Trades.
- Settles – Toggles the display of Settles.
- Volumes – Offers Not Displayed, All, Large and Range values for volumes.
- Minimum – Specifies the minimum Volume value required for it volumes to be displayed.
- Maximum – Specifies the maximum Volume value required for volumes to be displayed.



- Background – Specifies the Background Color.
- Text – Specifies the Text Color.
- Cursor Background – Specifies the color for the Cursor.
- Cursor Text – Specifies the text color for the Cursor. The Cursor is the time containing trades.
- Highlight Shadow – Specifies the color for shadowing text.
- Heading – Specifies the text color for the Heading.
- Lines – Specifies the line color.
- Strike – Specifies the color of any canceled trades.

## Displaying the Time and Sales Property Dialog

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### Using Icons

1. Left-Click the Properties Icon. 

### Using the Context Sensitive Menu

1. Right-Click a Time and Sales Window.



- Left-Click Properties...

## Using the Main Menu

1. Left-Click on Time and Sales in the Main Menu.
2. Left-Click on Properties... in the Time and Sales Menu.

# Formulas

Formulas allow users to create their own studies where they do not exist by default, and can also be used in writing complex alarms, and color rules. They can also be used to replace complex syntax when entering multiple symbols on a chart. A final use would be to have text appear either on a chart to indicate Candlestick formations or on a quote page advising of Buy, Sell or Hold conditions.

## The Parts of a Formula

Formulas have three parts: a name, an equal sign and an expression.

Example:            21DayHigh = rmax(\$1.high,21)

                          ↑                          ↑                          ↑

                          Formula Name        Equal Sign        Expression

**Formula Names** can be as descriptive as you like. You may use up to 19 characters, and an underscore (“\_”) can be used to add a space to your formula name, as in 3month\_strip.



Aspen Graphics formula names are not case sensitive.

Do not name your formula any of the following:

1. A symbol name
2. A number, such as 15
3. A command, such as .bye

## Expressions

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Expressions are where the calculations take place. Expressions can contain:

- o *constants* (CLZ8, ibm, 42, etc.)
- o *operators* (+, -, \*, /, >=, = etc.)
- o *variables* (\$1, \$1.low, cl#, etc.)
- o *functions* (rmax( ), dev( ), if( ), etc.)

## Constants

Constants can be any number or symbol sent by your datafeed.

## Operators

Math operators used in Aspen Graphics are shown below. The Order of Evaluation specifies the operator in the formula that will be calculated first.

Operator	What it Does	Order of Evaluation
^	Exponentiation	1
-	Negative	2
+	Positive	2
*	Multiplication	3
/	Division	3
+	Addition	4
-	Subtraction	4
= =	Equals	5
!=	Does Not Equal	5
>	Greater Than	5
<	Less Than	5
>=	Greater Than or Equal To	5
<=	Less Than or Equal To	5

## Parenthesis

Parenthesis can be used to specify that a particular operation should be performed before other operations in the formula. For example:

$$(ng\#+ng\#1+ng\#2) / 3$$

First, add the three front months of Natural Gas, and then divide the sum by three.

## Variables

Variables are placeholders. They stand for a quantity or an instrument that will be specified later when the formula is implemented. Types of variables include:

### Instrument Variables

The advantage of using instrument variables (\$1, \$2, \$3, etc) in a formula instead of a specific symbol (such as OEX, MSFT or CLZ8) is that it allows you to use the formula with any symbol you like. In other words, it makes the formula *generic*. The \$1 *saves a place* for a symbol that will later be supplied.

Example: A spread formula written as:

$$\text{Spread}=\text{cn8}-\text{ck8}$$

This formula will be useful only as long as cn8 and ck8 are both trading; it will be useless after one of the contracts expires. A generic formula which could be used for *any* two instruments would be:

$$\text{Spread}=\$1-\$2$$

To chart this formula or to display this formula in a quote page, enter:

$$\text{Spread}(\text{cn8}, \text{ck8})$$

The # *macro* is another type of variable for instruments, like futures, which expire. It is used in place of a symbol's month and year codes to specify which of the currently trading contracts you want to evaluate. After the symbol root (*sp* for the S&P 500, *c1* for crude light, etc.), a # specifies the front month, #1 specifies the first month out, etc.

The # macro allows you to write a formula for futures which doesn't have to be edited when one of the contracts expires.

Example: In October of 2006, a strip formula for the first three months of natural gas could be written:

$$\text{NatGasStrip} = (\text{ngv6} + \text{ngx6} + \text{ngz6}) / 3$$

This would work, however, only as long as all three contracts were trading. After that, the formula would need to be changed to reflect the *current* three front months. For example:

$$\text{NatGasStrip} = (\text{ngx6} + \text{ngz6} + \text{ngf77}) / 3$$

A more useful formula could be written:

$$\text{NatGasStrip} = (\text{ng\#} + \text{ng\#1} + \text{ng\#2}) / 3$$

This formula could be used anytime, and the first three months of natural gas, whatever they happened to be at the time, would be averaged.

## Price Variables

Price Variables such as *spz7.high* and *\$1.avg*, are used to designate which of the many possible prices and values associated with an instrument are to be used in the formula. These variables, or *quote codes*, are placed after the symbol and separated from it by a period, as shown in the previous examples. Below is a list of quote codes which may be used in formulas.

Quote code	Description
.avg	Average of the high, low and close prices for a bar
.avgtick	Average of the ticks on an EquiTick bar
.close	Closing price for the period
.high	Highest price hit during the period
.last	Last price reported (includes bids, asks, trades and settles)
.low	Lowest price hit during the period
.midpt	Midpoint of the high and low prices for the period

.open	Opening price for the period
.prev	Closing price for the previous period
.thigh	“True High;” the higher of the current period high or the previous close
.tlow	“True Low;” the lower of the current period low or the previous close

## Flow Control

Aspen includes functionality for controlling the flow of a formula. This includes branching and looping controls.

### Branching

Aspen uses If statements as one method to control formula flow. If statements allow users to take two or more paths of execution based on the evaluation of the If statement. If statements can be written as single line commands or multi-line commands.

#### Single Line If Statement Example

```
If $1.high > $1.high[1] then retval = SomeValue
```

#### Multi-Line If Statement Example

```
If $1.high > $1.high[1] then begin
    <Add Additional Logic Here>
End
```

### Looping

Aspen offers looping mechanisms as another method of flow control. Loops are useful for counting and iterative operations. Aspen uses For and While statements for looping control.

#### While Example

```
while (currpeak>diverge-peaklen) do begin

    if $1.high[currpeak-1]<$1.high[currpeak] then
    peakmade=peakmade+1

    if sstoch($1,9,3)[currpeak-1]<sstoch($1,9,3)[currpeak]
then speakmade=speakmade+1

    currpeak=currpeak-1
end
```

### For Example

```
fact5(n)=begin
  result=1

  for i=1 to n result=result*i

  result
end
```



Looping in Aspen can be very resource intensive. Care should be taken to avoid unnecessary iterations. Care should also be taken to avoid writing infinite loops.

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## Functions

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Functions perform different types of calculations on the data. Aspen Graphics includes a variety of pre-programmed functions and gives you the ability to write your own formulas as necessary.

Each function needs to be told what data to examine: a specific instrument, a variable like \$1, a formula, number or some other series of data. In addition, there may be other parameters you need to specify as well depending on the type of function.

The tables below list the functions that are programmed in Aspen Graphics, along with their required and optional parameters.

Function	What It Calculates	Syntax Example	Required Parameters (Optional Parameters follow in parenthesis)
Abs( )	Absolute Value	abs(\$1.qty)	Instrument
Dev( )	Standard Deviation	dev(spm8,10)	Instrument, periods (shift)
Disttomax( )	Distance (in bars) to the highest value in a range	disttomax(ibm.high,1,9)	Instrument, starting bar of range, ending bar
Disttomin( )	Distance (in bars) to the lowest value in a range	disttomin(ibm.low,1,9)	Instrument, starting bar of range, ending bar
Exp( )	Exponentiation	exp(\$1.rate)	Instrument
Floor( )	Returns the integer portion of a number	Floor(number or expression)	A number, or an expression that evaluations to a number
Frac( )	Returns the fractional portion of a number	Frac(number or expression)	A number, or an expression that evaluations to a number
Log( )	Natural Logarithm	log(\$1/(\$1.last))	Instrument
Log10( )	Base 10 Logarithm	log10(\$1.xtime)	Instrument

Max( )	Highest value in group	max(us#,us#1,us#2)	All instruments to be evaluated
Min( )	Lowest value in group	min(us#,us#1,us#2)	All instruments to be evaluated
Rangemax( )	Highest value in a defined range	Rangemax(ch8,2,14)	Instrument, starting bar of range, ending bar
Rangemin( )	Lowest value in a defined range	rangemin(ch8,2,14)	Instrument, starting bar of range, ending bar
Rmax( )	Highest value over the last (number) periods	rmax(spm8.high,50)	Instrument, periods (shift)
Rmin( )	Lowest value over the last (number) periods	rmin(spm8.low,50)	Instrument, periods, (shift)
Rsum( )	Sum of the values over the last (number) periods	rsum(spm8,50)	Instrument, periods, (shift)
Scale( )	Units/number of decimal places in which a quote is displayed	scale(jy#,100)	Instrument, units or other instrument with the same units you want to use
<b>NOTE: The Scale ( ) function is used in quote windows or quote pages, but not in charts.</b>			
SQRT( )	Square Root	sqrt(\$1.xdays)	Instrument
SUM( )	Sums all values listed	sum(ibm,msft,mu)/3	All Instruments
IF( )	Conditional Statement (If, then, else)	if(\$1.prev<\$1.low, \$1.tlow,\$1.low)	Desired criteria, value if TRUE, value if FALSE (Boolean operators AND and OR)

## Study Functions

Function	What It Calculates	Syntax Example	Required Parameters (Optional Parameters follow in parenthesis)
ADX( )	Average Directional Index	adx(ch8,20)	Instrument, periods
BB( )	Bollinger Bands	bb(\$1,20,2,1) (top) bb(\$1,20,-2,1) (btm)	Instrument, Moving avg. length, Std. Devs, Envelope length (Shift)
Cci( )	Commodity Channel Index	cci(sk8,10)	Instrument, periods
Dio( )	Directional Indicator	dio(\$1,14)	Instrument, periods
Dmineg( )	DI- line of the Directional Indicator	dmineg(sm8,14)	Instrument, periods

Dmipos( )	DI+ line of the Directional Indicator	dmipos(smK8,14)	Instrument, periods
Eavg( )	Exponential Moving Average	eavg(\$1,30)	Instrument, periods, (shift)
Fstoch( )	Fast Stochastic (Fast K line)	fstoch(\$1,9)	Instrument, periods
Havg( )	Hamming Moving Average	havg(\$1,30)	Instrument, periods, (shift)
Hvol( )	Historical Volatility	hvol(gm,10) (default parameters: 10 periods, 1 Std. dev)	Instrument, (Periods, Std. devs., Trading Periods/Year, Base 100)
Keltner( )	Keltner Channel	keltner(\$1,20,1) (top) keltner(\$1,20,-1) (bottom)	Instrument, periods, multiplier (shift)
Lr( )	Linear Regression line	Lr(\$1,200,3)	Instrument, periods, (regression type)
Mavg( )	Modified Moving Avg	mavg(\$1,30)	Instrument, periods (shift)
Mbestcycle( )	MESA Best Fit	mbestcycle(cl#,6)	Instrument, periods
Mdomcycle( )	MESA Standard Prediction	mdomcycle(cl#)	Instrument
Mom( )	Momentum	mom(gcz8,10)	Instrument, periods
Mphase( )	MESA Phase	mphase(ngz7)	Instrument
Mtrend( )	MESA Trend	mtrend(ngz7,1)	Instrument, cycle factor
Rsi( )	Relative Strength Index	rsi(\$1,14)	Instrument, periods
Savg( )	Simple Moving Average	savg(\$1,30)	Instrument, periods (shift)
Sstoch( )	FastD/SlowK Stochastic Line	sstoch(us#,9,3)	Instrument, periods for the FastK, periods for the FastD/SlowK
Ssstoch( )	Slow Stochastic (Slow D Line)	ssstoch(us#,9,3,3)	Instrument, periods for the FastK, periods for FastD/SlowK, periods for the SlowD
Wavg( )	Weighted Moving Average	wavg(\$1,30)	Instrument, periods, (shift)

## Chart Functions

Function	What it Calculates	Syntax Example	Required Parameters (Optional Parameters)
Chart( )	Provides a formula with a frame-of-reference similar to that of a chart	chart(rsi(ip,14)[-1],15, 1,100,1,3)	Formula or function, bar-width, bartype, numbars, nogaps, night session (Calc On/Off[-1])



Gapfill( )	Value with which to fill gaps on a chart	gapfill(cl#,cl#.thigh)	Instrument, formula, function or value to fill gap
Quote( )	Most recent value of the requested quote, displayed as a horizontal line in a chart	quote(csko.ask)	Instrument Quote Code

## Trig Functions

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Function	What it Calculates	Syntax Example	Required Parameters (Optional Parameters)
<code>Cosine()</code>	Returns the cosine, in degrees, of an angle in degrees	<code>Cosine(degrees)</code>	Angle An angle in degrees.
<code>Sine()</code>	Gives the sine, in degrees, of an angle in degrees	<code>Sine(angle0</code>	Angle An angle in degrees.
<code>Tangent()</code>	Returns the tangent, in degrees, of a given angle	<code>Tangent(angle)</code>	Angle An angle in degrees.
<code>arcCosine()</code>	Returns the arccosine (the angle whose cosine is a number) in degrees in the range of 0° to 180°	<code>ArcCosine(Cosine(degrees))</code>	Cosine The cosine in degrees ( <code>cosine()</code> ) of an angle. This value must be between -1 and 1.

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## Special Functions

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### The Chart Function

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The chart function is a very powerful and unique feature of Aspen Graphics. It is a function, just like `rmin()` or `max()`, but it allows the user to create a “virtual chart”, setting a time frame and other chart settings for the formula.

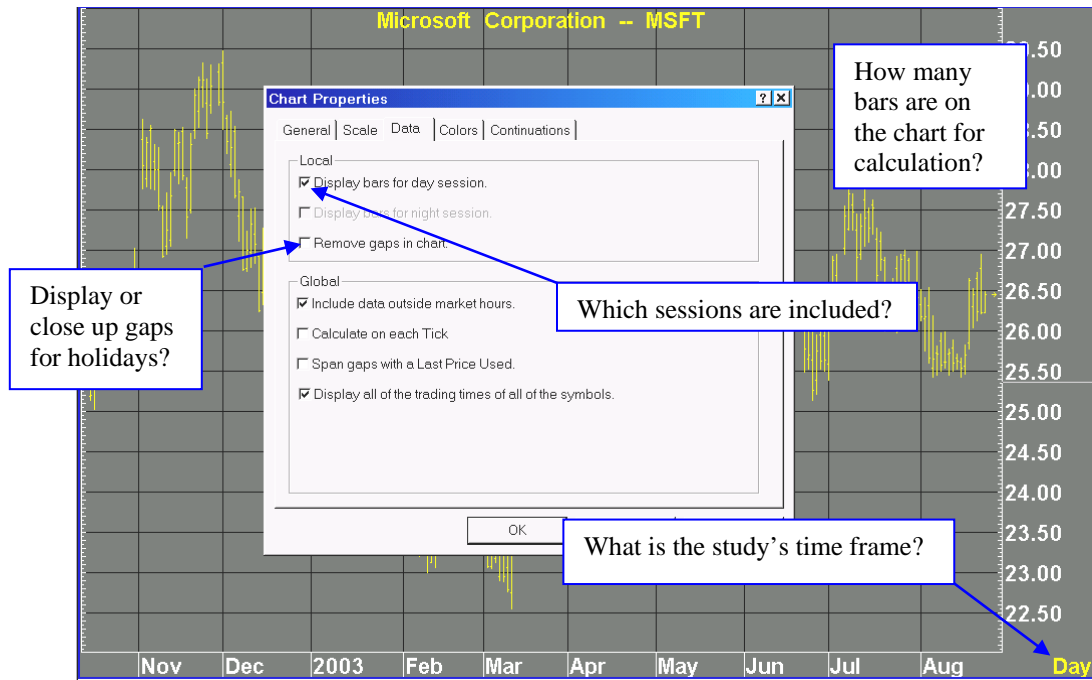
### When Is the Chart Function Used?

There are three instances when you need to use the chart function in a formula:

- To display formula values in a quote window.
- To set alarms on formulas or studies that include functions calculated over more than the current bar. The chart function allows the user to reference historical data, and therefore set alarms on formulas and studies that reference past bars.
- To use more than one time base in a chart. The chart function allows the user to display studies with different time bases, such as a 60-minute RSI and a daily RSI, together in one chart.

## What Parameters does the Chart Function pass on to a Formula?

When a study or formula is charted, some of the inputs for the study are defined by the chart in which it is displayed. These parameters are not available on a quote page or an alarm unless the chart function is used.




## How is the Chart Function Used?

The chart function is a *shell* which surrounds an expression or formula, providing that formula with a chart's parameters. The chart function is essentially the same as any other programmed function in Aspen Graphics: it requires calling the function by name and then listing the parameters, separated by commas and enclosed in parentheses. The chart function has seven elements:

**chart((function or formula) [-1], Bar Width, Bar Type, # of Bars, NoGaps, Session)**

Write your function or formula, including all parameters	<u>Calc On</u> If you <i>don't</i> want the chart to recalculate <i>after each trade</i> <b>omit</b> this, and the chart() function will recalculate when the bar is completed	<u>How Many</u> tics, minutes, or days you want in each bar. Tics = 1 – 10,000 Min = 1 – 1439 Days = 1 – 7, 30, 90, 365	<u>Type of bar</u> Tic = 0 Min = 1 Day = 2	<u>How many bars</u> to be used in the chart. 100 is optimal	<u>No gaps</u> Off = 0 On = 1	<u>Which Session?</u> All = 1 Night only = 2 Days only = 3 Use setting from setup.txt file = 0
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 A quote page or alarm has no way of knowing this information unless the chart function is used to define these parameters.

## Examples of Formulas Utilizing the Chart Function

### To display a study value on a quote page:

Suppose you want to have the current values of an ADX study displayed on a quote page and you want to specify the following parameters:

- 14 periods in the ADX study
- CalcOn
- Closing price on a daily bar
- Nogaps On
- Day session only

In the Formula Editor, enter this formula:

```
ADX_DAY(series)=chart(adx($1,14)[-1],1,2,100,1,3)
```

Now go to your quote page or window and format the appropriate cell with the following:

```
ADX_DAY($1)
```

More details about formatting a formula in a quote page can be found in the following section.

### To set an alarm on a study:

Suppose you want to be alerted when the momentum on SPZ7 is greater than 0.5 or less than -.5, using the parameters below:

- 10 periods in the momentum study
- CalcOn
- Closing price of a 60 minute bar
- Nogaps off
- All trading sessions displayed

Enter an alarm for these conditions as:

```
chart((mom(spz4,10)>0.5 or mom(spz4,10)<-0.5)[-1],60,1,100,0,1)
```

### Using more than one time base in a chart:

If you want to view a study in two different time frames (e.g. - to "screen out" minor trend reversals), you can write a study using the `chart( )` function and overlay it on the study in your chart.

### To view both an hourly and a daily RSI on the same hourly bar chart:

1. Bring up an hourly bar chart.
2. Add a Split For Study.
3. Add a RSI study in the new Split Window.
4. Enter the following formula in the Formula Editor and save it to a folder.  
`RSI_Day(series)=chart(rsi($1,14)[-1],1,2,100,1,1)`
- 5.
6. Right-click in the new Split Window of the chart.
7. Select Add Study.
8. Select Formula Study.
9. Select (Folder Name)
10. Left-Click RSI\_DAY.

When you enter a symbol in the quote window, you will see the daily RSI value for that symbol.

## The Scale Function

---

Sometimes it is useful to change the units in which an instrument is quoted. The Scale function allows users to control how a value is displayed in a quote window or quote page.

For example, a formula in Aspen will normally be displayed in decimals. If you use a formula to evaluate Bonds, which trade in 32<sup>nd</sup>'s, you may also want to use the Scale function to display the result of the formula in 32<sup>nd</sup>'s.

The Scale function has two parameters. The first parameter identifies *what you want to modify*; this can be a price, quote code, formula or variable. The second parameter tells the Scale function *what the units should be modified to resemble*; this can be a number, instrument or variable.

For example, both `scale($1.high,us#)` and `scale($1.high,32)` will display the high value of any instrument in 32<sup>nd</sup>'s.

## The Scale function can be used to:

Modify a Price ...	Example	Syntax
Using a number	Display Bonds to three decimal places	<code>scale(usz8,1000)</code>
Using an instrument	Display 10-yr notes like 5-year notes	<code>scale(ty#,fv#)</code>
Using a variable	Display corn like another instrument	<code>scale(cn8,\$1)</code>
Modify a Quote Code	Example	Syntax
Using a number	Display a bid in 64th's	<code>scale(\$1.bid,64)</code>
Using an instrument	Display the last price like a stock	<code>scale(\$1.last,ibm)</code>
Using a variable	Display the net like another instrument	<code>scale(ibm.net,\$2)</code>
Modify a Formula	Example	Syntax
Using a number	Display percent change in 32nd's	<code>scale(pchg(\$1),32)</code>
Using an instrument	Display P&L in increments like the S&P's	<code>scale(PandL(\$1),sp#)</code>
Using a variable	Display a spread in the first symbol's units	<code>scale(spread1(\$1,\$2), \$1)</code>
Modify a Variable	Example	Syntax
Using a number	Display an instrument in 8th's	<code>scale(\$1,8)</code>
Using an instrument	Display an instrument like the S&P's	<code>scale(\$1,sp#)</code>
Using a variable	Display an instrument in other units	<code>scale(\$1,\$2)</code>

## Rounding and the Scale Function

Cell width is important when using the `SCALE()` function to modify the number of decimal places of any value. If a cell's width will not accommodate a decimal value rendered by the `SCALE()` function, the value returned may not be the value expected.

When using the `SCALE()` function to display an instrument quote value in decimals, and its cell is too short to display all decimal places, Aspen Graphics drops off the decimal places it cannot display. The numbers are there, but the display width is too short, so the numbers are not visible on the page.

In formula quotes, the `SCALE ( )` function truncates values modified by numbers and rounds values modified by instruments and quote groups when the display width is too short.

To avoid problems caused by inadequate cell width, remember to allot extra space when using the `SCALE ( )` function. A cell can always be made smaller, but it is often difficult to make cells larger in a quote window.

---

## Writing a Formula

---

Formulas are written in Aspen using two methods: by entering them directly on the chart and by using the Formula Editor. Directly entry is the ideal methods for one line formulas such as spreads. The Formula Editor is best used for complex multi-line formulas.

### Entering Formulas Directly on a Chart

1. Create a Default Chart.
2. Type the formula directly onto the chart.
3. Press <enter>.

#### **Example Formulas:**

CH7 - CZ6  
SP# \*.5

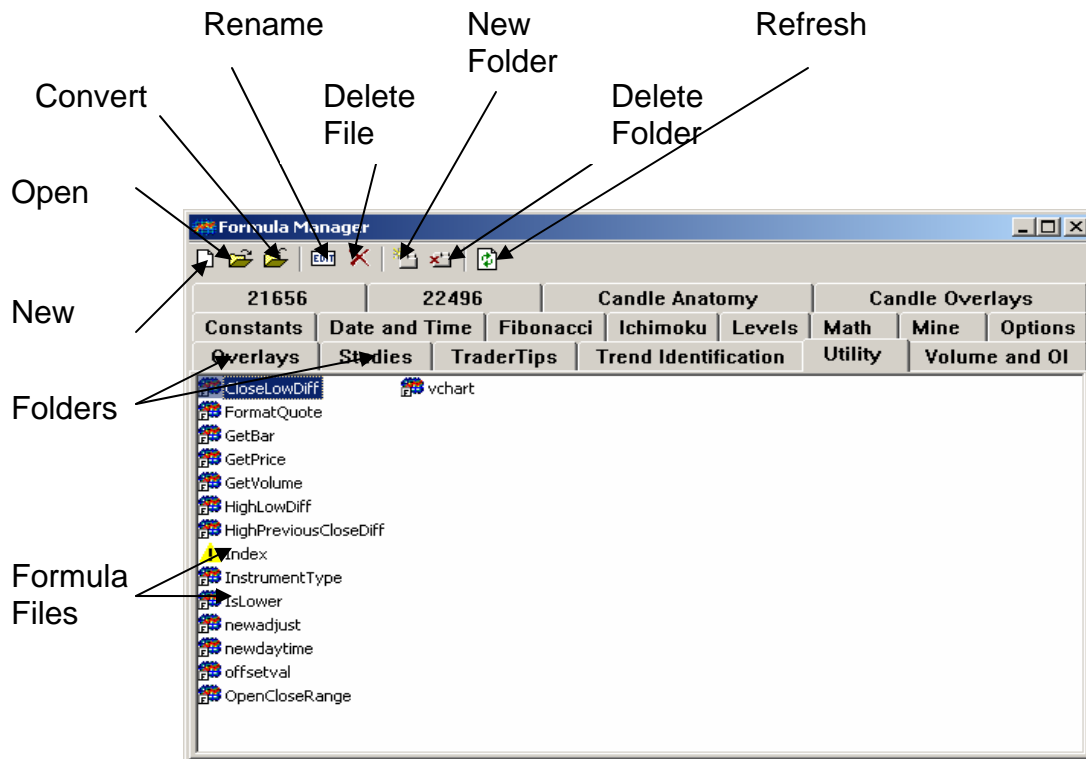
---

## The Formula Editor

---

Complex, Multi-Line formulas are written using the formula editor. The Formula Editor and the Formula Manager are tools that complement each other. The Formula Manager is used to Manage Formulas and folder. The Formula Editor is used to create the formulas.

## The Formula Manager



- New – Opens the Formula Editor Window for creating a new formula.
- Open – Opens a selected Formula File for editing.
- Convert – Converts existing formulas that use the Aspen 3.71 file format.
- Rename – Renames the Formula file or folder.
- Delete File – Deletes the selected file.
- New Folder – Creates a new Formula folder named New Folder.
- Delete Folder – Deletes the selected Formula folder.
- Refresh – Recompiles the existing formulas.

## Displaying the Formula Manager

### Using the Context Sensitive Menu

1. Right-Click an empty Aspen Workspace.
2. Select Tools.
3. Left-Click Formulas...



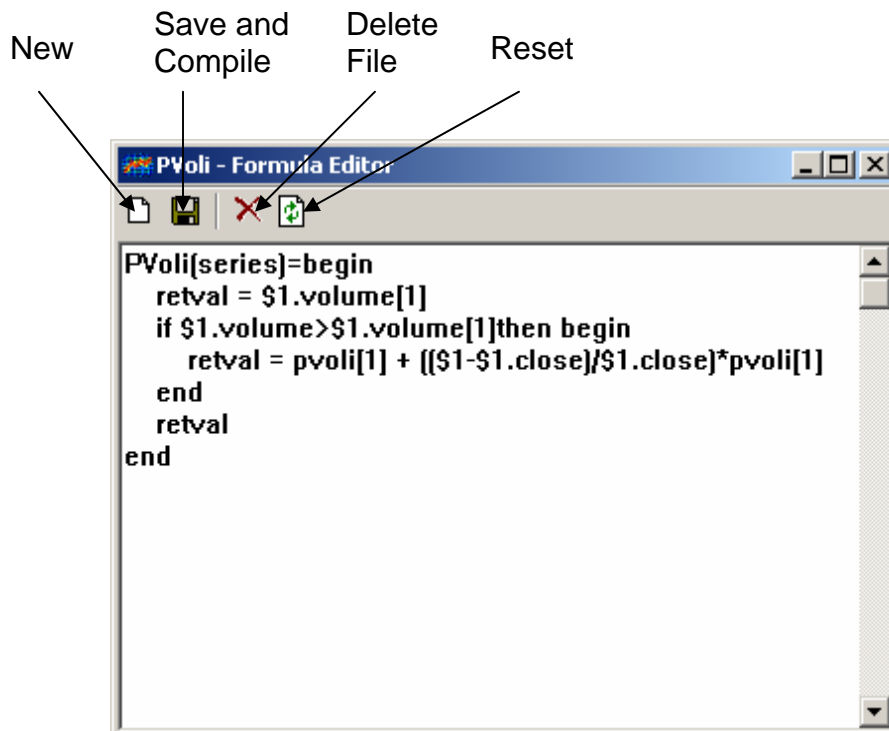
## Using the Main Menu

1. Left-Click Tools in the Main Menu.
2. Left-Click Formulas... in the Tools Menu.

## Using Dot Commands

1. Type `.form <enter>`

## The Formula Editor




- New – Clears the current formula from the screen.
- Save and Compile – Opens the Save Dialog and compiles the formula.
- Delete File – Deletes the formula from the file folder.
- Reset – Resets the cursor position in the Formula Editor.

## Example Formula

---

The following example outlines the steps used to write a generic formula (one that can be used with any symbol) for an instrument's average true range over 10 periods.

## To enter a new formula using the Formula Editor, follow these steps:

1. Display the Formula Manager.
2. Left-Click the New Formula Icon to display the Formula Editor.
3. Enter the name for the formula.
4. AvgTrueRange
5. Press the = key.
6. Select a function to use for the average. This example uses a Simple Moving Average. Enter the following:
7. Now, enter the parameters for the savg() function. Remember to surround the parameters with parenthesis. Use the true range quote code .trange, and specify 10 for the number of periods.
8. AvgTrueRange=savg(\$1.trange,10)
9. Left-Click the Save icon. 
10. Left-Click a folder name to save the formula in.
11. Name the file AvgTrueRange.
12. Click Ok.

## Embedded Formulas

This shows how a previously defined formula called AvgTrueRange can be used, or embedded, in another formula (in this case, AvgTrueRange is embedded in a formula called *range\_form*).

```
range_form=(AvgTrueRange($1)+$1.recent)/2
```

## Reference to Past Bars

This shows how a past value can be used in a formula using the square brackets []. Within the brackets, type the desired number of bars back that you want to use in the calculation. [1] is the value one bar back, [2] is the value two bars back, etc.

```
avg_volume=($1.volume + $1.volume[1] + $1.volume[2]) / 3
```

## Self-Referencing Formulas

This shows how a formula can make reference to itself. In this case, the current volume is added to the formula's previous value.

```
volAccumulator=$1.volume+volAccumulator[1]
```

## Formulas to be Charted (Custom Indicators)

The following are examples of formulas you intend to chart, or *custom indicators*.

```
MidTickAvg(input)=eavg($1.avgtick,14) Overlay  
MFI_(series)=( $1.high-$1.low)/$1.volume Study
```

Aspen Graphics has two categories of indicators: Overlays and Studies.

**Overlays** are indicators which share the same scale as the price data. Moving averages are a good example of an overlay indicator. It makes sense to “overlay” a moving average on a bar chart or candlesticks because its values are related and very close to the price data.

**Studies** refer to the group of indicators which have their own scale. Volume is a good example of such an indicator. An instrument’s volume is usually very different from the underlying symbol’s price, as in the case of an equity which trades in the \$17 to \$18 price range and has a volume of several hundred thousand shares. If study is placed in the same window as a chart, in most cases this will flatten the chart making it difficult to read.

A custom indicator is written in the same manner as writing a formula using the Formula Editor with one exception. The category the indicator will be used in must be specified as an overlay or a study.

If the indicator is to be viewed as an **overlay**, insert the word **input** in parenthesis after the formula’s name, as in this example:

```
MidTickAvg(input)=eavg($1.avgtick,14)
```

If the indicator is to be viewed as a **study**, insert the word **series** in parenthesis after the formula’s name, as in this example:

```
MFI_(series)=( $1.high-$1.low)/$1.volume
```

## Displaying a Formula on a Chart

There are two approaches used when charting a formula. Formulas with the input or series keywords are used with a chart of an instrument. Formulas with neither keyword may be charted without placing an instrument on the chart.

### Formulas with No Keywords


1. Bring up a chart.
2. Type the name of the formula.
3. Press <enter>.



If the formula was written using the \$1 variable, you need to specify the name of the formula *and* the instrument to be used in place of the variable. For example:  
`My_Formula(ibm)` and press <enter>.

## Formulas Using the Input Keyword

### Using Icons

1. Create a chart.
2. Add a symbol.
3. Left-Click the Add Overlay icon in the Chart Toolbar. 
4. Select Formula Overlay
5. Select the sub-folder the formula resides in.
6. Left-Click the formula name to apply it.

### Using the Context Sensitive Menu


1. Create a chart.
2. Add a symbol.
3. Right-Click the chart.
4. Select Add Overlay.
5. Select Formula Overlay.
6. Select the sub-folder the formula resides in.
7. Left-Click the formula name to apply it.

### Using the Main Menu

1. Create a chart.
2. Add a symbol.
3. Left-Click Study in the Main Menu.
4. Select Add Overlay.
5. Select Formula Overlay.
6. Select the sub-folder the formula resides in.
7. Left-Click the formula name to apply it.

## Formulas Using the Series Keyword

### Using Icons

1. Create a chart.
2. Add a symbol.
3. Left-Click the Add Study to New Split Icon. 
4. Select Formula Study.
5. Select the sub-folder the formula resides in.
6. Left-Click the formula name to apply it.

## Using the Context Sensitive Menu

1. Create a chart.
2. Add a symbol.
3. Right-Click the Chart.
4. Left-Click Add Split for Study.
5. Right-Click the New Split Window.
6. Left-Click Add Study.
7. Select Formula Study.
8. Select the sub-folder the formula resides in.
9. Left-Click the formula name to apply it.

## Using the Main Menu

1. Create a chart.
2. Add a symbol.
3. Left-Click Chart in the Main Menu.
4. Left-Click Add Split for Study in the Chart Menu.
5. Left-Click Study in the Main Menu.
6. Select Add Study in the Study Menu.
7. Select Formula Study.
8. Select the sub-folder the formula resides in.
9. Left-Click the formula name to apply it.

## Displaying a Formula in a Quote Window

The value of a formula can be displayed in a Quote Window by formatting the name of the formula in a quote window. For instructions on how to format a quote window, see the Quotes chapter of this manual. Some examples of formatting a formula in a quote window are shown below.

The formula appears as:	Formula should be formatted as:	Because:
Weekhigh= chart(ibm.high,7 ,2,100,1,1)	weekhigh	All the information necessary to calculate the formula is present; there are no variables.
Pchg=(\$1.recent- \$1.prev)/\$1.prev *100	pchg(\$1)	The \$1 is a variable, holding the place for an instrument that will be specified later.
SPREAD=\$1-\$2	SPREAD(\$1,\$2)	There are two variables in the formula, so we leave room for the two variables we'll be specifying later.
21DayHi=rmax (\$1.high,21)	Chart(21DayHi(\$1) [-1],1,2,100,1,1)	The formula needs the same frame of reference as a chart. This is

	supplied by the chart() function.
--	-----------------------------------



Some formulas require the chart function `chart( )` when being formatted in a quote window.

## Studies-on-Studies

Formulas can be written so that a study is performed on another study. In the previous example, a three-period RSI is performed on a one-period Momentum study. For example:

```
RSI_Momentum(series)=rsi(mom($1,1),3)
```

## Multi Line Formula Writing

---

Up to this point all of the formulas in this manual have been single line formulas. Much more advanced and organized formulas are possible by using multiple lines. In a multi line formula it is possible declare any number of simple variables, use Aspen functions and use embedded formulas.

## Expression Blocks

Multi line formula writing requires the use of expression blocks. These statements tell the formula writer where an expression begins and ends. They can be written in two ways, `Begin ... End` or `{ ... }`. All multi line formulas start with a `Begin` statement (or `{`) after the equals sign and terminate with an `End` (or `}`) statement as their last line. Expression blocks can also be used in logical statements such as `If.... Begin... End` to create multi-line, boolean logic statements.

### Multi-Line Formula Structure

```
myFormula(series) = begin  
  
    <Formula Logic>  
  
End
```

### Multi-Line If Statements

```
myFormula(series) = begin  
    if $1.high < $1.high[1] then begin  
        <Execute some logic>  
    end  
  
    if $1.high > $1.high[1] then begin  
        <Execute some logic>  
    end  
end
```

```
end
end
```

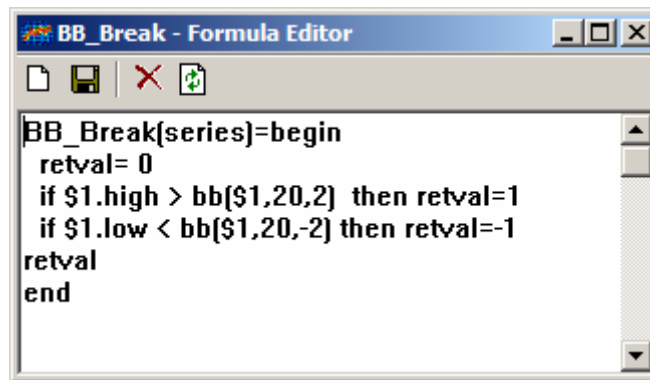
## Declaring Variables

Multi-line formulas support variables, which are place holders for data. A formula will return the last variable listed before exiting. Variables are declared using the following syntax:

```
Identifier = Value
```

Identifiers must abide by naming rules. Identifiers cannot be named an existing Aspen function, ticker symbol or formula name. Identifiers must use alpha-numeric characters.

In many pre-defined Aspen Graphics formulas we use the variable `retval`, short for return value. `retval` is given a starting value, often 0, and then calculations are done in the formula to change that value which is then returned. Here is an example of a simple multi-line formula using `retval` as a variable. `retval` begins equal to 0. If the high of the period is greater than the top Bollinger band then `retval` is equal to 1. If the low of the period is less than the lower Bollinger band then `retval` is equal to -1.



## Drawing Text Values on the Screen

Multi-line formulas allow greater scope for formula writing as they contain functions for looping and multi-line If statements than single line formula. Also the ability to have text returned as a result of a formula as well as numeric values is not available to single line formulas. This can be useful for identifying candlestick formations or indicating where averages cross without the need for the lines themselves to be drawn. When used with Quote windows we can have buy, sell or hold indications appear dependent on market conditions.

Displaying text instead of values as the result of a formula is achieved by enclosing the text in single quotation marks:

"My Text"

There are a number of additional parameters which can follow the text, each separated by the pipe ( | ) symbol. The parameters are:

Parameter	Result
Above	Draws the Text above the chart
Below	Draws the Text below the chart
Horizontal	Draws the Text horizontally
Vertical	Draws the Text vertically
FTiny	Sets the font size to Tiny
FSmall	Sets the font size to Small
FNomal	Sets the font size to Normal
FBig	Sets the font size to Big
Arrow	Displays an arrow indicating the bar the text is associated with.
Clr_Black	Displays Black Text.
Clr_Blue	Displays Blue Text.
Clr_Cyan	Displays Cyan Text.
Clr_Gray	Displays Grey Text.
Clr_Green	Displays Green Text.
Clr_Orange	Displays Orange Text.
Clr_Pink	Displays Pink Text.
Clr_Purple	Displays Purple Text.
Clr_Red	Displays Red Text.
Clr_Violet	Displays Violet Text.
Clr_White	Displays White Text.
Clr_Yellow	Displays Yellow Text.

Examples:

```
"Sell" | clr_green | ftiny | below | arrow | vertical
```

```
"Sell" | clr_red | ftiny | above | arrow | horizontal
```

## Multi-Line Formula Examples

---

In the first example, we need to display the points at which a short-term moving average crosses a long-term one. At first the point at which lines cross might appear to be when the values are equal, but this is not the case. In the vast majority of cases the point at which the lines actually touch and are of the same value is between two successive bars, therefore to determine if the lines have crossed we need to check whether the value of line 1 was previously below line 2 and is now greater than line 2.

Given that the periods in our averages are 10 and 100, we need to write an IF statement comparing their relative values on the two bars:



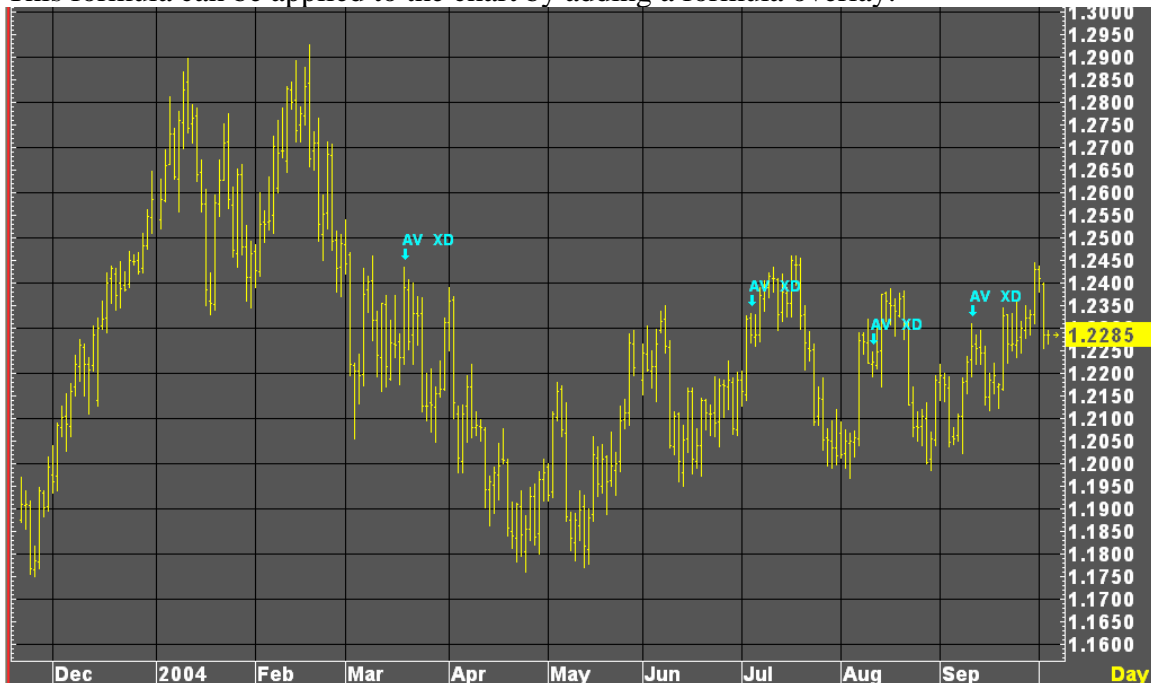
```
IF SAVG($1,10)[1]<SAVG($1,100)[1] AND SAVG($1,10)>SAVG($1,100)
THEN.....
```

When using multi-line formulae, the basic format is the same as for single line formulae i.e. `formulaname=expression`, however to indicate that a multi-line formula is being written, the word `begin` follows the `=` and the rest of the formula goes on subsequent lines. At the end of the formula, because we have ‘begun’ it we must also end it.

The name of the formula will be 10x100 (10 crossing 100), and is written as follows:

```
10x100(input)=begin
    if savg($1,10)>savg($1,100) and
savg($1,10)[1]<savg($1,100)[1] then begin
    'Av X'd'|clr_cyan|fsmall|above|arrow|horizontal
    end
end
```

This formula can be applied to the chart by adding a formula overlay:



The example below introduces the concept of looping use the `While...End` statements. The entire formula is written out with a description of each section. The premise is that we are looking for a peak to be made by both the price and the slow stochastic; a peak being defined as x number of days with successive higher highs followed by a similar number of days with successive lower highs. The x being a parameter called `PEAKLEN`. Further, we then look y number of days into the future and check to see if the price has gone up on the peak price and the stochastic is lower than the peak stochastic, or visa

versa. This would indicate a divergence. Again the number of days is a parameter, this time called DIVERGE.

This section establishes the name of the overlay formula, the default values for the two parameters, and defines four variables peakmade (checks the rising then falling prices), speakmade (checks the rising then falling stochastics), 2Peaks (whether both price and stochastic make a peak), and divsig (checks whether a divergence occurs)

```
MyDiverge(input,peaklen=2,Diverge=5)=begin
    peakmade=0
    speakmade=0
    2peaks=0
    divsig=0
```

This line sets the start point to be divergence-plus-peak-length bars back (initially seven bars)

```
currpeak=peaklen+diverge
```

We now have the loop when checks for the successive higher highs for both the price and stochastic, each time a new high is set then the peakmade and speakmade variables increase by one, and the CURRPEAK value decreases by one until the number of rising highs have been checked for.

```
while (currpeak>diverge) do begin
    if $1.high[currpeak-1]>$1.high[currpeak] then
peakmade=peakmade+1
    if sstoch($1,9,3)[currpeak-1]>sstoch($1,9,3)[currpeak] then
speakmade=speakmade+1
    currpeak=currpeak-1
end
```

```
while (currpeak>diverge-peaklen) do begin
if $1.high[currpeak-1]<$1.high[currpeak] then peakmade=peakmade+1
    if sstoch($1,9,3)[currpeak-1]<sstoch($1,9,3)[currpeak] then
        speakmade=speakmade+1
        currpeak=currpeak-1
end
```

The successive lower highs are now checked and again, if made, the appropriate variable is increased, until the requisite number of PEAKLEN bars has been checked.

```
if speakmade == peaklen*2 and peakmade == peaklen*2 then 2peaks=1
```

If a peak has been made for either the price or the stochastic then the PEAKMADE and SPEAKMADE values will be twice the number of the PEAKLEN. The line above checks to

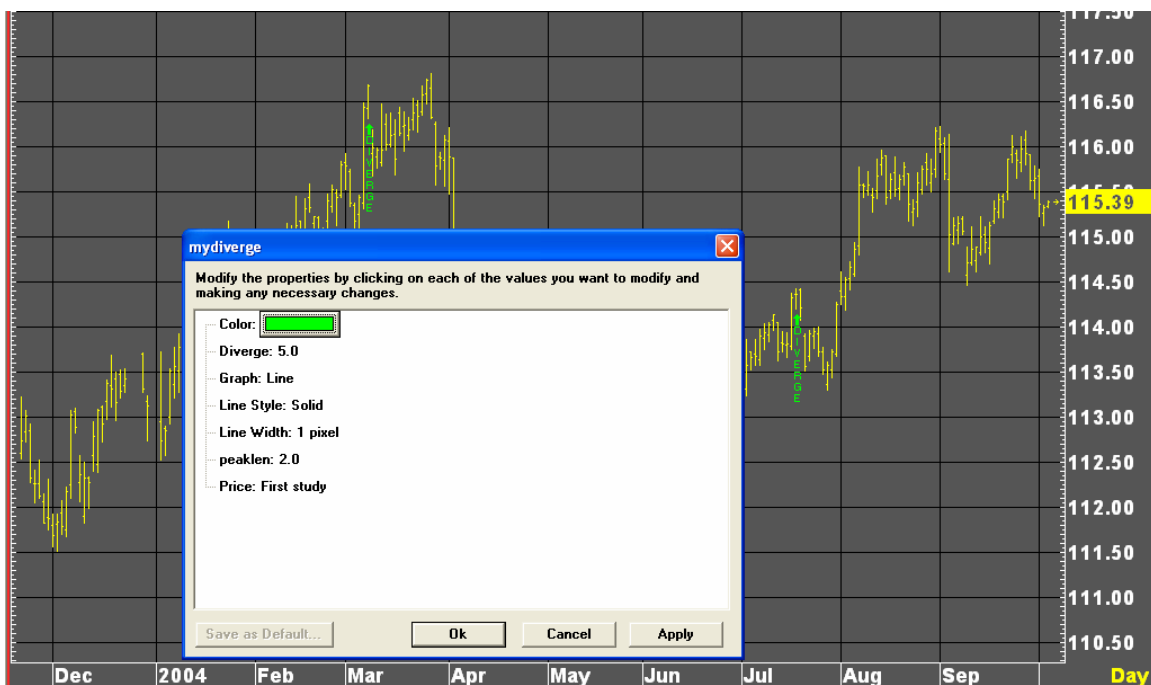
see if both these are twice the length, at which point the 2PEAK variable is assigned a value of 1.

```
if 2peaks == 1 then begin
```

The values of the price and the stochastic at the peak are now compared with the current values and if the divergence has occurred then the DIVSIG variable is assigned a value of 1 and the appropriate text is displayed.

```
if ($1[diverge]>$1 and sstoch($1,9,3)[diverge]<sstoch($1,9,3)) or  
($1[diverge]<$1 and sstoch($1,9,3)[diverge]>sstoch($1,9,3)) then  
    divsig=1  
end
```

```
if divsig==1 then begin  
    'Diverge' |ftiny|clr_green|vertical|below|arrow  
end  
end
```



Again because we have defined Diverge and PeakLen as parameters, they can be changed through the menu.

## Entire Formula Listing:

```
MyDiverge(input,peaklen=2,Diverge=5)=begin  
    peakmade=0  
    speakmade=0  
    2peaks=0
```

```

divsig=0

currpeak=peaklen+diverge

while (currpeak>diverge) do begin
  if $1.high[currpeak-1]>$1.high[currpeak] then
    peakmade=peakmade+1

    if sstoch($1,9,3)[currpeak-1]>sstoch($1,9,3)[currpeak]
    then speakmade=speakmade+1

    currpeak=currpeak-1
  end

while (currpeak>diverge-peaklen) do begin
  if $1.high[currpeak-1]<$1.high[currpeak] then
    peakmade=peakmade+1

    if sstoch($1,9,3)[currpeak-1]<sstoch($1,9,3)[currpeak]
    then speakmade=speakmade+1

    currpeak=currpeak-1
  end

if speakmade == peaklen*2 and peakmade == peaklen*2 then
2peaks=1

if 2peaks == 1 then begin
  if ($1[diverge]> $1 and sstoch($1,9,3)[diverge] <
  sstoch($1,9,3)) or ($1[diverge] < $1 and
  sstoch($1,9,3)[diverge] > sstoch($1,9,3)) then
  divsig=1
end

if divsig==1 then begin
  'Diverge'|ftiny|clr_green|vertical|below|arrow
end
end
end

```

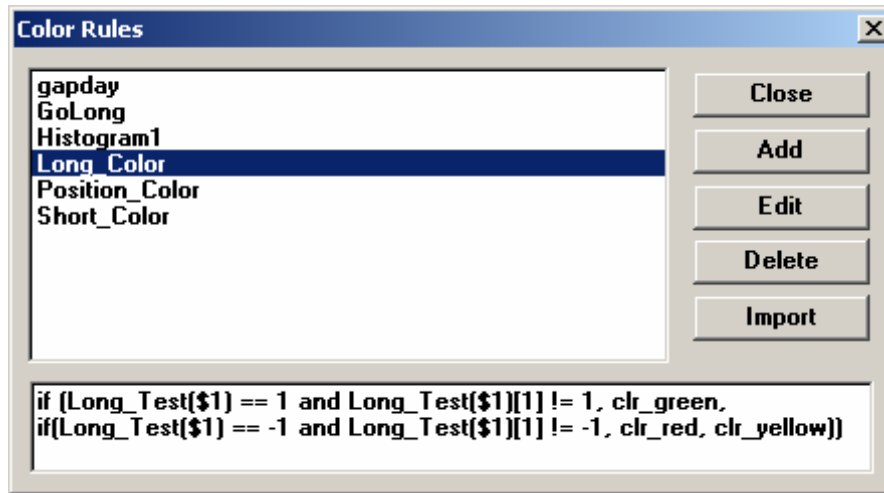
---

## Color Rules

---

By default, the bars in Aspen Graphics charts are yellow. In addition to being able to change the color of the bars from the Bar Chart parameter menu, Aspen Graphics has a Color Rule capability. Color rules act as a visual alarm on a bar chart, coloring certain bars which meet user-defined criteria. For example, a color rule can be written so that each bar that hits a 21-day high will be colored red, while all other bars will remain yellow.

## Color Rule Dialog



- Close – Closes the Color Rule Dialog.
- Add – Opens the New Color Rule Dialog.
- Edit – Opens the Edit Color Rule Dialog.
- Delete – Deletes the selected Color Rule.
- Import – Imports Color Rules from Previous Versions of Aspen.

## Displaying the Color Rule Dialog

### Using the Context Sensitive Menu

1. Right-Click an empty Aspen Workspace.
2. Select Tools.
3. Left-Click Color Rules...

### Using the Main Menu

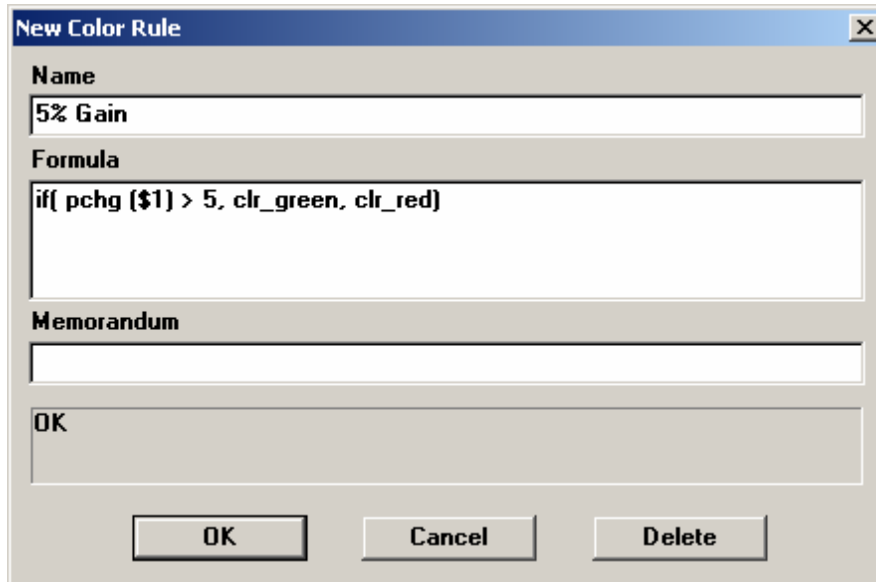
1. Left-Click Tools in the Main Menu.
2. Left-Click Color Rules in the Tools Menu.

### Using Dot Commands

1. Type `.color <enter>`

## Creating a Custom Color Rule

Display the New Color Rule Dialog by Left-Clicking the Add Button in the Color Rule Dialog.



The screenshot shows a dialog box titled "New Color Rule". It has a title bar with a close button (X). The dialog contains three text input fields: "Name" with the text "5% Gain", "Formula" with the text "if( pchg (\$1) > 5, clr\_green, clr\_red)", and "Memorandum" which is empty. Below the "Memorandum" field is a status field displaying "OK". At the bottom of the dialog are three buttons: "OK", "Cancel", and "Delete".

- Name - A unique name for the color rule must be entered in this field. This is one of the few instances where spaces can be used in the name. Up to 39 characters can be used for the color rule name.
- Formula – The condition for the color rule must be entered here, using formula language. Color rules are limited to 255 characters.
- Memorandum – Allows the user to enter a description of the color rule. Up to 39 characters may be entered in the Memorandum field.
- Status – This field is not editable; it displays information about the color rule. If the syntax of your formula is correct, the status field will display OK. If an error has been made in writing the color rule, an error message will be displayed.
- Ok – Adds the color rule to memory and displays the Color Rule menu.
- Cancel – Aborts the color rule; it is not saved in memory.
- Delete - Deletes the selected color rule from memory.

## Color Rule Syntax

Color Rule syntax closely resembles single-line formula syntax. Color Rules cannot use multi-line syntax by themselves. Also, the syntax for IF statements is slightly different. The Boolean test syntax remains the same, however, the statements that should be executed when the Boolean statement is true or false are separated by commas.

```
If (<Boolean statement>, <True command>, <False Command>)
```

```
if(pchg ($1)>5,clr_green,clr_red)
```

If - Then, Else-If and Else statements are written by placing Else-If Boolean tests following the command that is executed when the initial If statement is evaluated:

```
IF (<Boolean Statement>, <True Command>, If(<Else-If Statement>, <Else-If True Command>, <False Command for BOTH Boolean statements> ))
```

```
If(pchg ($1) > 5, clr_green, if (pchg($1) < 0, clr_red, clr_yellow))
```

The above statement says that if PCHG is greater than 5, color the bar green. If PCHG is less than 0, then color the bar red. Otherwise color the bar yellow.

Color rules are not case sensitive; upper and lower case letters can be used interchangeably. Using both upper and lower case letters in the name can make it easier to read from the Color Rules menu.

## Color Rule Example

The following steps will take you through the process of writing a generic color rule. This color rule alerts you when the *current* bar of the charted instrument has increased 5% from the *previous* bar, using the pchg formula already entered in the Formula Listing.

This formula will color any bar on the chart green where the percent change from the previous bar was above 5%. The rest of the bars on the chart will be colored red. The \$1 variable was used so that the color rule could be applied to any instrument that is displayed in the chart.

### To write a color rule for this condition, follow these steps:

1. In the Color Rule Dialog, Left-Click the Add button.
2. Left-Click the Name textbox.
3. Type in 5% Gain
4. Left-Click the Formula textbox.
5. Type the following:  

```
if(pchg ($1)>5,clr_green,clr_red)
```
6. Left-Click the Memorandum Textbox.
7. Check the Status field; if it says *ok*, select Done. If it has an error message, change the formula to read exactly as the line above.

## Writing a Color Rule for a Specific Symbol

Color rules can be written either generically or specifically. The 5% Gain color rule in the previous example is generic; it will calculate on any instrument displayed on the chart. Replacing \$1 with an instrument (i.e. SPH7) would calculate the color rule using that instrument, regardless of the data displayed in the bar chart. For example, the 5% Gain formula could be written as:

```
if(pchg(sph7)>5,clr_green,clr_red)
```

Written this way, IBM could be displayed in the bar chart and the bars of the chart will be colored based on the percent change of SPH7.



If you define a specific symbol in your color rule, it will only calculate your formula for that symbol, regardless of what symbol is displayed in the chart.

## Edit a Color Rule

---

To edit a color rule already entered in Aspen Graphics, follow these steps:

1. Display the Color Rule Dialog.
2. Left-Click a Color Rule to Select it.
3. Make any necessary changes to the color rule.
4. Left-Click on *Done*.

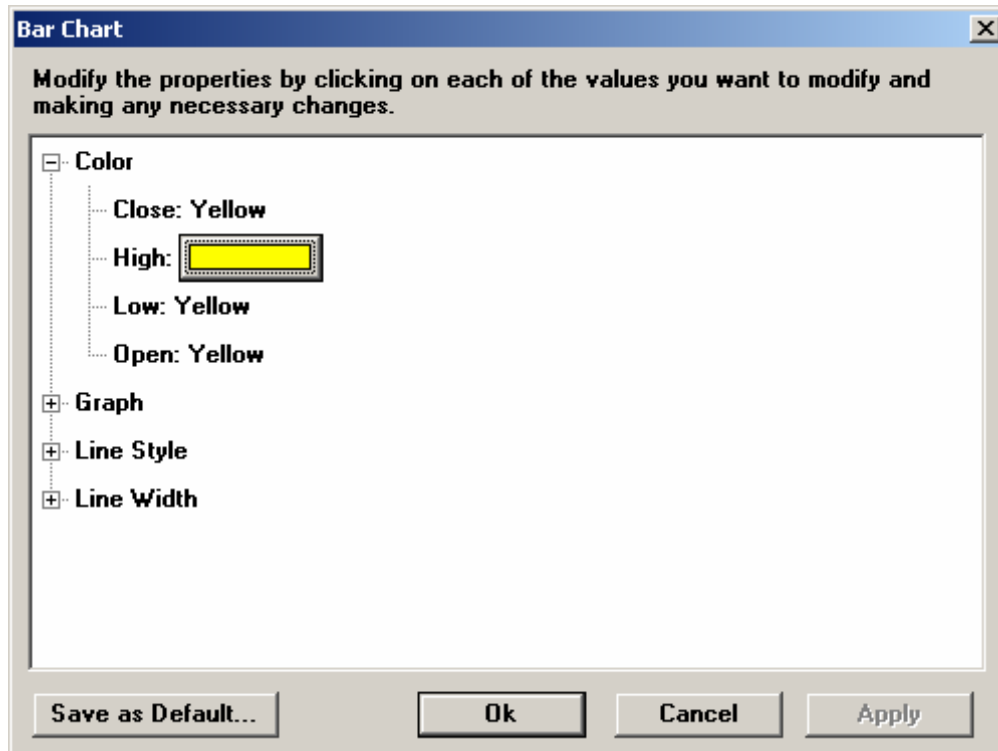
## Using Color Rules in a Chart

---

Once a color rule has been written, an additional step must be taken to activate it on a chart. To display a color rule on the chart, follow these steps:

1. Right-Click the Chart.
2. Left-Click Parameters...
3. Left-Click the + Icon beside the word Color.
4. Left-Click the word Yellow by the High field.





5. Left-Click the Yellow Colored Box to display the Color Picker.



6. Left-Click the Color Rules... Button.
7. Double-Click the Color Rule name to select it.
8. Click Apply.

When you edit an active color rule, the changes will take effect immediately on any chart on which that color rule is active.

When a color rule is activated on a chart and the cursor window is displayed, the High price in the cursor window will be drawn in the same color as the bar.

Other data listed in the cursor window can be displayed in different colors using color rules. Although a color rule enacted on a value other than the High price will change the color of that price in the cursor window, *the color of the bar itself will only be controlled by the color or color rule selected for the High price in the Bar Chart parameter menu.*

## Using Color Rules to Color Studies

Color rules can be displayed on studies as well as price data. When using color rules to color study values, there are two options. If you want the color rule to evaluate data based upon the values of the *study*, use the \$1 convention. For example, to be alerted when the slope of the study is rising, enter the following in the formula field:

```
if($1>$1[1],clr_green,clr_red)
```

To color a *STUDY* based upon *data of the underlying instrument*, RAWDATA must be used instead of \$1. For example, to be alerted when the instrument's price is rising or falling, regardless of the study value displayed on the chart, enter the following formula:

```
if(rawdata>rawdata[1],clr_green,clr_red)
```

With a study displayed in a chart, activate the color rule by bringing using the same method as adding a color rule to a chart.

## Using Number Codes For Colors In A Color Rule

In very lengthy color rule formulas, replacing the number codes for the colors can save valuable space. (Color rule formulas are limited to 255 characters). Number equivalents to system colors are listed below.

Color	Named Constant	Number
Yellow	clr_yellow	0
Green	clr_green	1
Cyan	clr_cyan	2
White	clr_white	3
Violet	clr_violet	4
Pink	clr_pink	5
Orange	clr_orange	6
Gray	clr_gray	7
Red	clr_red	8
Blue	clr_blue	9
Purple	clr_purple	10
Black	clr_black	11

The 5% Gain formula, using number codes in place of the colors, would be written the following way:

```
if(pchg($1)>5,1,8)
```

## Coloring Specific Prices

Color rules can be used to color a specific price on the bar chart. For example, to set 5% Gain to the Low price, follow these steps:

1. Right-Click the chart.
  2. Left-Click on Parameters...
  3. Left-Click on the color name to the right of the Low price.
  4. Left-Click on the Colored Box to the right of the Low Price.
  5. Left-Click the Color Rules... button.
  6. Double-Click on 5% Gain.
  7. On the Parameter menu, under the Graph heading, Left-Click on *Bars* and change to *Dots*.
- Left-Click on *Done*.

---

## Alarms

---

Alarms, or "alerts", let a trader know when certain market conditions have been met. They can be a visual alarm, an audio alarm or a combination of the two. An alarm is completely independent of anything else in Aspen Graphics. Once a user sets an alarm, s/he will be free to use their program for whatever they want - to watch another market, for profit and loss analysis, to enter strategies - while the alarm is constantly monitoring conditions in the background.

This saves the user:

- Time – you are free to work on other projects instead of watching a chart, waiting for their criteria to be met.
- Space - you don't have to have a chart or quote window on the screen, so you can dedicate more room to other things.
- Money - alarms are added insurance that a trade opportunity won't be missed.



If the Aspen Graphics session is minimized while you are working on another application, Aspen Graphics will "assert" itself as the active application when the alarm triggers.

---

## What can Trigger an Alarm?

---

Aspen Graphics allows you to set alarms on:

- PRICE:  $c1x2 \leq 19$
- TIME:  $time = 15:30$

- o DATE: `date==12/31/99`
- o EXPIRE: `date==clx4.expire-2` (alerts you 2 days before Nov 2004 crude expires)
- o FORMULAS: `pchg(us#)>=.5` (when the value of "pchg" (percent change) is greater than or equal to .5 for the lead month of bonds).
- o EXPRESSIONS: `sp#.prev-sp#.low>=10` (when S&P is down 10 points from yesterday's close)

Any formula that can be entered in the Formula Writer can have an alarm set on it. Since most of the "canned" studies that come with Aspen Graphics can be written this way, these studies can have alarms set on them.

**Note:** if the formula contains a *ranged* function (e.g. the highest high in the last 14 bars) or a *subscription* (e.g. the previous bar, or two bars back), the formula must include the `Chart()` function. See the [Formulas section](#) of this document for more details on using the `Chart()` function.



Alarms cannot monitor Trendlines or News stories.

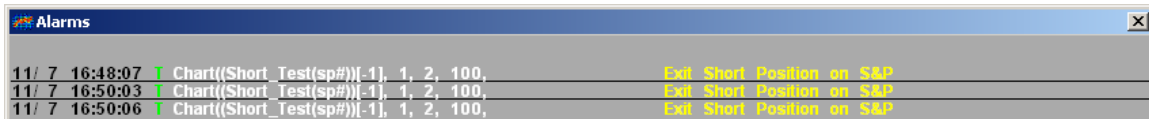
## What Happens When The Alarm Is Triggered?

When an alarm is triggered, an alarm window is displayed across the bottom of the screen (if Visual Alert is enabled). The alarm window will include the date & time the alarm was triggered, the state of the trigger condition (T=true, F=false), the trigger condition, a memorandum (if a message in the Memorandum field is specified) and directions for removing the alarm window from the screen.



If the "Trigger When State" matches the "Current State" in the Alarm Setup Window, your alarm will be triggered as soon as you select *Done*. This allows you to test your alarm after creating it to ensure that it is evaluating your criteria properly.

If more than one alarm is triggered before the alarm window is cleared off the screen, they will be stacked on top of one another. The number of alarms that can be displayed at one time depends on the font size settings; the smaller the font size, the more alarms that can be displayed simultaneously.



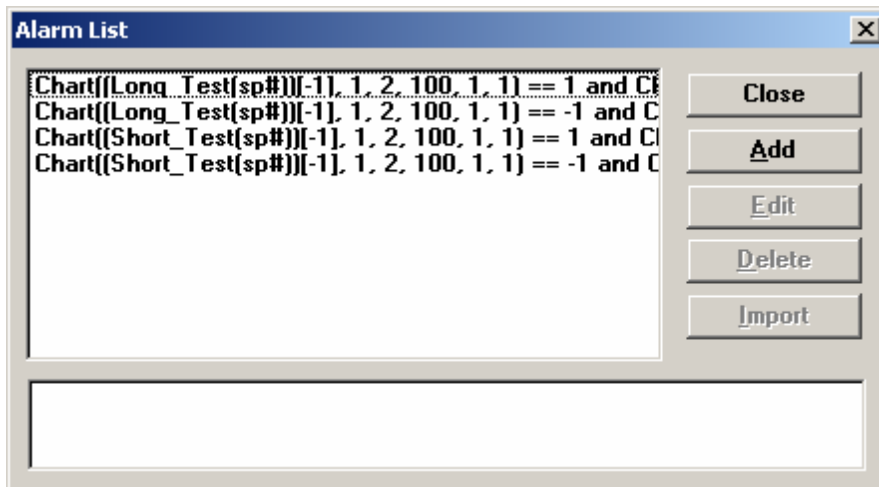
## Limitations on Setting Alarms

- o There is a maximum of 299 alarms that can be defined in any one session of

Aspen Graphics.

- There is a maximum of 256 characters per command
- Activating many alarms that utilize the Chart Function could slow down system performance if they are very math-intensive. This may be alleviated somewhat by adding a "mem" clause (e.g. mem=12336) to the Target line of the icon which launches the Aspen Graphics program. Contact a support technician for assistance in adding this clause.

## The Alarm List Dialog



- Close – Closes the Alarm List Dialog.
- Add – Opens the New Alarm Dialog.
- Edit – Opens the Edit Alarm Dialog.
- Delete – Deletes the selected Alarm.
- Import – Imports Alarms from Previous Versions of Aspen.

## Displaying the Alarm List Dialog

### Using the Main Menu

1. Left-Click Tools in the Main Menu.
2. Left-Click Alarms... in the Tools Menu.

### Using the Context Sensitive Menu

1. Right-Click an *empty* Aspen Workspace.
2. Select Tools.
3. Left-Click Alarms...

## Using Dot Commands

1. Type `.alarm <enter>` anywhere in Aspen.

## Adding or Editing an Alarm

**Edit Alarm**

**Trigger Condition**  
time == 11:15

**Memorandum and Email Subject**  
This is the Alarm

**Command Actions on Trigger**

**Trigger State**  
 True  
 False  
 Changes

**Trigger Frequency**  
 Continuous  
 Daily  
 Once

Enabled  
 Auto-Delete  
 Visual Alert

**Audio Alarm:** ALARM1.WAV  
 Audio Repeat

**Email**  
Frequency: Once **Configure Email**  
Recipient(s): support@aspenres.com; test@aspenres.com

**Current State:** FALSE

OK Cancel Delete

- Trigger Condition – Specifies the alert condition. (SPM7 == 765 or CK8.Recent – CN8.Recent > 4)
- Memorandum – Optional and requires no entry. Configures a message that will be displayed in the visual alert box when the alarm is activated.
- Command Actions on Trigger – Allows the user to assign an action to be performed when the alarm conditions are met.
- Trigger State – Set the alarm to be activated when the Trigger Condition is *True*, *False*, or when the current status *Changes*. Selection depends on how the Trigger Condition is written. The Changes selection is probably best used when triggering the crossing of two study lines.
- Enabled – Disables or enables the alarm.
- Auto-Delete – Automatically deletes the Alarm after triggering.

- Visual Alert - Toggle the visual alarm window on or off.
- Trigger Frequency – *Continuous*: configures the alarm to trigger continuously. *Daily*: Configures the alarm to trigger once a day. *Once*: Configures the alarm to trigger once.
- Audio Alarm – Configures the alarm to place a specified wave file. Use the up and down buttons to scroll through the possible wave files.
- Audio Repeat – Selecting this option will configure the alarm to repeat an audio alert every 10 seconds until the alarm is disabled. Deselecting this option will configure the alarm to play the audio alert only once.
- Frequency – *Never*: configures the alarm to never send an email. *Always*: Sends an email every time the alarm triggers. *Once*: Sends the email only once when the alarm is triggered.
- Configure Email – Launches the setup options dialog for configuring email preferences.
- Recipient(s) – Configures one or more email addresses as recipients when the alarm triggers. Separate multiple addresses with a semi-colon.  
([myEmail@email.com](mailto:myEmail@email.com); [yourEmail@email.com](mailto:yourEmail@email.com))

## Defining a Trigger Condition

The first step in writing an alarm is establishing the Trigger Condition. To enter a Trigger Condition, Left-Click in the Trigger Condition textbox and type the condition. There are six types of criteria that can be entered in this field. The following sections include definitions and examples of these.

### Instrument Symbols and Prices

An alarm can be configured for any instrument that is defined in your feed. The Trigger Condition needs to reference a *specific instrument*; using the \$1 variable will return an error message in the Current State field.

Examples	Result of Condition
<code>ibm==137</code>	When the price of IBM reaches 137

### Times

Alarms can be written to trigger at a specific time. These trigger conditions need to be written in HH:MM format, using 24-hour notation.

Examples	Result of Condition
----------	---------------------

time>=9:00	On or after 9:00 a.m.
time==15:45	At 3:45 p.m.

## Dates

Dates used in trigger conditions need to be stated in mm/dd/yy format. Dates can be combined with times using the and operator.

Examples	Result of Condition
date==4/15/97	On April 15, 1997
date>=1/1/98	On or after Jan 1, 1998
date==6/1/97 <b>and</b> time==14:00	On June 1, 1997 at 2:00 p.m.

Aspen Graphics' date math capabilities make it possible to create alarms that tell you when it is a certain number of days before a future's or option's expiration date.

Examples	Result of Condition
date==ck300c.expire-3	Three days before expiration
date==spu7.expire	Expiration day
date<=dmm7.expire-2	Two days before expiration

**Table 17**

## Formulas

Any formula defined in the Formula Manager can be referenced in the Trigger Condition of an alarm. If the formula was written using the \$1variable the symbol must be included in the trigger condition.

Examples	Result of Condition
spread(ck7,cn7)>=0	When the spread value is positive
chart(slowk(sp#,9)>=slowd(sp#,9)[1],1,2,100,0,1)	When the %K line is above %D line



If you are setting an alarm on a formula which requires other parameters in addition to an instrument, you must use the chart function around the formula.



## Functions

An alarm can be set to monitor any Aspen Graphics function. For a complete list of functions, see the Formulas section of this manual.

Examples	Result of Condition
<code>chart((mom(sp#,10)&gt;mom(sp#,10)[1] and mom(sp#,10)[1]&gt;mom(sp#,10)[2]) [-1],1,2,100,1,3)</code>	When momentum is increasing over the last 2 bars
<code>chart((rsi(ck7,14)&gt;70 or rsi(ck7,14)&lt;30)[-1],30,1,100,1,3)</code>	When the RSI is above or below 30

## Expressions

You can write a mathematical expression as a condition for an alarm. An expression can employ any of the operators below.

Operator	Name	Example
<code>^</code>	Exponentiation	<code>kc#^2</code>
<code>-</code>	Negative	<code>-2*(ibm.last)</code>
<code>+</code>	Positive	<code>+spz7</code>
<code>*</code>	Multiplication	<code>42*(ho#)-cl#</code>
<code>/</code>	Division	<code>ibm/indu</code>
<code>+</code>	Addition	<code>ck7+cn7</code>
<code>-</code>	Subtraction	<code>cc#-cc#1</code>
<code>==</code>	Equals	<code>intc==131</code>
<code>&gt;=</code>	Greater than or equal to	<code>kw#&gt;=470</code>
<code>&lt;=</code>	Less than or equal to	<code>time&lt;=14:00</code>
<code>!=</code>	Does not equal	<code>date!=1/1/98</code>
<code>&gt;</code>	Greater than	<code>gcm7&gt;gcz7</code>
<code>&lt;</code>	Less than	<code>ok7&lt;175</code>
A space must be used <i>before</i> and <i>after</i> the next two operators when using them in a formula.		
AND	Evaluates both trigger conditions. Alerts only when <i>both</i> conditions are met.	<code>ck7.high&lt;=300 and cn7.high&gt;=300</code>
OR	Evaluates both trigger conditions. Alerts when <i>either</i> condition is met.	<code>time==9:45 or time==13:10</code>

## Command Actions on Trigger

The Command Actions on Trigger feature allow you to assign any Aspen Graphics command to be enacted when your alarm is triggered. Individual commands should be separated by a semi-colon. For example, if you have written an alarm to trigger when the price of May corn goes above 305 and would like to print a page (called My\_Page) when the alarm is triggered, enter the following in the Command Actions on Trigger field:

```
My_Page; \CK7;.print
```

When the alarm is triggered, My\_Page will be displayed on your screen. May corn will be entered into all windows on the page, and the page will be printed.

The portion of the screen that will be printed when the alarm is triggered depends on the selection in the *Object* section of the Print Setup box. If *Screen* is selected, the entire contents of the screen, including the alarm window, will be printed. If *Active Window* is selected, only the window which was active when the page was saved will be printed.



If you want to auto-print using this method, make sure that Print Preview (found in the Print Setup box) is *not* selected. If Print Preview is selected, the system will wait for you to approve the print job before it is printed.

## Setting an Audio Alarm

The Audio Alarm field configures the alarm assign a sound sequence to an alarm. Single left clicking in the *Audio Alarm* field will scroll through the audio files assigned to the audio alarms. Setting this field to None will only trigger a visual alarm; no audio alarm will accompany it.

If your computer is equipped with a sound card, you have access to up to 99 audio alarms. Using the Windows® audio recorder, you can record a custom message and assign it to an alarm. The Windows® audio recorder creates .WAV files. To create a .WAV file for use in an Aspen alarm, record a message, and name the file using the convention ALARM<integer>.WAV. Examples of names for your .WAV files are:

```
Alarm1.wav  
Alarm23.wav  
Alarm89.wav
```

Up to 99 unique .WAV files can be saved and applied to the Aspen alarm feature. Save the .WAV files to the \apex directory on the drive Aspen Graphics is located in.


To assign a .WAV file to an alarm, left click in the *Audio Alarm* field until the file name which corresponds to the name of the .WAV file is displayed. For instance, if the file is named Alarm16.wav, scroll through the numbers in the Audio Alarm field until the name

ALARM16.WAV appears. When the alarm is triggered, the selected custom recording will play.

## Alarms on Instruments Quoted in Fractions

Some equities and commodities are quoted in fractional numbers, i.e. U.S. Bonds are quoted in thirty-seconds and grain options are traded in eighths. To set alarms based on fractional prices, use the following syntax:

Syntax	Meaning
v+numerator	Specifies eighths. To enter a price in the trigger condition in eighths, (for example, sx600c==29 <sup>3</sup> / <sub>8</sub> ) type in sx600c==29 v3.
'+ numerator	Specifies thirty-seconds. To enter a price in the trigger condition quoted in 32's, (i.e. us#>=107 <sup>26</sup> / <sub>32</sub> ), type in us#>=107 '26.
'+<32 <sup>nd</sup> s>< <sup>1</sup> / <sub>8</sub> 's of 32 <sup>nd</sup> s>	Specifies half- and quarter-thirty-seconds. See the following section on Half and Quarter Thirty Seconds.

 To indicate a single digit numerator for 32's, you must preface it with a zero. For example: us#==107 <sup>3</sup>/<sub>32</sub> would be entered us#==107'03. A price of less than one also needs a zero. <sup>14</sup>/<sub>32</sub>'s would be entered as: 0'14.

## Half- and Quarter-Thirty-Seconds

To enter a trigger condition based on half-thirty seconds, follow these steps:

1. Reduce the fraction to thirty-seconds. This will produce one of two conclusions:
  - a) The fraction reduces to an even number. For example, you want to set an alarm to alert you when the five-year note hits 104 <sup>28</sup>/<sub>64</sub>. This fraction reduces to <sup>14</sup>/<sub>32</sub>. The Trigger Condition should be written as:  
fv#==104'14

- b) The fraction does not reduce evenly. For example, you want to be alerted when it hits  $104^{43}/64$ . This trigger condition should be entered as:

`f v # == 104 ' 214`

104 - Represents the whole-number portion of the price.

' 21 - Represents the reduced numerator ( $43/64$  reduces to  $21.5/32$ ).

4 - Represents the multiplier  $4/8$ , converting the fraction to half-thirty-seconds.

2. To enter a trigger condition based on quarter-thirty-seconds follow these steps:

- a) Reduce the fraction to thirty-seconds.  
If it reduces evenly, follow **step a** in the previous section.

If the fraction does not reduce evenly,  
follow these steps:

- . For example, you want to use  $t u \# == 10253 / 128$  as the Trigger Condition. It would be entered as:

`t u # == 102 ' 132`

102 - Represents the whole-number portion of the price.

13 - Represents the reduced numerator ( $53/128$  reduces to  $13^{1/4}$  thirty-seconds).

2 - Represents the multiplier  $2/8$ , converting the price to quarter-thirty-seconds.

---

## Alarm Examples

---

These examples highlight some of the opportunities available through Alarms.

## Slow Stochastic Lines Crossing

---

This alarm triggers each time the SlowD line crosses the SlowK on a daily bar chart. Three Aspen Graphics functions are used in this alarm: the `ssstoch()` function, which replicates the SlowD line of a Slow Stochastic, the `sstoch()` function, which replicates

the SlowK line, and the `chart()`. The Chart Function () works like a shell around the other two functions, providing the same frame-of-reference to the alarm when charting the study.

**Trigger Condition:**

```
chart((ssstoch(us#,9,3,3)>=sstoch(us#,9,3))[-1],1,2,100,1,3)
```

**Trigger State:**

Changes

## Slow Stochastic Lines Crossing Above 80 or Below 20

---

This alarm differs from the earlier Stochastic alarm it only alerts you when the SlowD and SlowK lines cross above 80 or below 20.

**Trigger Condition:**

```
chart(((ssstoch(us#,9,3,3)>=sstoch(us#,9,3) and
ssstoch(us#,9,3,3)[1]<sstoch(us#,9,3)[1] and sstoch(us#,9,3)>=80)
or (ssstoch(us#,9,3,3)<=sstoch(us#,9,3) and
ssstoch(us#,9,3,3)[1]>sstoch(us#,9,3)[1] and
sstoch(us#,9,3)<=20)[-1],1,2,100,1,3)
```

**Trigger State:**

True

## Price Breakouts from Bollinger Bands

---

This alarm triggers when the price of NGZ9.fs breaks the top or bottom of the Bollinger bands. The function used for the Bollinger Band calculations is `bb()`. Default parameters are used in the example; these can be modified at the user's discretion.

**Trigger Condition:**

```
chart((NGZ9.low<bb(ngz4,20,-2,1) or NGZ9.high>bb(NGZ9,20,2,1))
[-1],60,1,100,1,1)
```

**Trigger State:**

True

The Chart Function parameters used above ( i.e. [-1], 60, 1, 100, 1, 1 ) are used when:

- [-1] the alarm recalculates each time there is a price change
- 60, 1 the hourly study values
- 100 the default setting for “Numbars”
- 1 Nogaps On
- 1 includes the Night session in calculations

## Momentum Changes Direction

---

This alarm triggers when the 10-period momentum of Microsoft begins to change direction. The Chart Function parameters used are the same as in the example above.

### Trigger Condition:

```
chart( (mom(msft,10)>mom(msft,10)[1] and  
mom(msft,10)[1]<mom(msft,10)[2]) or (mom(msft,10)<mom(msft,10)[1]  
and mom(msft,10)[1]>mom(msft,10)[2]) [-1], 60, 1, 100, 1, 1)
```

### Trigger State:

True

## Option Volume Increases

---

Stock option traders sometimes follow the volume on the first calls in-the-money. When the volume on these options suddenly increases, it can signal that a rally in the price of the underlying is on the way.

This alarm triggers when the daily volume on the first in-the-money call triples from the previous day's volume.

### Trigger Condition:

```
chart( (mu#+1c.volume>=3*mu#+1c.volume[1]) [-1], 1, 2, 100, 1, 3)
```

### Trigger State:

True

The Chart Function parameters used above ( i.e. [-1], 1, 2, 100, 1, 3 ) are used when you want Calc On ( [-1] ), a daily time frame ( 1, 2 ), the default setting for “numbars” ( 100 ), the Nogaps On setting ( 1 ) and the Night session omitted from consideration ( 3 ).

## Moving Average Crossover

---

In this example we use two Moving Averages: one based on 18 periods, the other based on 40 periods. Once again we need the Chart Function because we are doing this on 5-minute bars and are *comparing* the *current* bar with *previous* bars.

### Trigger Condition:

```
Chart((savg(msft,18)>=savg(msft,40) and savg(msft,18)[1]<=
savg(msft,40)[1] or savg(msft,18)<=savg(msft,40) and
savg(msft,18)[1]>=savg(msft,40)[1]) [-1],5,1,100,1,3)
```

### Trigger State:

True

## Index or Instrument Outside a Given Range

---

This type of alarm monitors indices or instruments trading outside a pre-defined range. It triggers when the TIKI (Tick of Dow Jones Industrials) is above 23 or below -23.

### Trigger Condition:

```
tiki>23 or tiki<-23
```

<sup>4</sup> Another equivalent version of this trigger condition would be:

### Trigger Condition:

```
abs(tiki)>23
```

### Trigger State:

True

## Instrument Up/Down 5 points

---

In this particular example we used Microsoft's ticker *and* we needed the Chart Function. Can you see why the Chart Function was needed?

We wanted to be alerted if Microsoft went **up** 5 points or more on an intraday chart. We are comparing the currently building 15-minute bar with *previous* bars. Because we are *comparing* the *current* bar with *earlier* bars we needed to use the Chart Function.

### Trigger Condition:

```
Chart(((msft.recent-msft.open)>=5)[-1],15,1,100,1,1)
```

**Trigger State:**

True

## Auto-Print 3 days prior to Expire

---

This alarm will automatically print a page called “great\_page” 3 days before the prompt crude oil futures contract expires. The command entered tells Aspen Graphics to bring up the page called *great\_page*, change all the symbols on this page (using “\”) to the lead month of crude (cl#), and send this page to the printer

**Trigger Condition:**

```
date = = cl#.expire-3
```

**Trigger State:**

True

**Command Actions on Trigger:**

```
great_page;\cl#;.print
```

## DDE / Exporting Data to Excel

---

**Dynamic Data Exchange (DDE)** allows information from Aspen Graphics data files to be transferred directly to Microsoft® Excel, a spreadsheet program. The links between the two programs are “live”; as a value is updated in Aspen Graphics, it is immediately updated in the spreadsheet. This can save time if you manually post values (i.e. daily closes) in spreadsheets for reports or analysis. Up to 5000 links containing 2-4000 bars each are available for both import and export.

With DDE you can also:

- Export historical information from Aspen Graphics into Excel
- Import your own historical or “live” data *from* a spreadsheet program *into* Aspen Graphics
- Create symbols not yet defined in your Aspen Graphics database, such as IPO's.



Microsoft® Excel is the only spreadsheet program we currently recommend using with the Aspen Graphics DDE utility.



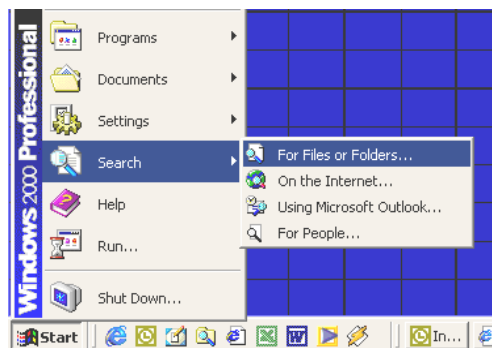
---

## Loading the Aspen Graphics DDE toolbar in Excel

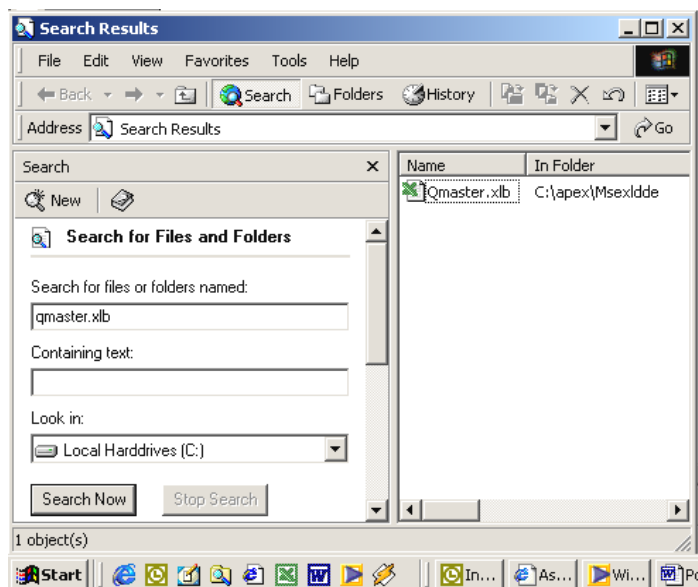
---

If Excel was already installed on your computer when you loaded the Aspen Graphics software, you will be able to load a custom toolbar into Excel to better facilitate creating links between the two programs. The initial setup is a one-time process. These steps do not need to be repeated each time use DDE is used. To display the toolbar, follow these steps:

**Step 1:** Left click on the **Start** button on the Windows® Taskbar; left click on **Search** and then **Files or Folders...**



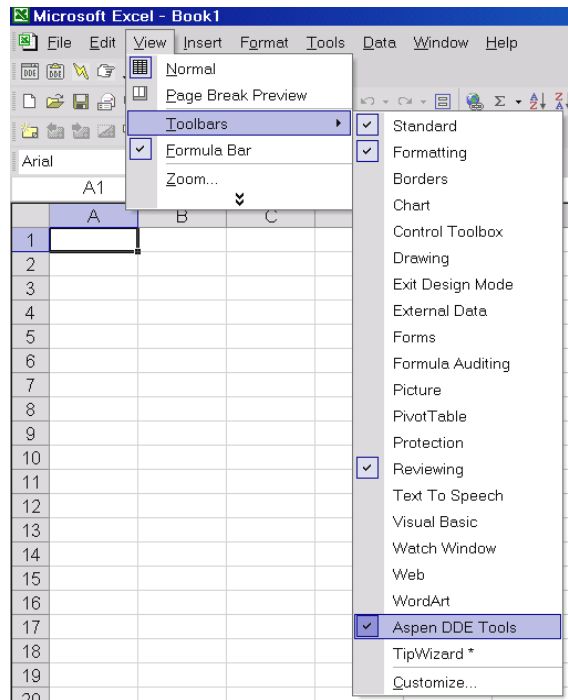
**Step 2:** Enter **qmaster.xlb** in the **Named** field of the dialog box and then left click on **Search Now**.



**Step 3:** Double-left click on **qmaster.xlb** when it comes up in the window on the right side. Note the path to where this file resides (usually c:\apex\msexldde as in the example above).

**Step 4:** Start Excel. Left-click on **View > Toolbars**. From the

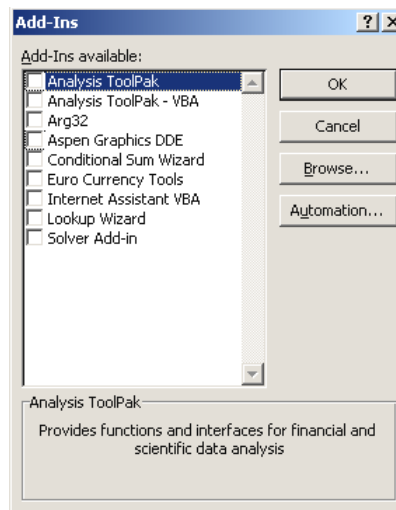
Toolbar menu select **Aspen Graphics DDE Tools**.



The custom Aspen Graphics DDE Toolbar will now be displayed.



**Step 5:** The final step is to left click on **Tools > Add-ins...** Left click the **Browse...** button and look in **c:\apex\msexldde** (or, substitute the path from Step 3 above if qmaster.xlb was found in a different folder.)



**Step 6:** Left click on **arg32.xla** and then click on **OK**. When returned to

the **Add-Ins** list, left-click on **OK**.

---

## Displaying the DDE Link Generator Dialog Box

---

A DDE link can be initiated from within either Aspen Graphics or Excel; however, both programs must be running for the links to be updated. The following steps are performed in the Excel program.



Be sure to select an empty cell **Before** performing the next step! The data will be pasted into the active cell automatically.

1. Left-Click a Cell in Excel to select it.
2. Single left click on the first button on the Aspen Graphics DDE Toolbar.

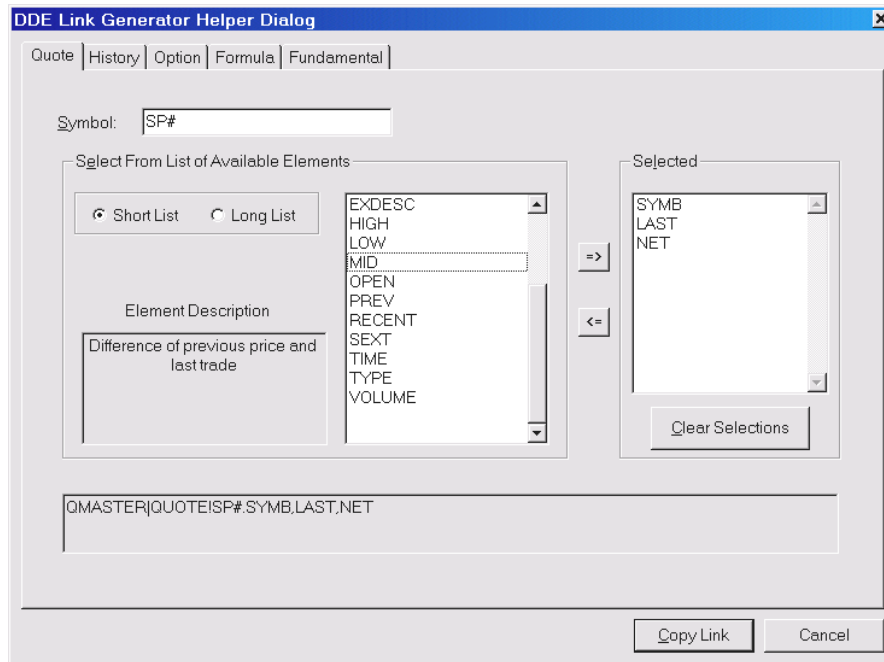


This action will display the DDE Link Generator Helper Dialog. There are four tabs on the DDE Link Generator Helper Dialog Box: *Quote*, *History*, *Option* and *Formula*. An explanation of each tab follows.

### Quote – “Live” Links from Aspen Graphics into Excel

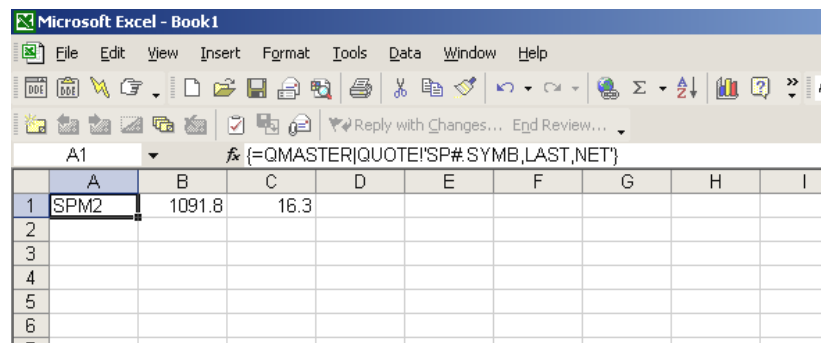
---

The first tab on the DDE Link Generator is labeled **Quote**. A link created with this option will mimic a quote page in that each time the value changes in Aspen Graphics, the quote element will update in the Excel spreadsheet.



## To create a link:

1. Enter the `Symbol` to be linked to the spreadsheet.
2. Select the quote fields in the link from the list in the middle of the menu. Left-Clicking a quote field displays a description of the selection in the `Element Description` box. Double-Click the element to send it to the `Selected` box (a double left click on an element in the `Selected` box puts it *back* in the original list).
3. When all of the quote elements have been selected, left click on the `Copy Link` button. The link is pasted into the spreadsheet.



The order in which elements are selected for the link is important! The elements will be displayed on the spreadsheet from left to right in the order selected. This is an indivisible array; the fields cannot be rearranged once the array is pasted into Excel. Carefully plan how the link should be viewed. (Hint: Select `SYMB` as the first element of the link. This will aid in identifying which symbol the data is associated with.)

## History – Exporting Historical Data from Aspen Graphics to Excel

To access Aspen Graphics historical database within Excel, a History link can be created. The History link differs from the Quote link. The output can contain up to 4000 periods of data in one link.

### To create a historical link:

1. Enter the **Symbol** to be linked to the spreadsheet.
2. Select the **Interval**, or time base, for the historical data to be exported.
3. If **Intraday** is selected, specify the number of minutes for each interval in the "**Span**" field. The number entered in the span field is the same as choosing a time frame in a chart. For example, a 15 entered in the Span field would export 15-minute data into Excel.
4. Choose the **Start Date** and **End Date** for your link, in *mm/dd/yy* format. Or, instead enter a number into the **Periods** field to have a rolling link that will always display the current period and the specified number of periods back from the current bar. **Start Time** and **End Time** will set the link to start at a particular time during the first day and end at the specified time on the final day of the link.
5. Select the **Quote Elements** for the link. By default, all the quote elements are selected; deselect any unwanted elements by Left-Clicking the element.
6. Selecting **Skip gaps** will close any gaps in data for holidays or other instances when there no data is available.
7. Select the **Copy Link** button in the lower right-hand corner. The link will now be pasted into Excel.

The screenshot shows the "DDE Link Generator Helper Dialog" window. It has a title bar with a close button. Below the title bar are tabs for "Quote", "History", "Option", "Formula", and "Fundamental". The "Quote" tab is active. The "Symbol" field contains "IBM". Under the "Interval" section, "Daily" is unselected, "Intraday" is selected, and the "Span" field contains "15". "Tick", "Weekly", "Monthly", and "Quarterly" are unselected. The "Skip gaps" checkbox is unchecked. The "Start Date", "Start Time", "End Date", and "End Time" fields are empty. The "Max days" field contains "0" and the "Periods" field contains "500". The "Quote Elements" list is expanded, showing "SYMBOL", "DATE", "TIME", "HIGH", "LOW", "OPEN", "CLOSE", "VOLUME", and "OPEN INTEREST". A "Clear" button is below the list. At the bottom of the dialog, there is a text box containing the generated link: "QMASTER|HIST|IBM.INT=MIN.SPAN=15.PRDS=500.OE=SM,DT,TM,HILLO,01,ST". At the bottom right, there are "Copy Link" and "Cancel" buttons.

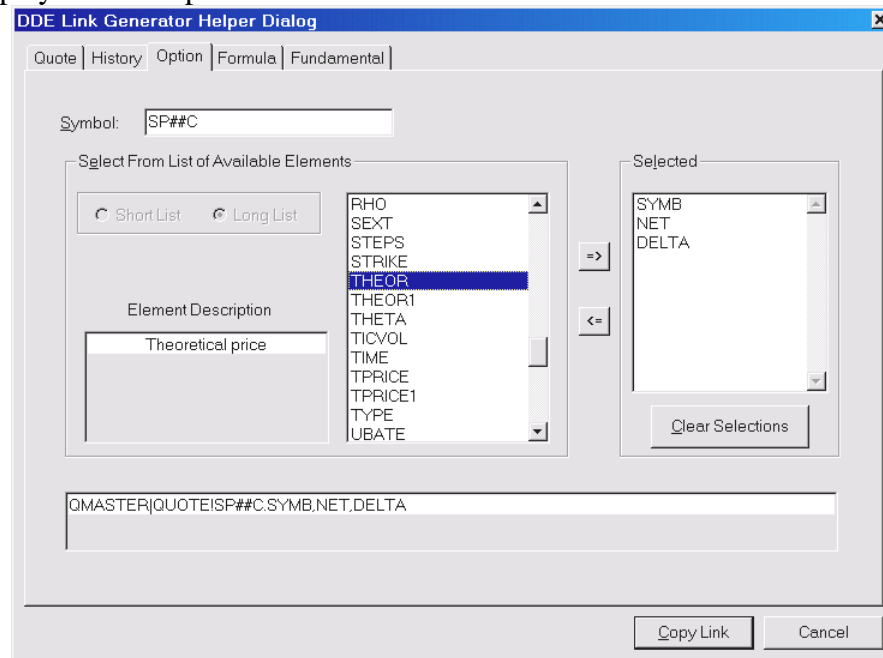
## Options - Exporting Theoretical Values and Volatility Data from Aspen Graphics

The **Option** link setup window looks identical to **Quote**, but has fields pertaining specifically to options analysis, including Implied Volatility, Theoretical Option Price and the Greeks. These options are only available if subscribing to either Basic or Advanced Aspen Graphics Optionanalysis.

To export *price* data for an option, use the **Quote** tab and follow the steps in the “Create a Quote Link” section above.

### To link Options specific data:

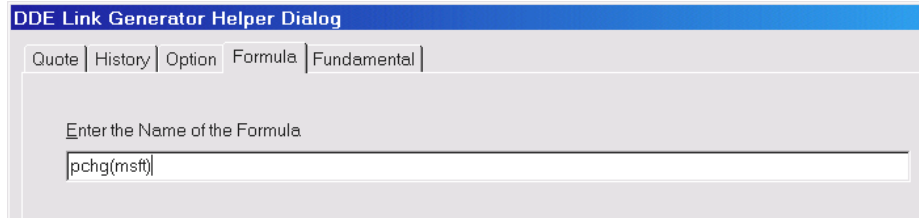
1. Enter an option symbol or macro into the **Symbol** field.
2. Double left click on the Options Quote Codes to be exported from the **List of Available Elements**.
3. Left click on **Copy Link**. The requested options information should now be displayed in the spreadsheet.



## Formula - Exporting an Aspen Graphics Formula to the Spreadsheet

---

The **Formula** tab only has one field for input. Enter the name of the formula as it appears in the Aspen Graphics Formula Manager, followed by the symbol(s) to be used in the formula in parentheses.



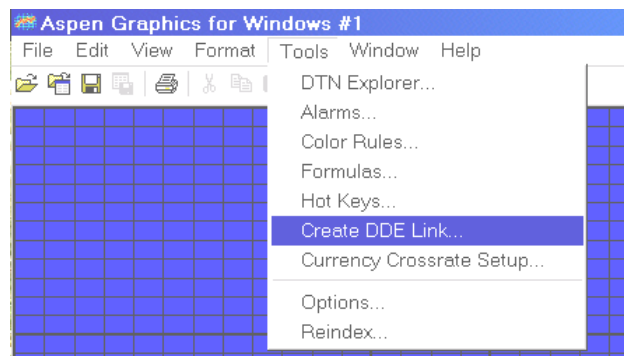
A formula can also be written directly into the dialog box. The formula must use Aspen Graphics Formula syntax and remember to use the Chart Function in studies that call on past bars.



## Initiate a DDE Link from within Aspen Graphics

---

A link can be initiated from the Aspen Graphics toolbar via **Tools > Create DDE Link**.



The "DDE Link Generator Helper Dialog" box will appear. Create the desired link as outlined in the segments above and then start Microsoft® Excel. Highlight the cell into which the link will be pasted. *If you selected more than one **quote** or **option** element*, select the "left-most" cell in which you want the link to begin. If you created a history link, select the cell which will be the upper-left corner of your array.

Click on the second custom Aspen Graphics button in Excel (the DDE clipboard).



---

## Creating a Symbol using DDE

---

The Personal (\Stand Alone) Edition and Server versions of Aspen Graphics allow the users to define a custom "symbol" and then import data for that symbol into the Aspen Graphics data files. There are several benefits for creating a custom symbol to do this:

- Track a basket of instruments, and calculate the P&L of that basket in Excel. Aspen Graphics' charting capabilities can then graph the performance of that basket, just as an equity or index.
- Chart data that isn't offered by the data provider, like total open interest or volume for a commodity.
- Spreadsheet contains data from some external source and you would like to view that data in Aspen Graphics.
- Results of formulas created in Aspen Graphics can only be displayed as a line, dots or a histogram. Using DDE, formula values for a period of time can be arranged in Excel, imported into Aspen Graphics as synthetic symbols, and charted as bars or candlesticks.



This feature is **not** available with the Aspen Graphics on the Internet versions of the software.

To create a symbol, left click on the third custom Aspen Graphics button (the lightning bolt).



The **Create Symbol DDE Helper** appears, allowing you to enter all the relevant information about the "symbol" you are creating.



Before naming a symbol, check to make sure there is not an existing symbol trading with that name. In Aspen Graphics, bring up the page SUPERQUOTE, then type in the prospective name. If it is undefined, use that name for the symbol. If it is quoted, try a different, more descriptive name.



## Create Symbol DDE Helper Fields

Field	Contains	Examples
Symbol	Name of Symbol	Corn_Oi
Description	Description of Symbol (appears on a chart or quote page).	CBOT Corn Total Open Interest
Scale	Increments in which a symbol trades (same as “Units” on Superquote)	.01, $\frac{1}{8}$ , 1, etc.
Exchange	Exchange on which the instrument will trade (for synthetic symbols based on real symbols, use the exchange for the real symbol)	CBOT
Type	Type of Instrument (stock, future, option, index)	Future
Base 100	Only for interest rate futures subtracted from 100	(leave blank)
Currency	Currency in which the instrument trades	US Dollars
Amount/Pt	Dollar value of a one-point move (same as “Dollars” on Superquote)	50
Volatility	Base volatility at-the-money; optional	(leave blank)
Minimum Tick	Minimum number of ticks per trade (For example, if the symbol scale is .01, but the smallest uptick or downtick is .05, the minimum tick would be 5 with the Scale set to .01. Most of the time this setting is 1.)	1
Expiration	Expiration date of the symbol (for future or option symbols only)	12/31/07 for futures or options, leave blank for other types
Trading Hours	Session start and ending times, and time zone of exchange (left blank, these will default to the exchange entered above)	(leave blank)

If the symbol Type is entered as an Option, the additional fields of **Strike Price**, **Underlying Symbol**, **Strike Scale** (minimum strike units), **Put/Call**, and **Option Type** (whether or not early exercise is allowed (American) or exercise is only allowed at expiration (European)) must also be entered.

Once the above fields are entered and **OK** is selected, the new symbol will be defined in the Aspen Graphics Master Table (the data file which contains symbol information).

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## Importing Data from Excel to Aspen Graphics

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There are two ways to export data *from* Excel *into* Aspen Graphics: as an array of data from Excel (non-real-time import) or a "live" link using the Aspen Graphics Tick function (real-time updating). This feature is only available with the Aspen Graphics Standalone and Aspen Graphics Server versions of software.

### Importing Static ("historical") Data from Excel into Aspen Graphics

---



A symbol must have been created for the data that you want to import into Aspen Graphics.

The order of the data in Excel is very important. The table below shows the format of the data in the spreadsheet. This is an **ARRAY** of data. It consists of two sections: the **Top Row** (in yellow highlight) and the **Body** (the remaining data series.)

- The first cell of the Top Row contains the **Symbol Name**.
- The second cell tells Aspen Graphics the **Type of Data** in the Body.

<b>PwrUser</b>	<b>HLO C</b>				
2/7/97	5:00	112.5	111.5	111.5	112
2/10/97	5:00	112.1563	111.7813	111.875	112
2/11/97	5:00	112.1875	111.875	112.125	111.9688
2/12/97	5:00	112.25	111.6875	111.9375	111.9375
2/13/97	5:00	112.875	111.9375	112.0625	112.8438
2/14/97	5:00	113.5938	113.0625	113.1563	113.4375
2/18/97	5:00	113.7813	113.1875	113.7813	113.375
2/19/97	5:00	113.6563	113	113.3438	113.1563

Contents of 2 <sup>nd</sup> Cell	Imports Data	Aspen Server Data File	Order of Data in the Array
TICKHIST	Import of tick data	Ticks.dat	Date, Time, Price, Volume
HLOC , 15	Import of 15 min. data	Bars15.dat	Date, Time, High, Low, Open, Close
HLOCV , 15	Import of 15 min. data	Bars15.dat	Date, Time, High, Low, Open, Close, Volume, Open Interest

HLOC	Import of daily data	Days.dat	Date, Time, High, Low, Open, Close
HLOCV	Import of daily data	Days.dat	Date, Time, High, Low, Open, Close, Volume, Open Interest

The Body of the array must always have the date and the time in the first two columns. The next columns will contain the price data, and volume and open interest if applicable. Once the array of data is properly formatted, simply highlight the entire array (Top Row and Body) and Left-Click on the fourth button on the DDE Toolbar. The data will be written to the Aspen Graphics database(s) and available on a chart of the corresponding time frame (.day if the data was based on daily values.)



## Import "Live" Data using the Aspen GraphicsTick Function

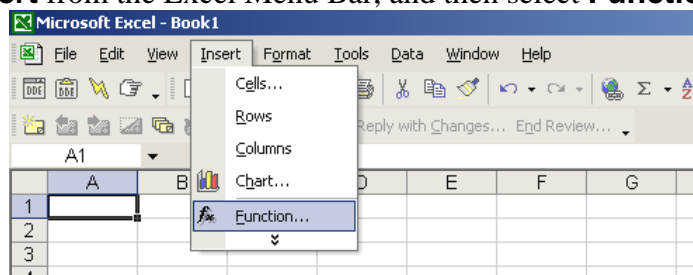
The Aspen GraphicsTick function allows values from Excel to be imported into Aspen Graphics in real-time. Excel containing established live links from Aspen Graphics to Excel and manipulated the data once it arrived in Excel, that manipulated value can then be sent back to Aspen Graphics via a live link.

Since the Aspen GraphicsTick function sends information to Aspen Graphics as tick data, it will be written to the TICKS.DAT file. It can't be viewed on a daily (or higher) chart, because those charts reference the DAYS.DAT data file. To chart data from Excel on a daily chart, use the method outlined above ("Exporting Static Data from Excel to Aspen Graphics").

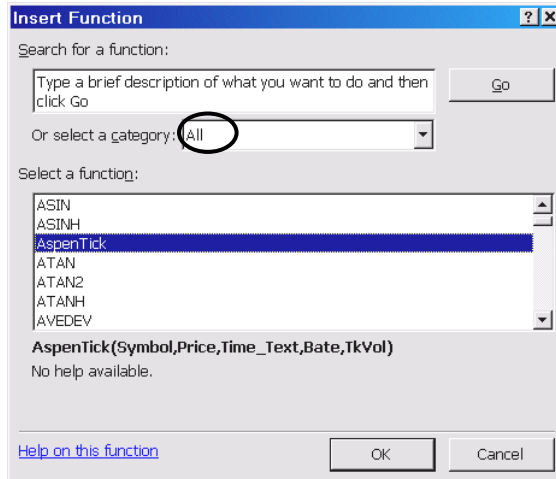
First make sure you have created a symbol to assign the data you want to export.

Aspen GraphicsTick is a function which is placed in Excel when installing or upgrading Aspen Graphics. Once you have a cell in Excel that is producing the values you want to import to Aspen Graphics, select an empty cell, then:

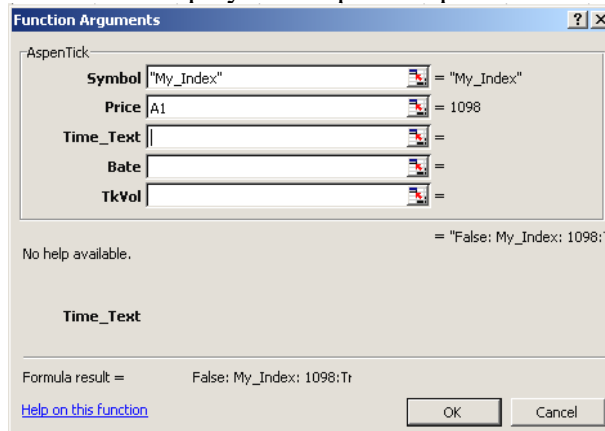
1. Select **Insert** from the Excel Menu Bar, and then select **Function...**



2. In the **Insert Function** dialog, make the following changes:
3. Select the **All** category in the "Select a Category" field.
4. Choose **Aspen GraphicsTick** from the "Select a Function" list.



5. Left click on **Next**. This displays an Aspen GraphicsTick Setup Window.



6. Enter the following information into the Aspen GraphicsTick dialog:

- Symbol - Enter the name of the symbol name used to bring up this data once it is in Aspen Graphics.
- Price – Left-Click on the cell whose value is to be linked to Aspen Graphics. The remaining fields are optional

- Time\_Text - Used assigning a time to the tick OTHER THAN the current time. Leave blank to default to the current system time.
- Bate – Specifies the price to reflect TRADE, BID, ASK, SETTLE, OPEN or CLOSE, enter those values here. If left blank, all prices are marked as trades.
- TkVol - Enter the tick volume associated with the price. If left blank, the value will be 1.

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## DDE Examples

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The following examples illustrates some of the possibilities available in Aspen Graphics and DDE.

### Displaying a Formula Value as a BAR Chart (intraday)

---

By default, a formula is displayed as a line on an Aspen Graphics chart. Users who would like to see the values displayed in other formats can use the Aspen GraphicsTick DDE function. You would use this feature if:

- You would like to see a custom formula (i.e. the spread of two commodities or a Natural Gas strip) as a bar chart, not a line or histogram.
- You like to use Candlesticks or Point & Figure charts to analyze markets and want to use this method for the formula.
- You want to easily quote the Net, Previous or any other quote value for the formula.

The following example uses a July/December spread formula for Corn Futures, but the same steps apply to any Aspen Graphics or custom formula in your system.

1. Display the Formula tab of the DDE Link Generator Dialog Box. In the formula line, type in the formula `CN2-CZ2`, then click on the Copy Link button.
2. The next step is to create a symbol so that you can pipe the spread values back into Aspen Graphics. To do this, click on the lightening bolt icon on the DDE toolbar to display the Create Symbol DDE Helper box. Enter the following information into the dialog box:

3. In the worksheet which contains the spread formula, select an empty cell and insert the Aspen GraphicsTick function, following the parameters below:
4. In the Symbol field, enter the name of the symbol created. Left-click in the Price field, and then left click on the cell which contains the spread link. This enters the cell reference into the Price field. The other fields are optional and can be left blank.
5. Click on OK.

	A	B	C	D	E	F	G
1		-15.25					

Switch back to Aspen Graphics, bring up a 0 minute chart and enter your symbol. As the formula updates in Excel, it will tick on a Aspen Graphics chart. The new symbol can be charted in any intraday time frame; a close approximation to a daily chart is a 1439 minute chart (1 minute less than 24 hours.)

## Displaying a Formula Value as a BAR Chart (Daily)

---


This example illustrates how to create a daily bar chart for a three month Natural Gas Strip. The same method can be used to create daily bars with other Aspen Graphics formulas.

1. In the Aspen Graphics Formula Manager, create the following formulas:
  - a.  $\text{strip3}=(\text{ng\#}+\text{ng\#1}+\text{ng\#2})/3$  or any variation on this with more months, etc.
  - b.  $\text{stripOpen}=(\text{ng\#.open}+\text{ng\#1.open}+\text{ng\#2.open})/3$
  - c.  $\text{stripMax}=\text{chart}(\text{rmax}(\text{strip3}(\text{ng\#},\text{ng\#1},\text{ng\#2}),310)[-1],1,1,100,1,3)$
  - d.  $\text{stripMin}=\text{chart}(\text{rmin}(\text{strip3}(\text{ng\#},\text{ng\#1},\text{ng\#2}),310)[-1],1,1,100,1,3)$
2. Open a new spreadsheet in Excel (Aspen Graphics must be running in the background). Left-Click cell C2 of the spreadsheet.
3. Display the Formula tab of the DDE Link Generator Dialog Box.
4. Type:  $\text{stripMax}(\text{ng\#},\text{ng\#1},\text{ng\#2})$  into the Formula field.
5. Left-Click the Copy Link button.
6. Select cell D2. Display the Formula tab of the DDE Link Generator Dialog Box again.
7. Enter the formula  $\text{stripMin}(\text{ng\#},\text{ng\#1},\text{ng\#2})$
8. Select cell E2.
9. Enter the formula  $\text{stripOpen}(\text{ng\#},\text{ng\#1},\text{ng\#2})$  into the Formula tab.
10. Select cell F2.
11. Enter the formula  $\text{strip3}(\text{ng\#},\text{ng\#1},\text{ng\#2})$  into the Formula tab.
12. These values automatically update during trading hours. For this exercise, though, our focus is on the end-of-day value (after the market's close).
13. Select cell A1 and type the name used when the data is displayed on a chart or quote page in Aspen Graphics (e.g. ngstrip)
14. Select cell B1, type: HLOC (this defines that the data will all be written to the DAYS.DAT file in the Aspen Graphics database.)
15. Select cell A2. Enter =TODAY( ).
16. Select cell B2. Enter 16:30.
17. Create a synthetic symbol for the Strip, using the following information:

The screenshot shows the 'Create Symbol DDE Helper' dialog box with the following settings:

- Symbol: NGStrip
- Description: Natural Gas Strip
- Scale: .001
- Exchange: NYMEX
- Type: Cash
- Base 100:
- Currency: US Dollars
- Amount/Pt: 10000
- Volatility: 0
- Minimum Tick: 1
- Expiration Date: (empty)
- Trading Hours:
 

	Start	End	TZ
Session 1:			
Session 2:			
Session 3:			
Session 4:			
- Options:
  - Strike Price: 0
  - Underlying Symbol: (empty)
  - Strike Scale: 1
  - Put/Call:  Put  Call
  - Option Type:  European  American

18. Select cells A1 through F2. Left click the “Send Symbol Update”  icon on the DDE Toolbar. The data for the NGStrip bar chart can now be displayed on a daily chart in Aspen Graphics.

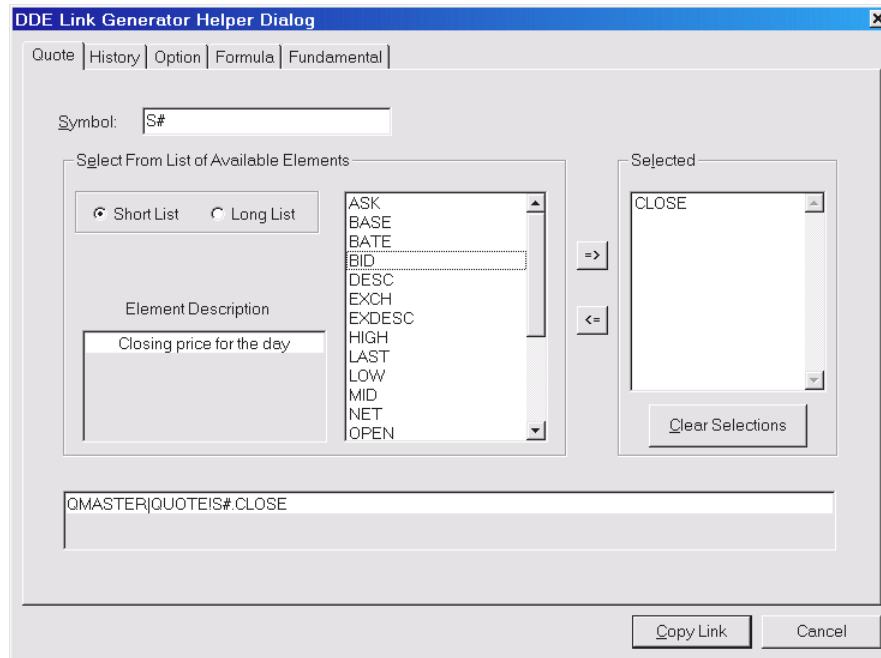
This last procedure needs to be performed after market hours each day. An Excel macro can be set to automate this process. (An advanced Excel macro user may be able to write a macro that performs this procedure automatically after market hours.)

## Creating a Database in Excel

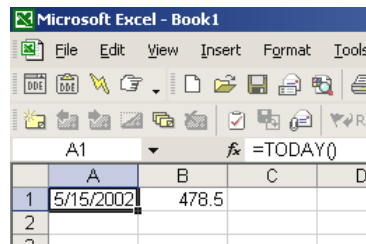
The following example shows how to automate building a database in Excel using the macro-writing feature. This feature is useful for archiving data which isn't stored in Aspen Graphics' data files (i.e.: study values or custom formula values). It is also useful for automatically posting daily closes (or any other value) in Excel for reports or further analysis. Although this automating process requires opening Excel once a day and performing a few keystrokes in this workbook, it greatly reduces the time required when compared to copying and pasting the values every day.

1. Create a live link between Aspen Graphics and Excel with the data that needs to be archived. This example uses the daily close for Soybean futures.

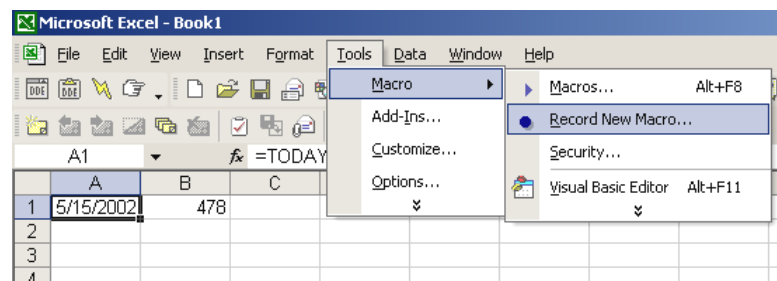




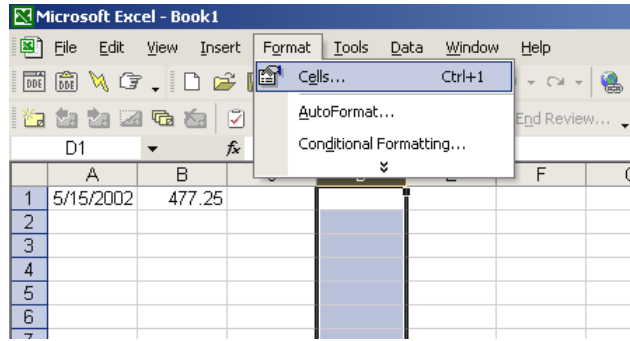
- To save the date each day with the data, select an empty cell, and type: `=today()`.



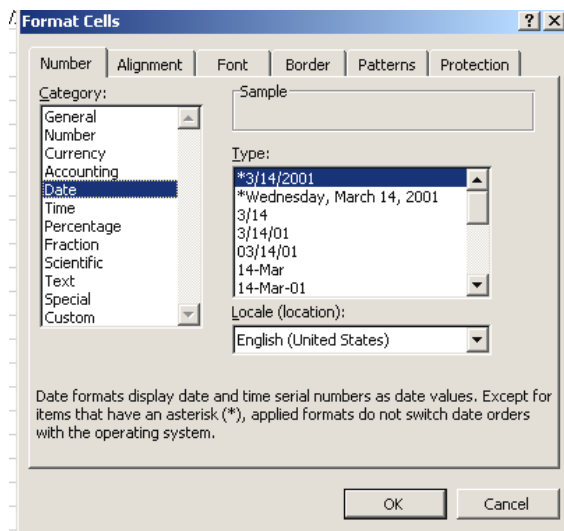
- Select **Tools > Record Macro > Record New Macro**. Rename the macro or click on **OK**. The steps performed from this point on are recorded as your macro.



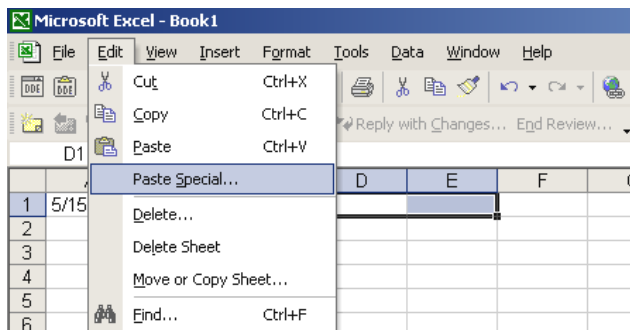
- Select column **D** by Left-Clicking the **D** in the column header. Next, while column **D** is highlighted, select **Format > Cells...**



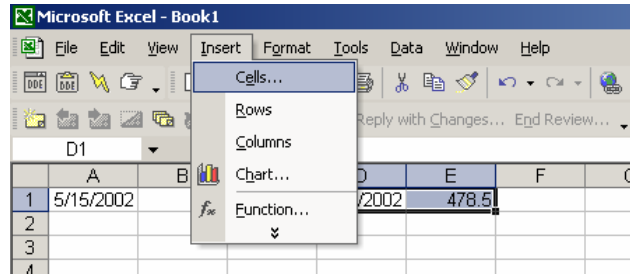
5. Choose **Date** from the Category field and the date format you want from the Type field.



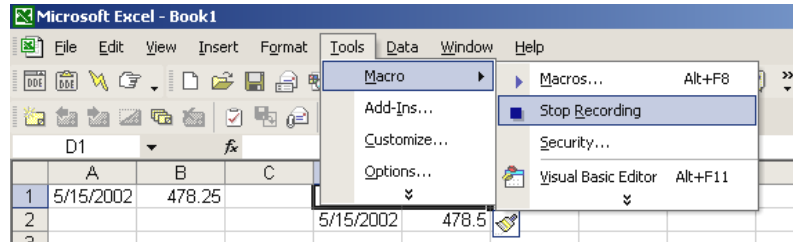
6. Select and copy cells **A1** and **B1**. Next, select cells **D1** and **E1**. Left click on **Edit > Paste Special**. Select **Values** from the Paste Category in the Paste Special dialog box. Click **OK**.



7. Cells **D1** and **E1** should still be highlighted (if not, highlight these two cells). Select **Insert > Cells...** From the Insert menu, choose **Shift Cells Down**. Click **OK**.



8. Left click on **Tools > Macro > Stop Recording**.



9. After the market close each day, open the Excel spreadsheet and then left click on **Tools > Macro > Macros...**. Select the macro from the list and then click on **Run**. (An advanced Excel user may be able to help you assign this macro to a newly created button on a toolbar.)

To further automate the process, assign the macro to a shortcut key. Go to **Tools > Macro > Macros...**, select the macro, select **Options...**, and enter the desired key into the Shortcut Key field.

## Charting a Portfolio in Aspen Graphics Using DDE

This example illustrates the process for building a portfolio, or custom index, in Excel and then importing the values of the portfolio back into Aspen Graphics for charting.

1. Create a live link for the **Last** price of a symbol in the portfolio.
2. Repeat this procedure for each instrument in the portfolio. Use Excel math functions to multiply the prices by the quantity of contracts (use negative quantities for short positions), as well as any other weighting that may need to be applied to each instrument in the portfolio. When finished, there should be one cell which contains the net value for the portfolio.
3. Create a symbol for your portfolio, using the information below.

**Create Symbol DDE Helper**

Symbol:  Description:

Scale:  Exchange:

Type:   Base 100

Currency:

Amount/Pt:

Volatility:

Minimum Tick:

Expiration Date:

Trading Hours

	Start	End	TZ
Session 1:	<input type="text"/>	- <input type="text"/>	<input type="text"/>
Session 2:	<input type="text"/>	- <input type="text"/>	<input type="text"/>
Session 3:	<input type="text"/>	- <input type="text"/>	<input type="text"/>
Session 4:	<input type="text"/>	- <input type="text"/>	<input type="text"/>

Options

Strike Price:

Underlying Symbol:

Strike Scale:

Put/Call:  Put  Call

Option Type:  European  American

- Highlight an empty cell on the portfolio spreadsheet and insert the Aspen Graphics Tick function, using the following parameters:

Microsoft Excel - Book1

File Edit View Insert

LINEST

	A	B
1		85.3
2		55.34
3		27.52
4		16.9
5		30.66
6	Total:	215.72
7		
8		<input ,b6"="" type="text" value="io1"/>
9		
10		
11		
12		
13		

**Function Arguments**

AspenTick

Symbol:  = "Portfolio1"

Price:  = 215.7200031

Time\_Text:  =

Bate:  =

TkVol:  =

No help available. = "False: Portfolio1: 215.72"

Price

Formula result = False: Portfolio1: 215.72

[Help on this function](#)

- Left-Click Ok to return to the spreadsheet.
- Switch back to Aspen Graphics and display an intraday chart (0-1439 minutes), and enter the name of the new symbol. The data should update on the chart as the values update in the Excel spreadsheet.

# Appendix A – Custom Page Walk Through

The ability to save and retrieve user-designed screen setups enables you to customize Aspen Graphics to suit your trading style. In working with Aspen Graphics you will hear the terms “Windows” and “Pages” used often. What are they?

An Aspen Graphics **window** is one area of information on your screen. In the example below, two chart windows, two quote windows and a news window are displayed on the screen. When a window is retrieved from memory, it will be added to what is displayed on the screen when it is recalled. There is no limit to the amount of windows that can be on the screen at one time.

A **page** is the entire Aspen Graphics screen layout. A page is made up of one or more windows. The example **page** below is comprised of five windows. When a page is retrieved from memory, any windows displayed on the screen at the time of recall will be cleared and then the retrieved page will be drawn.

## Creating a Custom Page

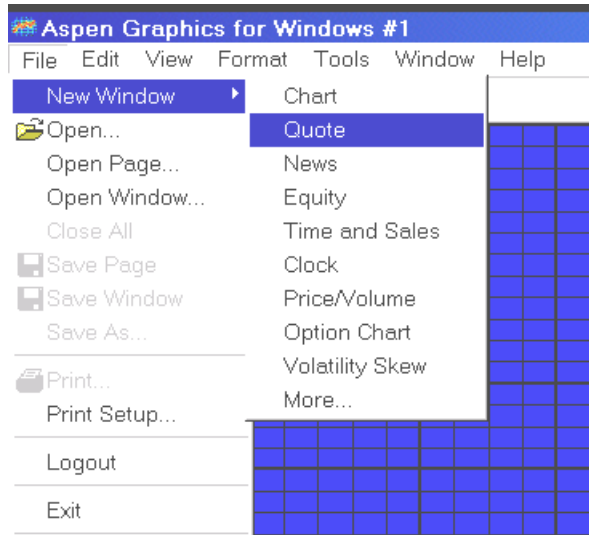
This page building exercise will show you step-by-step how to create the page drawn below, which contains two charts, a quote window, a news window and a ticker window. Developing these skills will allow you to apply these techniques in creating other pages in Aspen Graphics.



## Create a Quote Window

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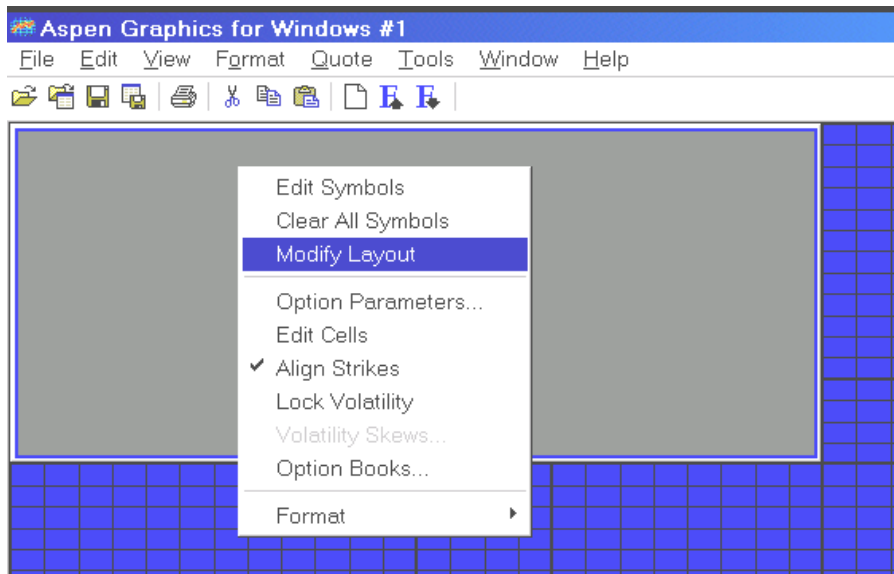
Open a new Quote Window via **File > New Window > Quote**



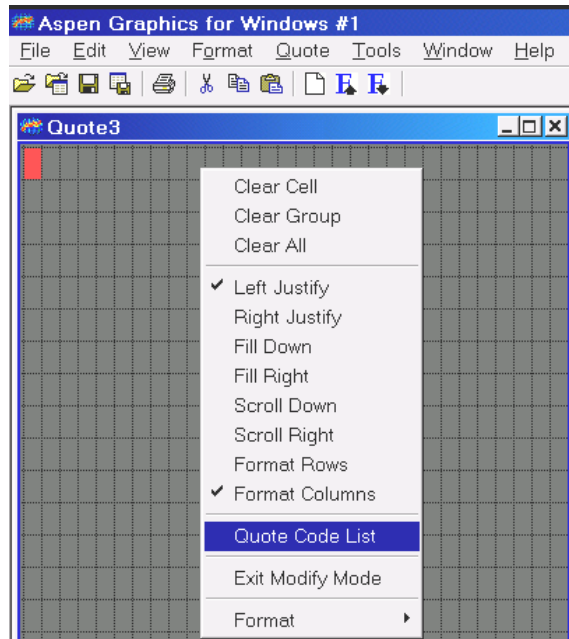
## Ready the Quote Window for Formatting

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Display the quote window's menu by right-clicking the mouse button, then left-click on **Modify Layout**.



Three things happen: a gray grid appears on the quote window, an red cursor fills the upper left cell of the grid, and the menu is displayed.



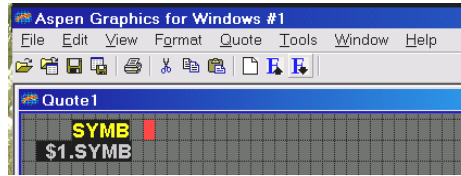
The window is now ready to be formatted with quote codes.

## Format the Quote Window using the Code Menu

Left-click **Quote Code List** on the Quote Window Menu (see above). This displays the Quote Code List of available field variables for use in quote windows. Left-click, on **SYMB** (it's in the first column about half way down).

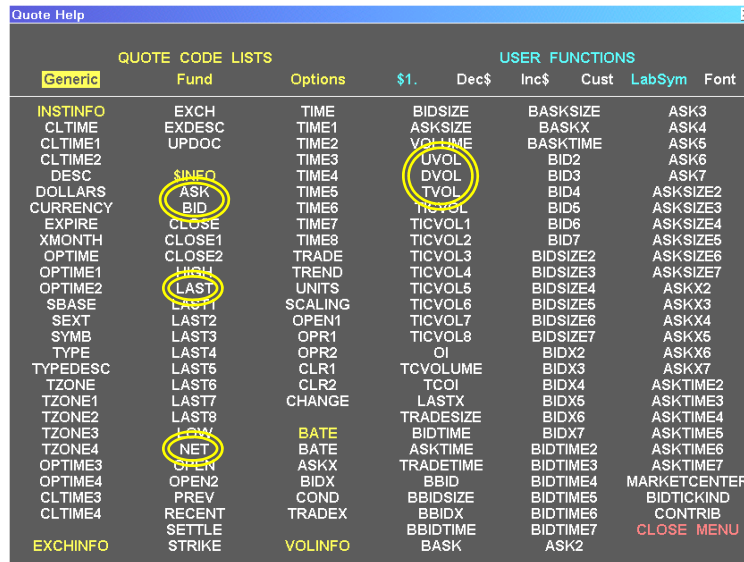
Generic		Fund	Options	\$1.	Dec\$	Inc\$	Cust	LabSym	Font
INSTINFO	EXCH	TIME	BIDSIZE	BASKSIZE	ASK3				
CLTIME	EXDESC	TIME1	ASKSIZE	BASKX	ASK4				
CLTIME1	UPDOC	TIME2	VOLUME	BASKTIME	ASK5				
CLTIME2		TIME3	UVOL	BID2	ASK6				
DESC	\$INFO	TIME4	DVOL	BID3	ASK7				
DOLLARS	ASK	TIME5	TVOL	BID4	ASKSIZE2				
CURRENCY	BID	TIME6	TICVOL	BID5	ASKSIZE3				
EXPIRE	CLOSE	TIME7	TICVOL1	BID6	ASKSIZE4				
XMONTH	CLOSE1	TIME8	TICVOL2	BID7	ASKSIZE5				
OPTIME	CLOSE2	TRADE	TICVOL3	BIDSIZE2	ASKSIZE6				
OPTIME1	HIGH	TREND	TICVOL4	BIDSIZE3	ASKSIZE7				
OPTIME2	LAST	UNITS	TICVOL5	BIDSIZE4	ASKX2				
SBASE	LAST1	SCALING	TICVOL6	BIDSIZE5	ASKX3				
SEXT	LAST2	OPEN1	TICVOL7	BIDSIZE6	ASKX4				
<b>SYMB</b>	LAST3	OPR1	TICVOL8	BIDSIZE7	ASKX5				
TYPE	LAST4	OPR2	OI	BIDX2	ASKX6				
TYPEDESC	LAST5	CLR1	TCVOLUME	BIDX3	ASKX7				
TZONE	LAST6	CLR2	TCOI	BIDX4	ASKTIME2				
TZONE1	LAST7	CHANGE	LASTX	BIDX5	ASKTIME3				
TZONE2	LAST8		TRADESIZE	BIDX6	ASKTIME4				
TZONE3	LOW	BATE	BIDTIME	BIDX7	ASKTIME5				
TZONE4	NET	BATE	ASKTIME	BIDTIME2	ASKTIME6				
OPTIME3	OPEN	ASKX	TRADETIME	BIDTIME3	ASKTIME7				
OPTIME4	OPEN2	BIDX	BBID	BIDTIME4	MARKETCENTER				
CLTIME3	PREV	COND	BBIDSIZE	BIDTIME5	BIDTICKIND				
CLTIME4	RECENT	TRADEX	BBIDX	BIDTIME6	CONTRIB				
EXCHINFO	SETTLE		BBIDTIME	BIDTIME7	CLOSE MENU				
	STRIKE	VOLINFO	BASK	ASK2					

This will enter both a *yellow label* and the *\$1.symb* quote code into the top left-hand corner of the quote window.

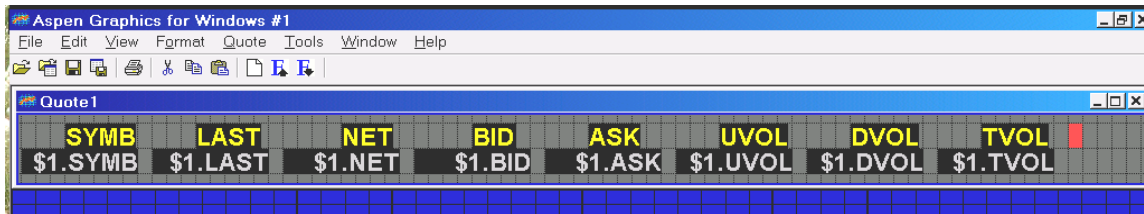


Each time you click on a Quote code the red cursor automatically moves to the next position, readying the quote window for the next quote code.

Continue left clicking on **LAST, NET, BID, ASK, UVOL, DVOL** and **TVOL**.



- Click the “X” on the Quote Code List title bar (or double left click on **CLOSE MENU** in the bottom right corner of the Quote Code List) to clear the Quote Code List from the screen.
- Resize the window
  - Place the mouse arrow on the bottom right corner of the window
  - Hold the left mouse button and drag until the border is just below the quote codes and the window fills the screen horizontally.

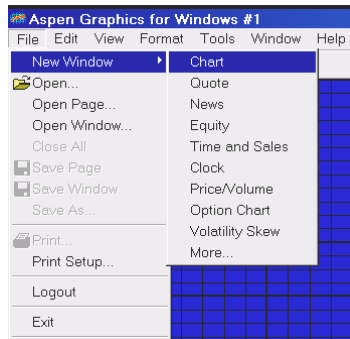


- Right-click in the body of the quote window to display its menu. Click on “Exit Modify Mode”



## Display the Two Charts

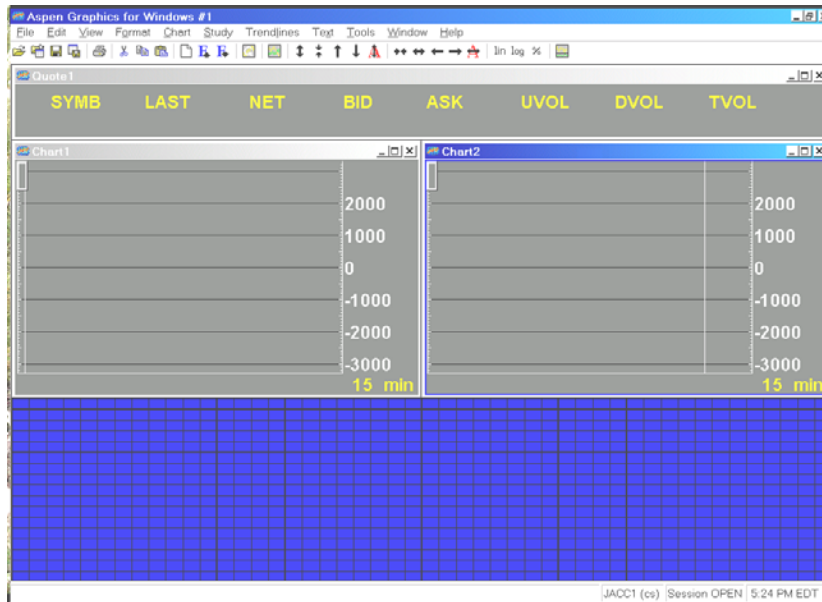
- Display a new chart by going to **FILE > NEW WINDOW > CHART**.



- Perform this step twice. This places two charts on the screen partially covering the quote window.

## Format the Charts

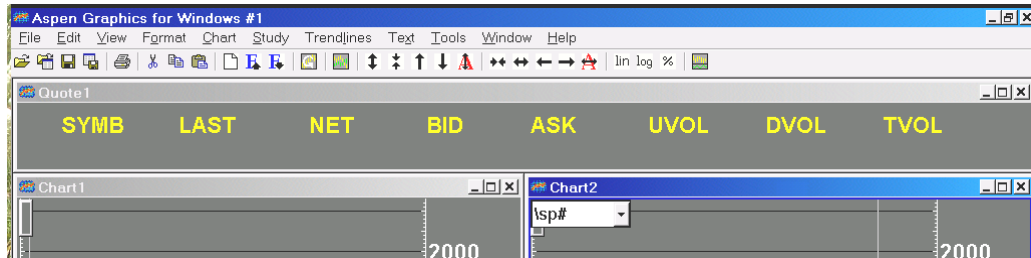
- Drag the charts into the layout as shown below by left-clicking and dragging their title bars. The quote window becomes visible and the tops of the charts align with the bottom of the quote window.



- Resize each chart by dragging the bottom of each chart up so it is just below the middle line of the grid on the blue background.
- Set the time frame of the right-hand chart to daily bars by right-clicking in that chart to display its menu and selecting **TIME FRAME > DAY**.

## Add a Symbol to the Charts and Quote Windows

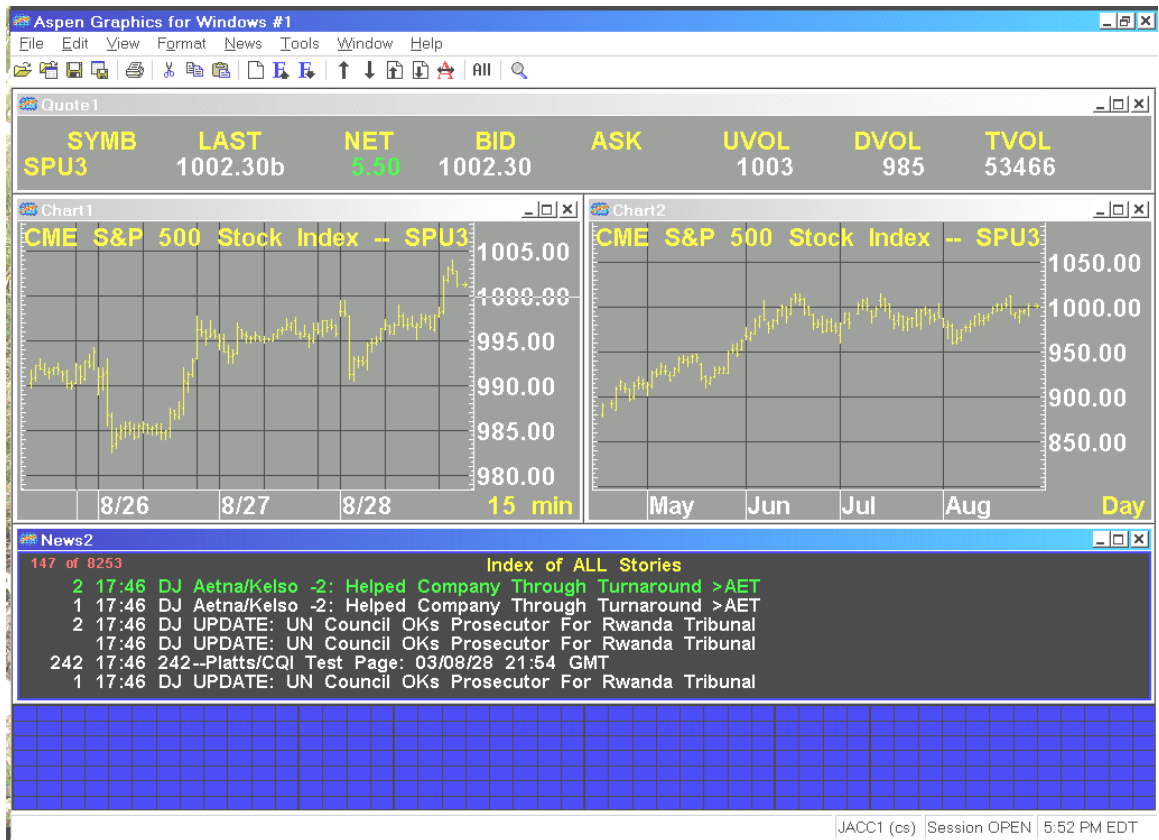
To add a symbol to all of the windows on the screen, type a backslash ( \ ) before the symbol. For example, typing \sp# will add the front month of the S&P futures to the quote window and both chart windows simultaneously.



Your page now displays data for the S&P futures in all three windows.

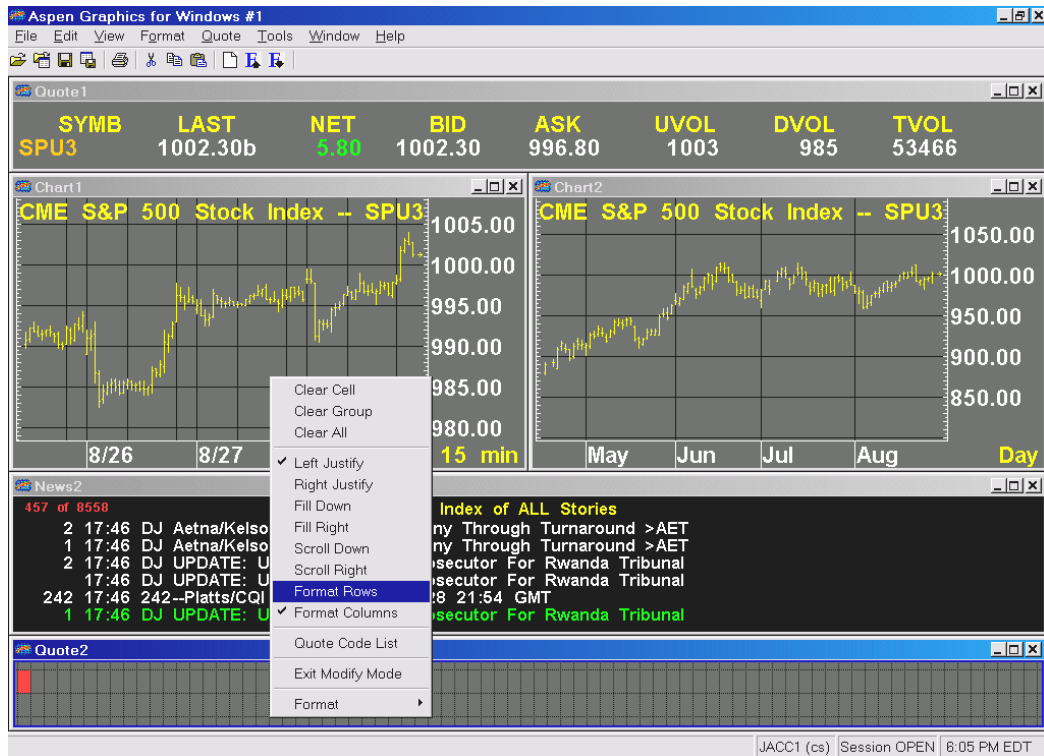
## Add a News Window to the Page

Add a news window by left clicking on **File > New Window > News**. Drag the news window down so that its top border aligns with the bottom borders of the charts. Resize it as necessary to fill the screen horizontally while leaving some space available under the News window as shown below.



## Add and Format the Ticker Window

1. Add a quote window by clicking on **FILE > NEW WINDOW > QUOTE**.
2. Drag the quote window down to the bottom of the screen and resize it to fit in the available area underneath the news window.
3. Right-click in the body of this new quote window to display its menu. Select **Modify Layout**.
4. Right-click again to redisplay the menu. Left click on **Format Rows**.



5. Redisplay the menu a third time and then select **Quote Code List**.
6. Select **SYMB, LAST** and **NET** from the **Quote Code List**. Double left click on **CLOSE MENU** to remove Quote Code List.
7. Redisplay the menu and click on **Scroll Right** to define the quote window as a "Scroll Region" (Aspen Graphics' term for ticker window).

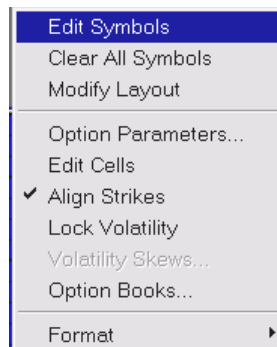
Your display should now look similar to the image below



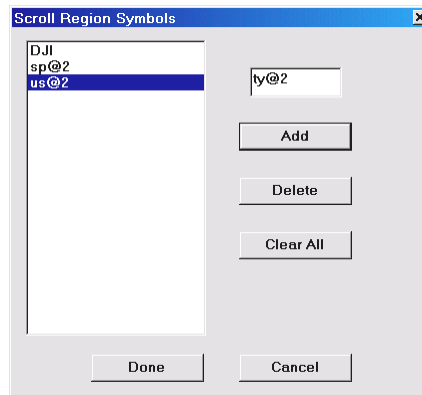
8. Display the menu one last time and select **Exit Modify Mode** to exit from the modify layout mode.

## Adding Symbols to the Ticker Window

Right-click in the body of this quote window to display its menu. Left click on **Edit Symbols**.



The Scroll Region Symbols dialog box will appear.

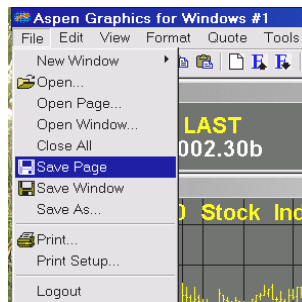


Enter the symbols you want to see in the ticker window, pressing **Add** after each symbol. When you are finished adding symbols, click **Done**. Remember to use the # and @ macros when entering futures contracts so you won't have to change symbols as contracts expire.

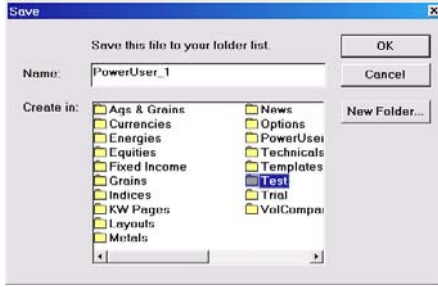
## Save the Page

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Save the page by left-clicking on **File**, then **Save Page**.



Enter a unique name in the **Name** field. Up to 20 characters can be used to name a page. You cannot use *only* symbols or numbers in naming pages; this will return an error message saying the name is reserved. Numbers and symbols can be used in combination with no conflict (e.g. - IBM\_15 is a valid page name). You also cannot use spaces in a page name; use the underscore ( \_ ) instead.



Select a folder from the choices available in the “**Create in:**” section. (If you want to create a new folder to store this page, click the **New Folder** button and, name the folder accordingly.) When you have selected (or created and named) the desired folder, click **OK**. The software verifies that the page has been saved by displaying its name in quotes on the title bar.

**Quote 1**

SYMB	LAST	NET	BID	ASK	UVOL	DVOL	TVOL
SPU3	1002.30b	5.80	1002.30	996.80	1003	985	53466

**Chart 1**: CME S&P 500 Stock Index -- SPU3. 15 min. Y-axis: 980.00 to 1005.00. X-axis: 8/26, 8/27, 8/28.

**Chart 2**: CME S&P 500 Stock Index -- SPU3. Day. Y-axis: 850.00 to 1050.00. X-axis: May, Jun, Jul, Aug.

**News2**: 1287 of 9393. Index of ALL Stories

- 2 17:46 DJ Aetna/Kelso -2: Helped Company Through Turnaround >AET
- 1 17:46 DJ Aetna/Kelso -2: Helped Company Through Turnaround >AET
- 2 17:46 DJ UPDATE: UN Council OKs Prosecutor For Rwanda Tribunal
- 17:46 DJ UPDATE: UN Council OKs Prosecutor For Rwanda Tribunal
- 242 17:46 242-Platts/CQI Test Page: 03/08/28 21:54 GMT
- 1 17:46 DJ UPDATE: UN Council OKs Prosecutor For Rwanda Tribunal

**Quote2**


SYMB	LAST	NET
SPU3		

Saved page " to file 'C:\Comstock\Apex40\kwoods\pages\Test\PowerUser\_1.agg' | JACC1 (cs) | Session OPEN | 7:01 PM EDT

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## Additional Page Building Tips

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- ◆ The **#** macro is a type of variable used for instruments, like futures, which expire. It is used in place of a symbol's month and year codes to specify which of the currently trading contracts you want to evaluate. Using the # macro will list a specific contract, either the front month if used alone or a number of contracts out if appended with a number. For example:
  - C#** will always point to the front month CBOT corn futures contract.
  - SP#2** requests the 2<sup>nd</sup> expire out for the S&P futures contract.
- ◆ The **@** is used to display a list of futures contracts. The @ sign lists *ALL* currently trading contracts for the specified future if used alone, or can be limited by placing the number of contracts desired after the @. For example:
  - C@** will list all of the currently trading corn contracts
  - NG@12** will list the first twelve Natural Gas contracts
- ◆ **“Drag-and-Drop”**: It is possible to drag-and-drop a symbol from one window into another window. Simply click and hold down the left mouse button on the symbol until a small rectangle appears at the base of the mouse pointer. When the rectangle appears, keep holding down the left mouse button as you drag the mouse into the destination window, then release the mouse button.
- ◆ **Clearing the Screen**: The “Clear” button  on the toolbar will remove everything displayed on the screen, taking you back to the blue screen with a black grid.
- ◆ **Turning off (hiding) Title Bars**: Title bars can be hidden by going to **TOOLS > OPITONS >** and selecting the **Miscellaneous** tab. Clear the check mark from the “Display title bars on all windows” checkbox. This makes for a cleaner looking display so more of the available space on a page is devoted to displaying data. The title bar will reappear when you pause your mouse near the top of a window or page.

## CHARTS

- ◆ **Tables**: When looking at a chart it is possible to see the values displayed in tabular form. This is done by displaying the chart's menu and selecting **Tabular List**.
- ◆ **Changing the Color of the Bars**: The bars of any chart can be changed from the default color to another color by selecting Parameters from the chart's menu. This opens the Bar Chart parameters dialog box, providing access to various chart features. Click the + sign next to **Colors**, then click the color name and the color box that subsequently appears. You can now select another color from the color palette.
- ◆ **Chart Parameters**: See **ASPEN GRAPHICS 4.0 > STUDIES > CHARTING TECHNIQUES > BAR CHARTS > CHARTING PARAMETERS** (accessible from **HELP > CONTENTS**) for more information on setting or changing a chart's parameters.

## QUOTES

- ◆ **Clearing quotes from a Quote Page:** ,, <enter> (2 commas) or double left clicking on **Clear All Symbols** from the Quote Menu will clear all symbols from any quote window.
- ◆ **.FILLDN and .FILLRT commands:** The **.filldn** and **.fillrt** are keyboard commands entered directly into the command line that perform the same functions as selecting Fill Down or Fill Right when you are formatting a quote window *but* **.Filldn** and **.Fillrt** can be limited to a specific range of cells. Examples:
  - .Filldn 1 3** will copy the \$1 row and fill down to the \$3 quote codes.
  - .Filldn 2** will start with the \$2 quote code and copy down the rest of the window.
- ◆ **.DELGROUP command** will clear the specified group of quote codes. **Delgroup 20 30** will clear groups \$20 through \$30 on the quote window.
- ◆ **Chart Header:** A chart header is a special kind of quote window that is linked to a chart; changing the symbol in one automatically updates the second. Chart headers are created like any other quote window, but must be saved as a window with the name of **chart\_header** to be defined as such. To retrieve a header and link it to the chart, first display the desired chart and then type **header <enter>**.

## Appendix B - Description of the Studies

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The Overlays and Studies listed on the Select Study menu can be categorized into four groups:

### Trend Followers:

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Moving Averages	Parabolic
Moving Average Envelope	Keltner Channels
Bollinger Bands	

### Overbought/Oversold Indicators:

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Momentum	Modified Stochastic
A/D Oscillator	MACD
Acceleration	Williams' %R



Fast Stochastic	MACD Oscillator
Slow Stochastic	Relative Strength Index
Moving Avg. Momentum	Commodity Channel Index
Moving Avg. Oscillator	HiLo Oscillator

## Trend Indicators:

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Directional Indicator
Directional Oscillator
Average Directional Index

## Activity Indicators:

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Volume	Cumulative Volume
Open Interest	Volume Accumulation. Oscillator
On Balance Volume	Variable Acc/Distribution
Average Balance Volume	Historical Volatility

The following section describes these indicators in more detail. They are arranged in alphabetical order. Examples of color rules and alarms based on these indicators are given at the end of each section. For more information on entering color rules and alarms, see the Formulas, Color Rules and Alarms chapter.

MESA, DeMark, Kase and Implied Volatility studies are not outlined here. They are available as optional packages which integrate seamlessly into the Aspen Graphics program. Each package comes with its own documentation detailing these studies. Contact your salesperson for more information.

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## Acceleration

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Acceleration is the difference between the current momentum value and a previous momentum value. While a momentum study indicates the rate at which prices change, an acceleration study indicates the rate of change in *momentum*. When an acceleration study yields a positive value, prices are not only rising, they are also rising at a faster rate. When an acceleration study yields a negative value, prices are falling at a faster rate.

For information on how momentum is calculated, see the **Momentum** section.

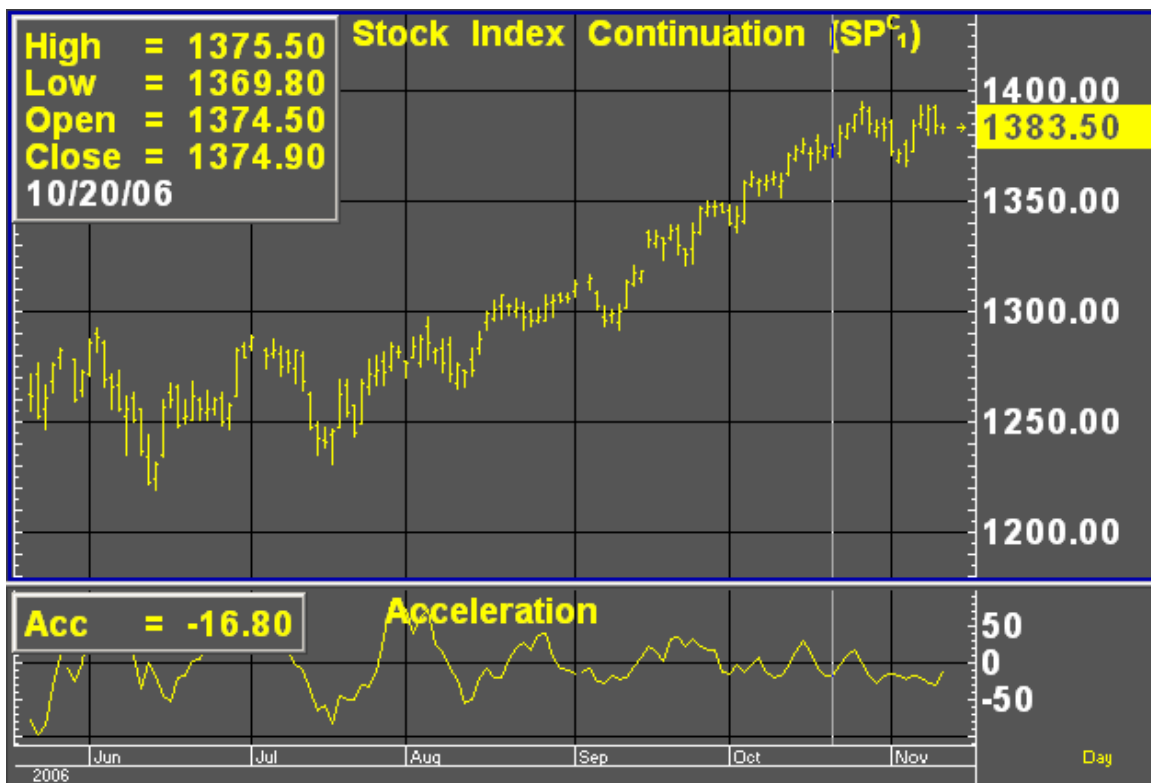
Divergence between momentum and acceleration, or price and acceleration, are other uses of this study. If momentum is decreasing while acceleration is unchanged or increasing, momentum may soon be changing directions; the converse is also true.

Type of Study	Dot Command	It works best in
Overbought/ Oversold	.acc	Cash and Futures markets, all time frames

### How Aspen Graphics Calculates It:

Acceleration is: **Current Momentum - Momentum  $n$  periods ago**

The user determines how many periods should be used in each of the Momentum studies. This is done from the Period field in the study's parameter menu.



At the end of October and beginning of November on the chart in, price was still rising but acceleration was falling.

### Default Parameters Settings:

Field	Value
Color	Yellow
Graph	Line
Line Style	Solid
Line Width	1 pixel
Period – 1 <sup>st</sup> Momentum	10
Period – 2 <sup>nd</sup> Momentum	10

Price	Close
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### Custom Aspen Graphics Formula:

`Accl(series,per=10)=mom($1,10)-mom($1,10)[per]`

This formula, once entered in the Formula Listing, allows you to use Acceleration in color rules and alarms, as shown in the following examples.



If charting this custom formula, make sure that Nogaps=On in the Chart Settings Menu.

### Color Rule Example:

`if(Accl($1,10)>Accl($1,10)[1] and mom($1,10)<mom($1,10)[1],clr_blue,clr_yellow)`

This color rule will turn a bar blue when the 10-period acceleration is increasing and the 10-period momentum is decreasing. It will leave all other bars yellow.

### Alarm Example:

`chart((Accl(c#,10)>Accl(c#,10)[1] and Accl(c#,10)[1]>Accl(c#,10)[2])[-1],15,1,100,1,1)`

The alarm will trigger when the Acceleration has increased over the last two periods. The alarm is based on 15-minute bars for the front month of corn.

### Charting Setup Idea:

Oscillators, such as Acceleration, are sometimes graphed as histograms rather than as line charts. To draw this study as a histogram, bring up the Acceleration study on a chart. Bring up a Graph Menu, select **Parameters**, and then single left click on the word **Line** in the Graph field. Select **Histogram**, and then select **Done**.

A color rule can be written to display all positive values in green (or any other color) and all negative values in red by entering the following color rule:

`if($1>0,clr_green,clr_red)`



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## Accumulation/Distribution (A/D) Oscillator

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The A/D Oscillator indicates overbought/oversold conditions by comparing “buying power” and “selling power” to the period’s trading range. This study was developed by Larry Williams and Jim Waters as a way of “normalizing” the relationship between the open and closing prices with the extreme prices for the period.

Type of Study	Keyboard Command	It works best in
Overbought/ Oversold	<b>.ado</b>	Cash and Futures markets that are trending.

### How Aspen Graphics Calculates It:

The A/D Oscillator is calculated as follows: 
$$\frac{\text{Buying Power} + \text{Selling Power}}{2 * \text{True Range}}$$

This study defines “buying power” as the difference between the true high (the higher of the current high or the previous close) and the period’s open. Selling power is defined as the difference between the close and the period’s true low (the lesser of the current low or the previous close).

The A/D Oscillator values are not smoothed by averaging the values of several periods (as with a moving average), so the oscillator often fluctuates

wildly between 0 and 100. ADTo make this study easier to read, a moving average can be applied to the A/D Oscillator, and overbought/oversold zones can be applied to this moving average.

### Default Parameters Settings:

Field	Value
Color	Yellow
Graph	Line
Line Style	Solid
Line Width	1 pixel

### Custom Aspen Graphics Formula:

$$\text{ADOSC}(\text{series})=100*((\$1.\text{thigh}-\$1.\text{open})+(\$1.\text{close}-\$1.\text{tlow}))/ (2*\$1.\text{trange})$$

This formula, once entered in the Formula Listing, allows you to use the A/D Oscillator study in color rules and alarms as shown in the following examples.

### Color Rule Example:

```
if(ADOSC($1)>90 or ADOSC($1)<10,clr_red,clr_yellow)
```

This color rule will turn a bar red when the value of the A/D Oscillator is over 90 or less than 10 and leave all other bars yellow.

### Alarm Example:

```
chart((eavg(ADOSC(lhq7),6)>70 or eavg(ADOSC(lhq7),6)<30),1,2,100,1,3)
```

This alarm will trigger if, at the end of the day, the 6-period exponential moving average of the A/D Oscillator is above 70 or below 30. The alarm is based on daily bars of the August '97 lean hog contract.

### Charting Setup Idea:

Oscillators are sometimes graphed as histograms rather than as line charts. To draw this study as a histogram, see the **Charting Setup Idea** section at the end of the Acceleration study.

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## Average Balance Volume

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Average Balance Volume is a simple moving average of the On Balance Volume which smoothes out that study. The uses of the Average Balance Volume study, and the signals to be derived from it, are identical to the On Balance Volume study. See the On Balance Volume study later in this **Studies** chapter.

Type of Study	Keyboard Command	It works best in
Activity Indicator	<b>.abv</b>	Cash and Futures markets which are active, all time frames

**Table 3**

### How Aspen Graphics Calculates It:

The Average Balance Volume study is calculated as follows:

#### Simple moving average of the On Balance Volume

Just like the On Balance Volume, the Average Balance Volume study uses an arbitrary positive integer as a starting point for the calculations. For this reason, the Custom Aspen Graphics Formula may not have the same value as the Average Balance Volume that is preprogrammed in Aspen Graphics; the extent of your database may also have an effect on this value. The *shape* of the graph, however,

should look the same. As mentioned later in the On Balance Volume section, the shape of the line is the most important aspect of these studies.

**Default Parameters Settings:**

Field	Value
Color	Yellow
Graph	Line
Line Style	Solid
Line Width	1 pixel
Period	10

**Custom Aspen Graphics Formulas:**

**OBVol(series)=if(\$1.close>\$1.prev,obvol[1]+ \$1.volume,if(\$1.close<\$1.prev,obvol[1]-\$1.volume,obvol[1]))**

**ABVol(series)=savg(OBVol(\$1),10)**

These formulas, once entered in the Formula Listing, allow you to use the Average Balance Volume study in color rules and alarms as shown in the following examples.

**Color Rule Example:**

**if(ABVol(\$1)>ABVol(\$1)[1] and ABVol(\$1)[1] >ABVol(\$1)[2] and ABVol(\$1)[2]>ABVol(\$1)[3],clr\_green,  
if(ABVol(\$1)<ABVol(\$1)[1] and ABVol(\$1)[1] <ABVol(\$1)[2] and  
ABVol(\$1)[2] <ABVol(\$1)[3],clr\_red,clr\_yellow))**

This three-part color rule will turn a bar green when the Average Balance Volume has increased for three consecutive periods; it will turn a bar red when the Average Balance Volume has declined for three consecutive periods, and it will leave all other bars yellow.

**Alarm Example:**

**chart((ABVol(sp#)>ABVol(sp#)[1] and sp#<sp#[1]) or (ABVol(sp#)<ABVol(sp#)[1] and sp#>sp#[1])  
[-1],30,1,100,1,3)**

This alarm will trigger when the direction of the Average Balance Volume line is diverging from price action. The alarm is based on 30-minute bars of the current S&P contract.

## Charting Setup Idea:

When graphed, the Average Balance Volume can sometimes appear as a type of oscillator. It can, like other oscillators, be graphed as a histogram rather than as a line chart. To draw this study as a histogram, see the **Charting Setup Idea** section at the end of the Acceleration study.

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## Average Directional Index (ADX)

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The Average Directional Index, often referred to as the Average Directional Movement Index or ADX, indicates the strength of a trend by measuring the degree of directional movement up *or* down. The ADX fluctuates between 0 and 100, with the higher values reflecting stronger trends. The ADX is designed to be used with the Directional Indicator, and is often displayed as an overlay on top of this study. Together, these two studies are often considered a Directional Movement System.

Type of Study	Keyboard Command	It works best in
Trend Indicator	.adx	Cash and Futures markets, all time frames

When the ADX line has risen *above* both the DI+ and DI- lines and then makes its first down turn, a trend reversal is often indicated. When the ADX line goes *below* the DI+ and DI- lines, it is a sign that trend-following systems should not be used; the market has entered a sideways or choppy phase.

### How Aspen Graphics Calculates It:

The Average Directional Index study is calculated like this:

$$100 * \frac{\text{DI+ minus DI-}}{\text{DI+ plus DI-}}$$

The above value is referred to as the DX. A modified moving average of the DX is then taken, and this is referred to as the Average Directional Index or ADX.

For an explanation of how the DI+ and DI- values are calculated, see the **Directional Indicator** study.

The chart below shows the ADX overlaid onto the Directional Indicator. Although the ADX is usually displayed as a solid line, it is shown here as a dotted line to distinguish it from the DI+ and DI- lines.



In mid-September, the DI+ line (green) was significantly above the DI- line (blue) signifying a strong uptrend. The ADX crossed above the DI+ line but soon turned down, predicting a reversal. This prediction was soon confirmed by price action as the market broke.

Note also that when the ADX dropped below both lines in August, it corresponded to the sideways movement of the market. The ADX then reversed direction and turned up as a new uptrend began.



#### Default Parameter Settings:

Field	Value
Color	Yellow
Graph	Line
Line Style	Solid
Line Width	1 pixel
Period	14

#### Related Aspen Graphics Function: `adx()`

Example: `adx($1,14)`

<b>Key to Example</b>	
<b>\$1</b>	Placeholder for a symbol that will be supplied later.

<b>14</b>	Number of periods in the ADX study.
-----------	-------------------------------------

This function allows you to use the Average Directional Index study in color rules and alarms as shown in the following examples.

**Color Rule Example:**

```
if(adx($1,14)>dmineg($1,14) and adx($1,14)>dmipos($1,14) and adx($1,14)<adx($1,14)[1]
and adx($1,14)[1]>adx($1,14)[2],clr_red,clr_yellow)
```

The color rule above will turn a bar red when the ADX line is above both the DI+ and DI- lines *and* it has just turned down. All other bars will remain yellow.

**Alarm Example:**

```
chart((adx(mu,14)>dmineg(mu,14) and adx(mu,14)>dmipos(mu,14) and
adx(mu,14)<adx(mu,14)[1] and adx(mu,14)[1]>adx(mu,14)[2]),1,2,100,1,1)
```

This alarm will trigger at the end of the day for the same condition as described in the color rule above. The alarm is based on daily values for Micron stock.

**Formula Example:**

```
ADX_Ovrly(input)=adx($1,14)
```

This custom formula benefits those who regularly overlay the ADX study on top of the Directional Indicator study. Once entered in the Formula Manager, it can be accessed from the Add Study menu by selecting Formula Study.

## Bollinger Bands

This study was developed by John Bollinger based on his theory that the band width of an envelope should be a function of a market's *volatility*.

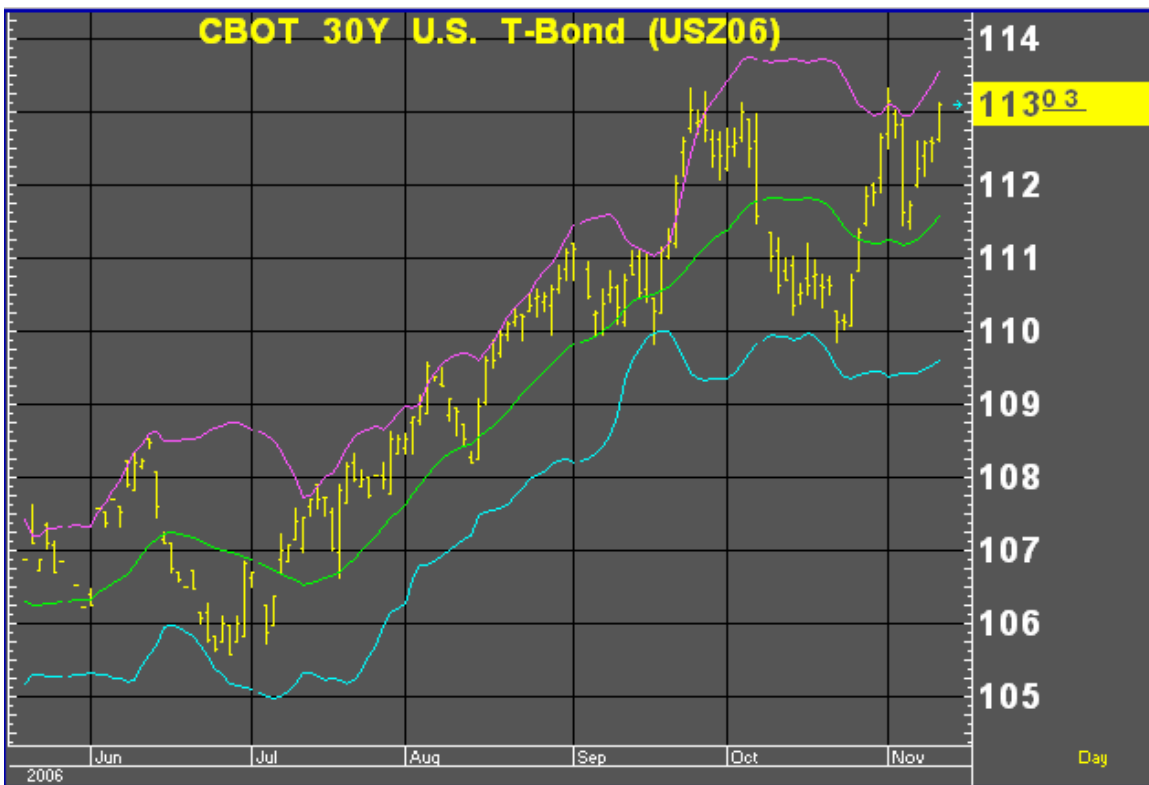
Bollinger Bands are similar to the Moving Average Envelope and Keltner Channel studies. The difference lies in the method used to calculate how far the bands should be drawn above and below the moving average line. Bollinger Bands are based on the number of standard deviations above and below the moving average.

Type of Study	Keyboard Command	It works best in
Trend Follower	.bb	Cash and Futures markets in all time frames, with daily being the most popular.

This chart outlines several important aspects of Bollinger Bands. They are as follows:

1. The moving average (green) usually gives support in bull markets or resistance in bear markets.
2. Penetration of a band usually signals the continuation of a trend, *not* the end of the trend (note the first breakout in early August).
3. After the bands tighten around the average (indicating volatility has decreased), a sharp move is usually on the way (note how the bands constricted at mid-September before the rally began).
4. Tops/bottoms falling outside the bands followed by tops/bottoms inside the bands usually signal that a trend reversal is imminent (note the double top in late September).

Bollinger Bands can also be used to spot exhaustion of a trend. Exhaustion can be indicated by a sharp move outside the bands followed immediately by a retracement.



**Default Parameters Settings:**

Field	Value
Avg.Type – Envelope Top	Simple
Avg.Type – Moving Average	Simple

Color – Envelope Bottom	Cyan
Color – Envelope Top	Violet
Color – Moving Average	Green
Graph – Envelope Bottom	Line
Graph – Envelope Top	Line
Graph – Moving Average	Line
Line Style – Envelope Bottom	Solid
Line Style – Envelope Top	Solid
Line Style – Moving Average	Solid
Line Width – Envelope Bottom	1 pixel
Line Width – Envelope Top	1 pixel
Line Width – Moving Average	1 pixel
Period – Envelope Top	1.0
Period – Moving Average	20.0
Price	First Study
Shift	0
StdDev – Envelope Bottom	2.0
StdDev – Envelope Top	2.0

### Related Aspen Graphics Functions:

**bb( )** Example: **bb(\$1,20,2)** Top Band  
**bb(\$1,20,-2)** Bottom Band

Key to Examples	
<b>\$1</b>	Placeholder for a symbol that will be supplied later.
<b>20</b>	Number of periods in the moving average.
<b>2, -2</b>	Number of standard deviations above or below the moving average.

This function allows you to use Bollinger Bands in color rules and alarms, as in the following examples.

### Color Rule Example:

**if(\$1.high>bb(\$1,20,2),clr\_red,if(\$1.low<bb(\$1,20,-2),clr\_green,clr\_yellow))**

This three-part color rule will turn a bar red when the high price of that bar penetrates the top Bollinger band, green when a bar penetrates the lower Bollinger band, and all other bars will remain yellow. (A Bollinger Band study does not need to be on the chart to use this color rule.)

### Alarm Example:

```
chart((us#.high>bb(us#,20,2) or us#.low<bb(us#,20,-2))[-1],1,2,100,1,1)
```

This alarm will trigger when either the top or bottom Bollinger Band is penetrated. The alarm is based on daily bars for the front month of bonds.

---

## Commodity Channel Index (CCI)

---

The CCI measures how far away a price is from its average. In any given market, 70 to 80 percent of random price fluctuations should fall within the +100 to -100 range of the CCI. If the CCI yields a value above +100, a long position may be indicated. When the CCI value falls back below +100, closing a long position should be considered. The same is true for short positions. When the CCI falls below -100, it is an indication to go short. It is also an indication to cover your short position when the CCI rises above -100.

Type of Study	Keyboard Command	It works best in
Overbought/ Oversold	.cci	Cash and Futures markets that trade in cyclical patterns

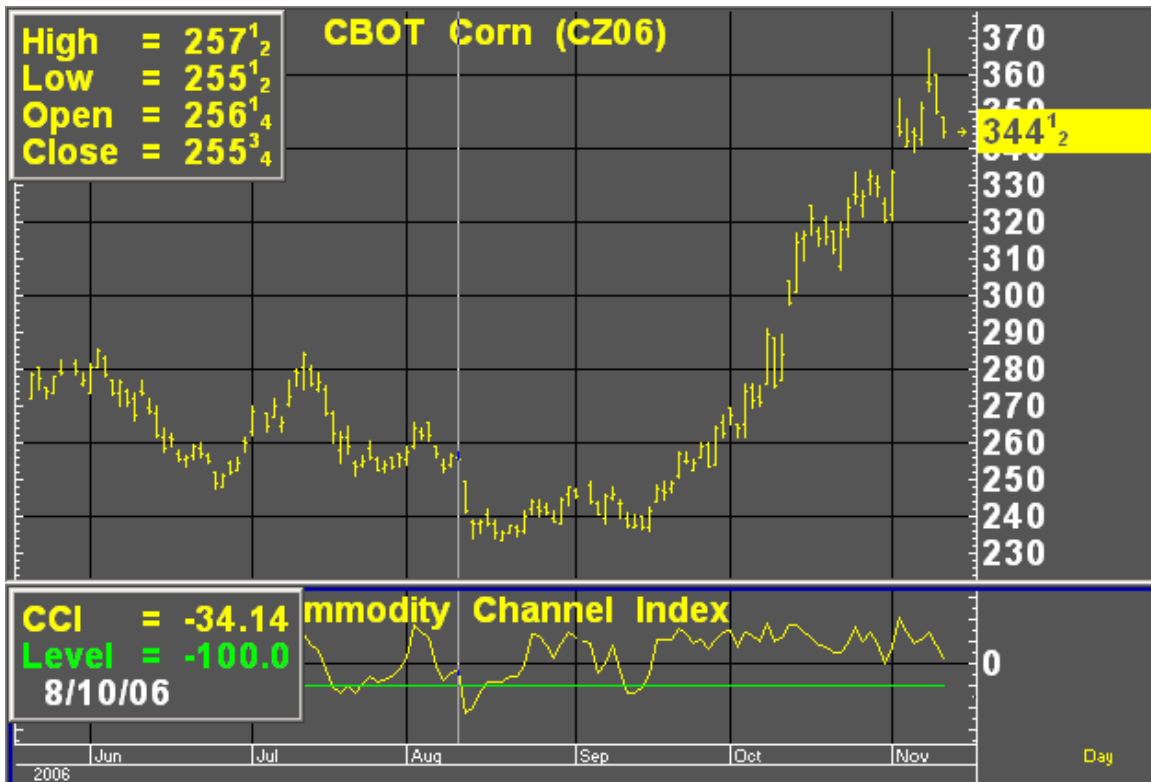
**Table 6**

### How Aspen Graphics Calculates It:

The Commodity Channel Index is calculated as follows:

$$\frac{\text{High,Low,Close avg}-\text{Current Simple Moving Avg}}{.015 * \text{Mean Deviation}}$$

The CCI study on the chart in chart below, shows how it can be used to time a short position. If a short position was initiated in early August when the CCI dipped below -100 (green lines) and was reversed when the CCI climbed back above -100 a few days later, the downtrend during that period could have been captured.



**Default Parameters Settings:**

Field	Value
Color	Yellow
Graph	Line
Line Style	Solid
Line Width	1 pixel
Period	10

**Related Aspen Graphics Functions: cci()**

Example: `cci($1,7)`

Key to Examples	
\$1	Placeholder for a symbol that will be supplied later.
7	Number of periods in the CCI

This function allows you to use the Commodity Channel Index study in color rules and alarms as shown in the following examples.

**Color Rule Example:**

**if(cci(\$1,14)>125,clr\_green,if(cci(\$1,14)<-125,clr\_red,clr\_yellow))**

This three-part color rule will turn a bar green when the CCI has a value over 125 and will turn a bar red when the CCI has a value under -125; all other bars will remain yellow.

#### **Alarm Example:**

**chart((cci(o#,7)>125 or cci(o#,7)<-125)[-1],1,2,100,1,3)**

This alarm will trigger when the 7-period CCI is over 125 or under -125. The alarm is based on daily bars of the front month of oats.

#### **Charting Setup Idea:**

Oscillators like the CCI are sometimes graphed as histograms rather than as line charts. To draw this study as a histogram, see the **Charting Setup Idea** section at the end of the Acceleration study.

---

## Cumulative Volume

---

Cumulative Volume is a weighted version of the On Balance Volume study. It adds or subtracts a prorated portion of the current volume to the previous Cumulative Volume value. The result is a weighted volume accumulator. On intraday charts, the accumulated tick volume for the period is used.

Type of Study	Keyboard Command	It works best in
Activity Indicator	.cv	Active Cash and Futures markets, all time frames

**Table 7**

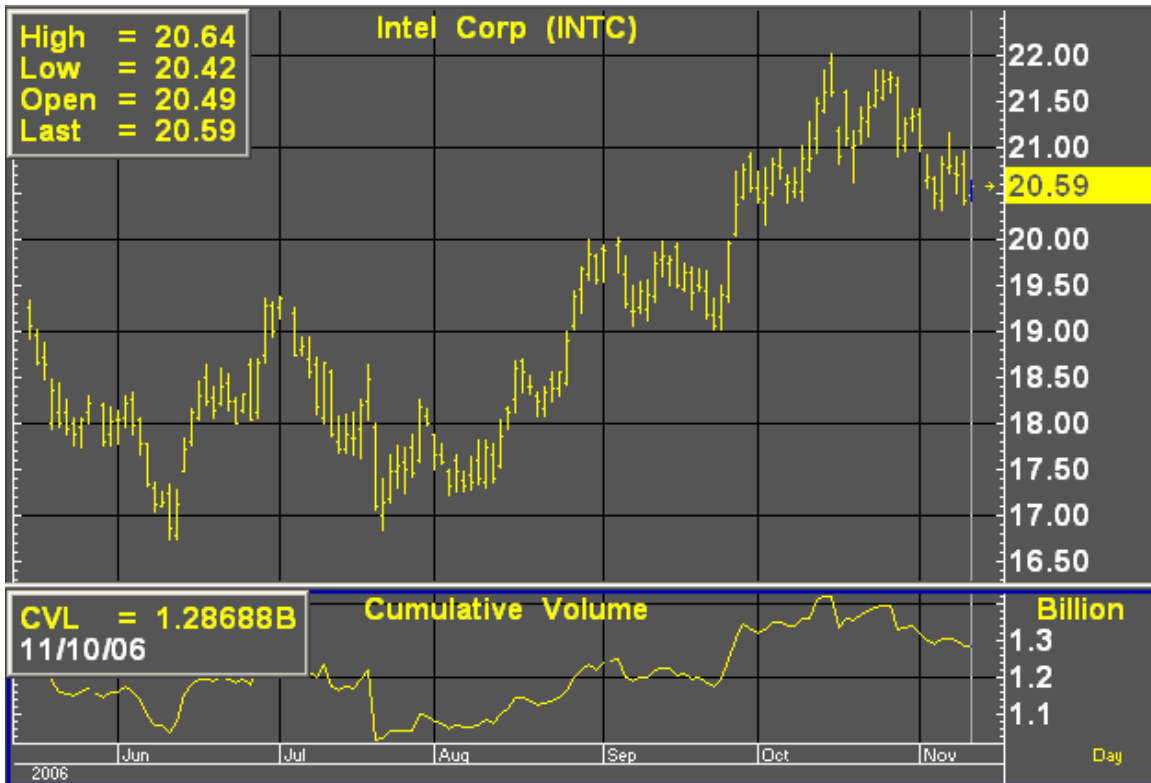
#### **How Aspen Graphics Calculates It:**

The Cumulative Volume study is calculated as follows:

**((Current Price - Previous Price) \* Volume) + the previous Cumulative Volume value**

Just like the On Balance Volume, the Cumulative Volume study uses an arbitrary positive integer as a starting point for the calculations. For this reason, the Custom Aspen Graphics Formula may not have the same value as the Cumulative Volume that is pre-programmed in Aspen Graphics; the extent of your database may also have an effect on this value. The *shape* of the graph, however, should look the

same. As mentioned in the On Balance Volume section, the shape of the line is the most important aspect of these studies.



**Default Parameters Settings:**

Field	Value
Color	Yellow
Graph	Line
Line Style	Solid
Line Width	1 pixel

**Custom Aspen Graphics Formula:**

$$\text{CumVol}(\text{series}) = \text{CumVol}[1] + ((\$1 - \$1[1]) * \$1.\text{volume})$$

This formula, once entered in the Formula Listing, allows you to use the Cumulative Volume study in color rules and alarms as shown in the following examples.

**Color Rule Example:**



```
if(CumVol($1)>CumVol($1)[1] and CumVol($1)[1] >CumVol($1)[2] and CumVol($1)[2]>
CumVol($1)[3],clr_green,if(CumVol($1)<CumVol($1)[1] and CumVol($1)[1]
<CumVol($1)[2] and CumVol($1)[2]<CumVol($1)[3],clr_red,clr_yellow))
```

This three-part color rule will turn a bar green when the Cumulative Volume has increased for three consecutive periods; it will turn a bar red when the Cumulative Volume has declined for three consecutive periods, and it will leave all other bars yellow.

### Alarm Example:

```
chart((if(CumVol(sp#)>CumVol(sp#)[1] and sp#<sp#[1] or CumVol(sp#)<CumVol(sp#)[1]
and sp#>sp#[1])[-1],30,1,100,1,3)
```

This alarm will trigger when the direction of the Cumulative Volume line is diverging from price action. The alarm is based on 30-minute bars of the S&P's.

### Charting Setup Idea:

The Cumulative Volume study can sometimes appear as a type of oscillator. It can, like other oscillators, be graphed as a histogram rather than as a line chart. To draw this study as a histogram, see the **Charting Setup Idea** section at the end of the Acceleration study.

---

## Directional Indicator (DMI)

---

The Directional Indicator is used to determine if the market is in trend mode. This makes it one of the few studies that doesn't simply *follow* a trend, but identifies the presence, strength and direction of a trend. It is often referred to as the DMI.

Type of Study	Keyboard Command	It works best in...
Trend Indicator	.dm	Cash and Futures markets, all time frames

### How Aspen Graphics Calculates It:

Two lines make up the Directional Indicator: the DI+ line and the DI- line. These lines measure the greatest part of the current price range that lie outside of the previous price range. A value is assigned *either* to the directional movement up (+DM) or to the directional movement down (-DM) for any given period; the other value is set to zero. For example, if the difference between the current and previous high is 8 points and the difference between the current and previous low

is 5 points, we say that the directional movement up is eight, and the directional movement down is zero.

The DI+ and DI- lines are plotted together. When the DI+ is above the DI-, a long position is indicated, and when the DI- is above the DI+, a short position is indicated.

+DM = current high - previous high

-DM = current low - previous low

Dirac

**If +DM > -DM, then -DM = 0**

**If -DM > +DM, then +DM = 0**

If the current range equals or lies within the previous range, both +DM and -DM = 0.

The DI+ Line is: **(modified moving avg of the +DM) \* 100**  
**modified moving avg of the Avg True Range**

The DI- Line is: **(modified moving avg of the -DM) \* 100**  
**modified moving avg of the Avg True Range**

Because the directional movement is divided by the instrument's average true range, the Directional Indicator is "normalized," which means you can use it to compare instruments across markets and in different trading ranges.

On the chart below, the Directional Indicator is signaling a long position at the end of June. The study indicates that this position should be closed when the DI+ line (green) crosses below the DI- line (yellow). A new long position taken on end of July, when the DI+ line once again rose above the DI- line, would have kept you in the market to enjoy the August rally which followed.

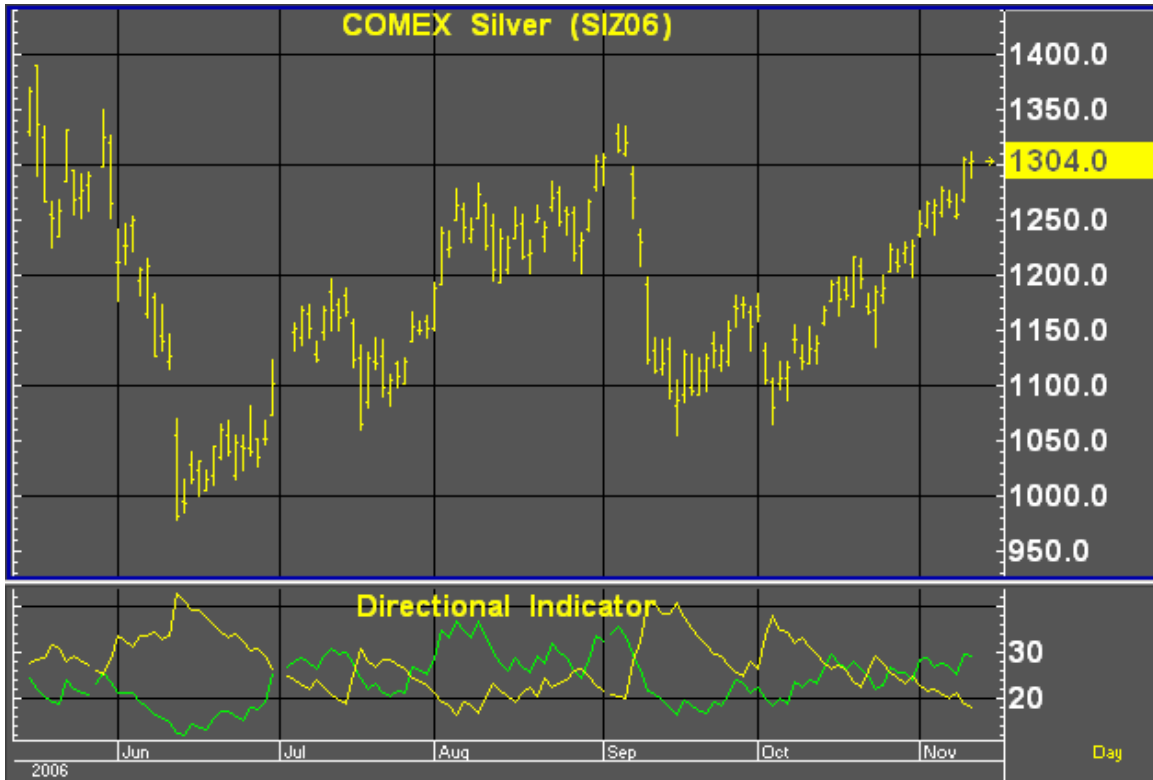


Figure 23

**Default Parameters Settings:**

Field	Value
Color: DI-	Yellow
Color: DI+	Green
Graph: DI-	Line
Graph: DI+	Line
Line Style: DI-	Solid
Line Style: DI+	Solid
Line Width: DI-	1 pixel
Line Width: DI+	1 pixel
Period	14

**Related Aspen Graphics Functions:**

**dmineg()** DI- line Example: **dmineg(\$1,14)**  
**dmipos()** DI+ line Example: **dmipos(\$1,14)**

Key to Examples	
<b>\$1</b>	Place holder for a symbol that will be supplied later.
<b>14</b>	Number of periods in the DMI study.

These functions allow you to use the DI- and DI+ lines of the Directional Indicator study in color rules and alarms as shown in the following examples.

### Color Rule Example:

```
if(dmipos($1,14)>=dmineg($1,14),clr_green,clr_red)
```

This color rule will turn all bars green when the DI+ line is above or equal to the DI- line and will color all bars red when the DI+ line is below the DI- line.

### Alarm Example:

```
chart((abs(dmipos(kc#,14)-dmineg(kc#,14))>=15)[-1],1,2,100,1,1)
```

This alarm will trigger when there is a spread of at least 15 points between the DI+ and the DI- lines. The alarm is based on daily bars for the front month of coffee futures.

---

## Directional Oscillator

---

The Directional Oscillator combines the DI+ and DI- lines of the Directional Indicator (also known as the Directional Movement Index) into one line that fluctuates above and below zero. The signals generated by the Directional Oscillator and the Directional Indicator are identical. See **Directional Indicator** in this section for more information on the DI+ and DI- lines.

Type of Study	Keyboard Command	It works best in...
Trend Indicator	.do	Cash and Futures markets, all time frames

### How Aspen Graphics Calculates It:

The Directional Oscillator study is calculated as follows: **DI+ minus DI-**

For an explanation of how the DI+ and DI- values are calculated, see the **Directional Indicator** study.

### Default Parameters Settings:

Field	Value
Color	Yellow
Graph	Line
Line Style	Solid

Line Width	1 Pixel
Period	14

### Custom Aspen Graphics Formula:

**DirOsc(series)=dmipos(\$1,14)-dmineg(\$1,14)**

This formula will allow you to use the Directional Oscillator study in color rules and alarms.

### Color Rule Example:

**if(DirOsc(\$1,14)>=0,clr\_green,clr\_red)**

This color rule will color all bars green when the Directional Oscillator is positive and will color all bars red when the Directional Oscillator is negative.

### Alarm Example:

**chart(((DirOsc(cSCO)-DirOsc(cSCO)[5])>=25)[-1],1,2,100,1,1)**

This alarm will trigger when the Directional Oscillator has increased by at least 25 points over the last 5 days. The alarm is based on daily bars for Cisco Systems stock.

---

## HiLo Oscillator

---

The HiLo Oscillator provides a measurement of directional movement. Periods which gap up or gap down will often register large positive and negative values on the HiLo Oscillator. This study takes the difference of the current period's high and previous period's close and divides it by the current period's true range.

Type of Study	Keyboard Command	It works best in...
Overbought/Oversold	.hlo	Cash, Futures, and Options markets in all time frames and all market conditions.

The true range is defined as the greatest of the following three values:

1. The current high minus the previous close;
2. The current high minus the current low; or
3. The previous close minus the current low.

The HiLo Oscillator is plotted on a scale between -100 and 100, and like the A/D Oscillator, often fluctuates dramatically between these numbers. To make this study easier to read, a moving average can be applied to the HiLo Oscillator and overbought/oversold zones can be applied to this moving average.

### How Aspen Graphics Calculates It:

The HiLo Oscillator is calculated as follows:

$$100 * \frac{\text{Current High} - \text{Previous Close}}{\text{True Range}}$$

Where True Range = true high - true low

### Default Parameters Settings:

Field	Value
Color	Yellow
Graph	Line
Line Style	Solid
Line Width	1 Pixel

### Custom Aspen Graphics Formulas:

$$\text{HiLoOsc}(\text{series}) = 100 * (\$1.\text{high} - \$1.\text{prev}) / \$1.\text{trange}$$

This formula allows you to use the HiLo Oscillator study in color rules and alarms as shown in the following examples.

#### Color Rule Example:

$$\text{if}(\text{HiLoOsc}(\$1) > 90 \text{ or } \text{HiLoOsc}(\$1) < -50, \text{clr\_red}, \text{clr\_yellow})$$

This color rule will turn a bar red when the value of the HiLo Oscillator is over 90 or less than -50, and leave all other bars yellow.

#### Alarm Example:

$$\text{chart}(\text{eavg}(\text{HiLoOsc}(\text{sm}\#1), 6) \geq 70 \text{ or } \text{eavg}(\text{HiLoOsc}(\text{sm}\#1), 6) \leq 30, 1, 2, 100, 1, 3)$$

This alarm will trigger if, at the end of the day, the 6-period exponential moving average of the HiLo Oscillator is above 70 or below 30. The alarm is based on daily bars of the first month out soybean meal contract.

### Charting Setup Idea:

Oscillators like the HiLo Oscillator are sometimes graphed as histograms rather than as line charts. To draw this study as a histogram, see the **Charting Setup Idea** section at the end of the Acceleration study.

---

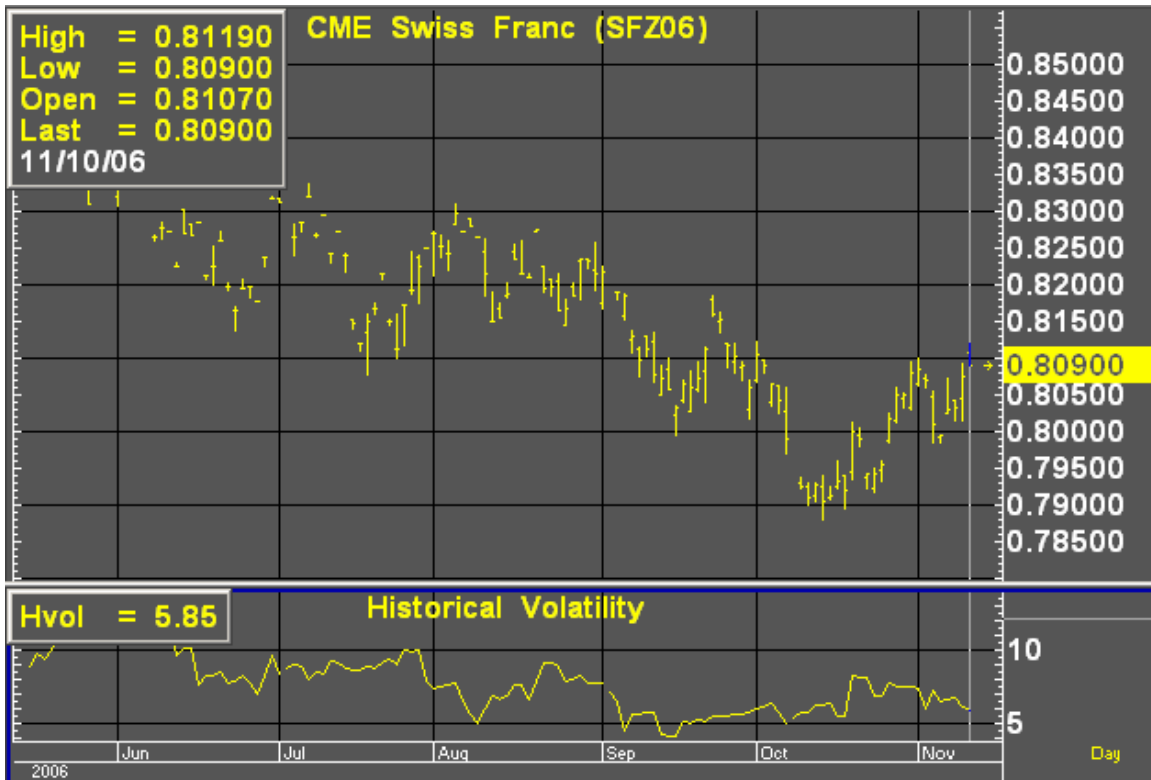
## Historical Volatility

---

Historical Volatility is a measure of price fluctuation over time. This study measures the likelihood of certain price levels being reached. If a market has large price swings over time, it is considered to have high historical volatility. In such a market, it is more likely that higher highs and lower lows will be hit than in a market that doesn't have such dramatic price swings.

Notice that Historical Volatility doesn't predict the *direction* of price movement. Instead, it shows how much the price has changed over a range of recent prices, and this information can be used in predicting the likelihood of future price movements. For example, rising volatility in a market that has been moving sideways usually indicates that prices are ready to break out of their current trading range to *either* the up *or* down side. It is also the case that decreasing volatility signals a breakout as market makers may soon step in to infuse new activity into a consolidated market.

Type of Study	Keyboard Command	It works best in
Activity Indicator	.hvol	Cash, Futures and Options markets, all time frames



### How Aspen Graphics Calculates It:

First identify the mean, and then calculate the standard deviation:

#### Formula:

Historical Volatility:

$$\sigma = \sqrt{\frac{1}{n-1} \sum_{i=1}^n (m - x_i)^2}$$

#### Where:

- $\sigma$  = standard dev, or historical volatility
- $n$  = number of occurrences (bars)
- $m$  = mean
- $x_i$  = price changes

#### And:

Mean:

$$m = \frac{1}{n} \sum_{i=1}^n x_i$$

#### Where:

- $m$  = mean
- $n$  = number of occurrences
- $x_i$  = price changes



**And:**

$x_i$  can equal percent of price change:

$$x_i = \frac{P_{i+1} + P_i}{P_i}$$

**Or:**

$x_i$  can equal natural logarithmic price change:

$$x_i = \text{LN}\left(\frac{P_{i+1}}{P_i}\right)$$

**Default Parameters Settings:**

Field	Value
Base	0.0
Color	Yellow
Deviations	1.0
Graph	Line
Line Style	Solid
Line Width	1 pixel
Method	Nat. Log.
Period	10
Price	Close
Trading Periods	253.0

**Related Aspen Graphics Function: hvol( )**

Examples: **hvol(\$1,10,1,253,0)**  
**hvol(\$1,10)**

<b>Key to Examples</b>	
<b>\$1</b>	Place holder for a symbol that will be supplied later.
<b>10</b>	Number of periods in the Hist. Vol. study
<b>1</b>	Number of standard deviations
<b>253</b>	Number of trading periods in a year
<b>0</b>	Base 100 value. 0 is Default. 100 needs to be used only when the hvol function is surrounded by the chart() function.

This function allows you to use the Historical Volatility study in color rules and alarms as shown in the following examples.

### Color Rule Example:

**if(hvol(\$1,10)<5,clr\_cyan,clr\_yellow)**

This color rule will change a bar to cyan when the historical volatility drops below five percent and will leave all other bars yellow.

### Alarm Example

**chart((hvol(sp#,10)>25)[-1],1,2,100,1,1)**

This alarm will trigger when the historical volatility for the front month of the S&P's exceeds 25. The alarm is based on daily bars.

### Formula Example:

**hsvol(series)=hvol(\$1,6)/hvol(\$1,100)**

In their book, Street Smarts, Linda Raschke and Larry Connors describe an indicator in which the six-day historical volatility is divided by the 100-day historical volatility. The formula above, once entered in the Formula Listing, will allow you to chart this indicator. From the Select Study menu, single left click on *Formulas...* and then select *hsvol* from the Select Formula Study menu.

---

## Keltner Channels

---

This study was developed by Chester W. Keltner and is similar to the Moving Average Envelope and Bollinger Band studies. The difference lies in the method used to calculate how far the bands should be drawn above and below the moving average line. Keltner Channels are drawn above and below the moving average at a distance which is the weighted 10-period moving average of the true range multiplied by a constant.

Type of Study	Keyboard Command	It works best in.....
Trend Follower	.keltner	Cash and Futures markets that are trending.

### Default Parameters Settings:

Field	Value
Avg,Type	Simple
Color – Lower Channel	Cyan
Color – Moving Average	Green
Color – Upper Channel	Violet

Graph – Lower Channel	Line
Graph – Moving Average	Line
Graph – Upper Channel	Line
Line Style – Lower Channel	Solid
Line Style – Moving Average	Solid
Line Style – Upper Channel	Solid
Line Width – Lower Channel	1 pixel
Line Width – Moving Average	1 pixel
Line Width – Upper Channel	1 pixel
Multiplier – Lower Channel	1.0
Multiplier – Upper Channel	1.0
Period	10.0
Price	Close

### Related Aspen Graphics Functions: `keltner()`

Example:     **`keltner($1,10,1)`** Upper Channel (default parameters)  
                  **`keltner($1,10,-1)`** Lower Channel (default parameters)

<b>Key to Examples</b>	
<b>\$1</b>	Placeholder for a symbol that will be supplied later.
<b>10</b>	Number of periods in the moving average.
<b>1, -1</b>	Multiplier for the Upper and Lower Channels

### Color Rule Example:

**`if($1.high>keltner($1,10,1),clr_red,if($1.low<keltner($1,10,-1),clr_green,clr_-yellow))`**

This three-part color rule will turn a bar red when the high price of that bar penetrates the top channel, green when it penetrates the lower channel, and will leave all other bars yellow.

### Alarm Example:

**`chart((msft.high>keltner(msft,10,1) or msft.low<keltner(msft,10,-1))[-1],1,2,100,1,1)`**

This alarm will trigger when either channel for MSFT is penetrated by a daily bar.

---

## Linear Regression

---

Linear regression uses the “best fit” technique to draw a straight line that is closest to most of the data points. The most popular technique in statistics for “best fit” determination is the method of least squares. The best fit is the straight line from which all actual data points vary least. Along with this “best fit” line, two parallel confidence level lines are drawn showing the range that 95% of all values fall in. Data lying outside of these ranges are considered outliers and are often followed by a trend reversal. Because of this linear regression is considered an “envelope” study, much like Bollinger Bands and Keltner Channels.

Type of Study	Keyboard Command	Works Best For
Trend Follower	.lr	Cash and Futures markets that are trending.

### How Aspen Graphics calculates it:

Aspen Graphics calculates linear regression using 200 periods by default. Linear regression always starts counting periods from the right hand side of the chart, even if there is no data displayed, so unlike Bollinger Bands and Keltner Channels the study will return different values as you look into the future.

$$Y = a + bX$$

where

Y is a price

X is time

b is the “Y intercept”, or the point at which the line crosses the Y axis, or

$$b = \frac{N \sum xy - \sum x \sum y}{N \sum x^2 - (\sum x)^2}$$

a is the slope, or angle of the line

$$a = \frac{1}{N} (\sum y - b \sum x)$$

N is the number of data points and  $\sum$  represents the sum over N points.

Linear regression uses the “best fit” technique to draw a straight line that is closest to most of the data points. The most popular technique in statistics for “best fit” determination is the method of least squares. The best fit is the straight line from which all actual data points vary least.

### Default Parameter Settings:

Field	Value
CI	95.0
Color – Confidence High	Blue
Color – Confidence Low	Blue
Regression	Green
Graph – Confidence High	Dotted
Graph – Confidence Low	Dotted
Regression	Line
Line Style – Confidence High	Solid
Line Style – Confidence Low	Solid
Line Style – Regression	Solid
Line Width – Confidence High	1 pixel
Line Width – Confidence Low	1 pixel
Line Width – Regression	1 pixel
Price	Close
Regression Width	200.0
Type	Linear

### Related Aspen Graphic Functions:

Lr() Example: Lr(\$1,100,0)

Key to Examples	
<b>\$1</b>	Placeholder for a symbol that will be supplied later.
<b>100</b>	Number of periods in the regression.
<b>0</b>	Tells the function to use linear scaling.
<b>1</b>	Use Logarithmic scaling
<b>2</b>	Use Continuous scaling
<b>3</b>	Use Quadratic scaling

This function allows you to use Linear Regression's best fit line in Color Rules, Quote pages, and Alarms. Unfortunately there is no function to calculate the confidence intervals.

### Color Rule Example:

`if($1.close > lr($1,200,1), clr_red, if($1.close <lr($1,200,1), clr_green, clr_yellow))`

This Color Rule will color the bars with a close above the 200 period best fit line red and those below the best fit line green.

---

## Moving Average Convergence Divergence (MACD)

---

The MACD study measures overbought or oversold conditions. The MACD differs from the Moving Average Oscillator in that it uses two moving averages of the same average type (exponential) but different number of periods.

Type of Study	Keyboard Command	It works best in
Overbought/ Oversold	.macd	Cash and Futures markets with wide trading ranges, and at the end of strong trends.

**Table 14**

### How Aspen Graphics Calculates It:

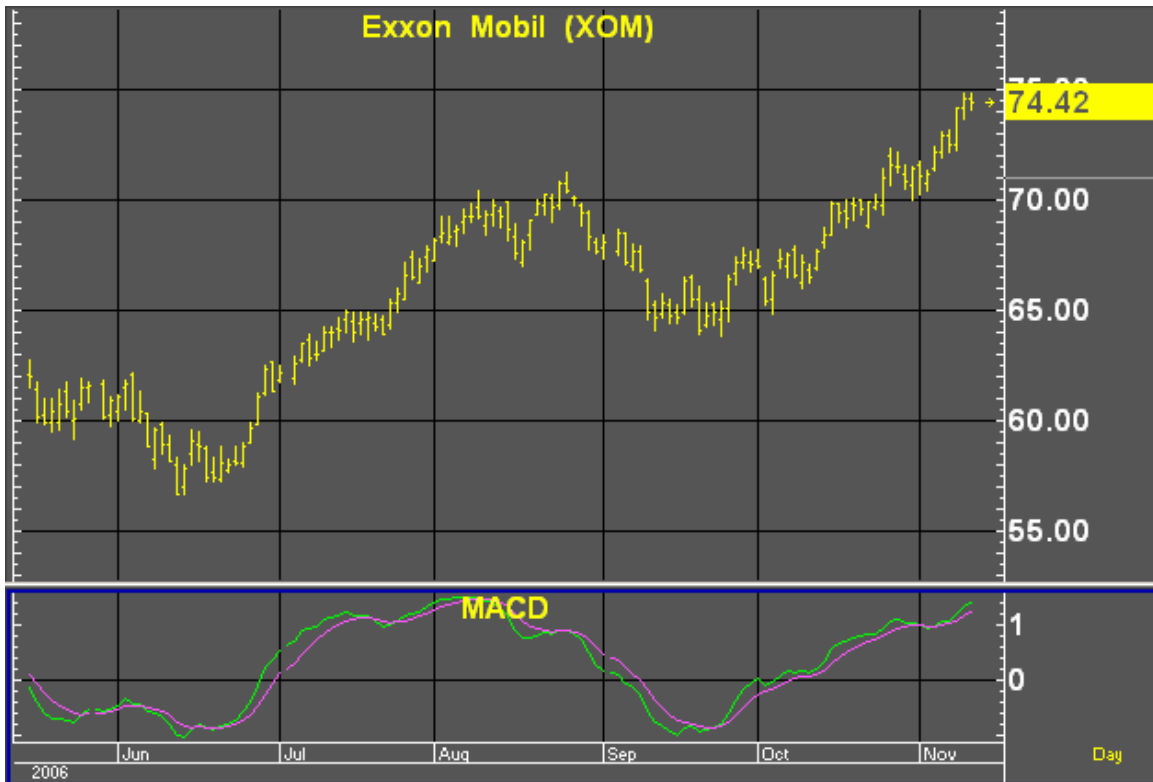
Moving Average Convergence Divergence (MACD) is as follows:

**MACD Line = short term Exponential Moving Average with smoothing factor  
minus long term Exponential Moving Average with smoothing factor.**

**Signal Line = Exponential Moving Average of the MACD line.**

Overbought and oversold conditions are indicated where the MACD line crosses above or below its moving average. These crossovers must occur above or below certain levels for the signal to be valid.

Bull markets are often indicated when the MACD line is above the signal line and rising; it is just the opposite for bear markets. These are only generalizations; the strongest signals are produced in volatile or trending markets.



**Default Parameters Settings:**

Field	Value
Avg. Type – Avg 1	Exponential
Avg. Type – Avg 2	Exponential
Signal Line	Exponential
Color – Macd Line	Green
Color – Signal Line	Violet
Graph – Macd Line	Line
Graph – Signal Line	Line
Line Style – Macd Line	Solid
Line Style – Signal Line	Solid
Line Width – Macd Line	1 pixel
Line Width – Signal Line	1 pixel
Period – Avg 1	0.1
Period – Avg 2	0.2
Period – Signal Line	0.3
Price – Avg 1	Close
Price – Avg 2	Close

Note that the periods for the MACD are expressed differently than in other studies. This is because the number of periods are related to the smoothing factor

$2/(n+1)$ , where  $n$  is the number of periods in the moving average. When you enter a value in the

**Period** field, you can enter either a whole number for the number of periods *or* a decimal value for the smoothing factor. It's automatically converted for you, as shown in Table 15.

If you enter this value in Periods field:	Aspen Graphics calculates the number of periods (n) like this:
.1	$1 = 2/(n+1)$ $1 = 20/(n+1)$ $1/20 = 1/(n+1)$ $20 = n+1$ $19 = n$ so Periods = 19
.2	$2 = 2/(n+1)$ $2 = 20/(n+1)$ $1/10 = 1/(n+1)$ $10 = n+1$ $9 = n$ so Periods = 9
.3	$3 = 2/(n+1)$ $3 = 20/(n+1)$ $3/20 = 1/(n+1)$ $20/3 = n+1$ $17/3 = n$ so Periods = 5.67

### Custom Aspen Graphics Formulas:

**MACD\_(series)=eavg(\$1,.2)-eavg(\$1,.1)**  
**Signal\_Line(input)=eavg(macd\_(\$1),.3)**

These formulas, once entered in the Formula Listing, allow you to use **MACD** study in color rules and alarms as shown in the following examples.

### Color Rule Example:

```
if(MACD_($1)>MACD_($1)[1] and MACD_($1)>Signal_Line($1),clr_green,
if(MACD_($1)<MACD_($1)[1] and
MACD_($1)<Signal_Line($1),clr_red,clr_yellow))
```

This three-part color rule will turn the bars green where the **MACD** line is rising and it is above the Signal line. Where the **MACD** line is falling and it is below the Signal line, the bars will be red. All other bars will be yellow.



### Alarm Example:

```
chart((MACD_(w#)>=Signal_Line(w#))[-1],30,1,100,1,3)
(make sure to set Trigger When State: to Changes)
```

This alarm will trigger each time the **MACD** line crosses the Signal line for the front month of wheat. The alarm is based on 30-minute bars.

---

## MACD Oscillator

---

The MACD Oscillator converts the two lines of the MACD into a single line that fluctuates above and below zero. The MACD Oscillator is calculated by subtracting the Signal Line value from the MACD Line value. When the MACD Line crosses the Signal Line, the MACD Oscillator displays a value of zero, and a buy or sell signal is generated. The signals provided by the MACD and the MACD Oscillator are identical.

Type of Study	Keyboard Command	It works best in
Overbought/Oversold	.macdo	Cash and Futures markets with wide trading ranges and at the end of strong trends.

### How Aspen Graphics Calculates It:

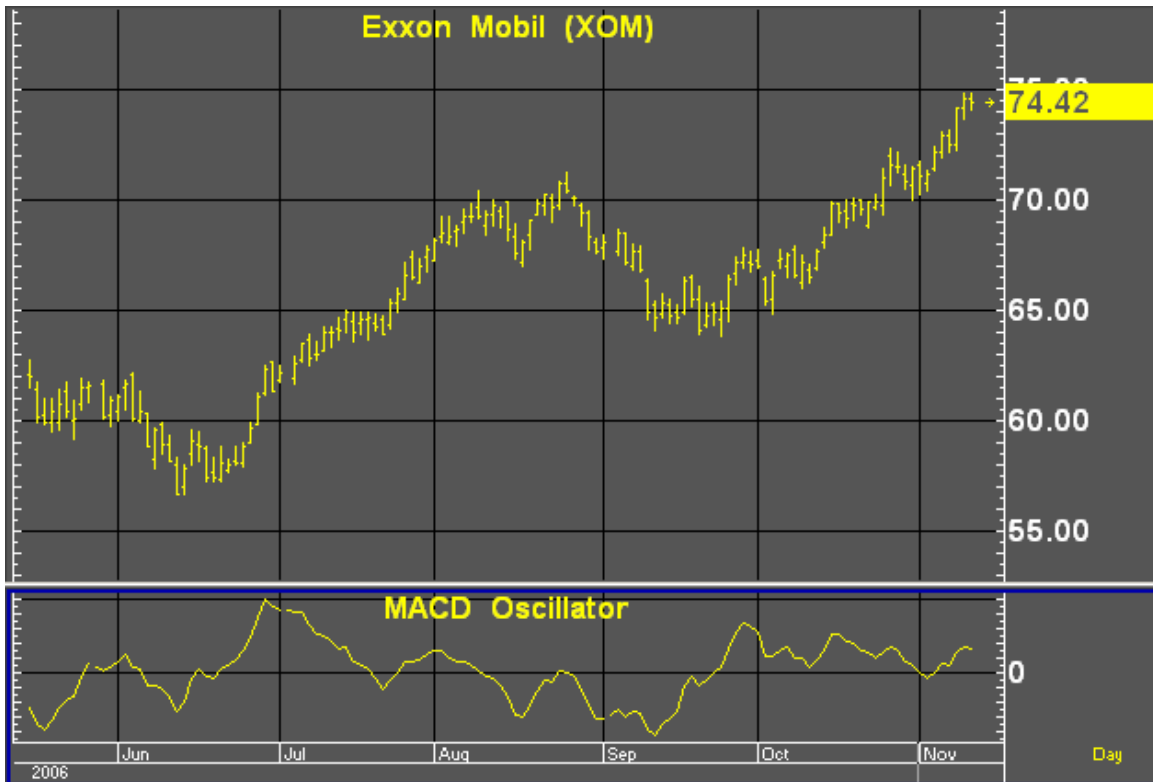
The MACD Osc is: **MACD Line *minus* Signal Line**

MACD Line = short term Exponential Moving Average with smoothing factor *minus* long term Exponential Moving Average with smoothing factor

Signal Line = Exponential Moving Average of the MACD Line

The MACD Oscillator study may indicate oversold conditions when it crosses above the “zero line.”

When the oscillator moves back below zero again, overbought conditions may be indicated.



**Default Parameters Settings:**

Field	Value
Avg. Type – Avg 1	Exponential
Avg. Type – Avg 2	Exponential
Avg. Type – Signal Line	Exponential
Color	Yellow
Graph	Line
Line Style	Solid
Line Width	1 pixel
Period – Avg 1	0.1
Period – Avg 2	0.2
Period – Signal Line	0.3
Price – Avg 1	Close
Price – Avg 2	Close

Note that the periods for the MACD Oscillator are expressed just like the MACD study, which are different from the other studies in Aspen Graphics. For an explanation of how these periods are calculated, see the Default Parameters Settings for the MACD study in the previous section.

**Custom Aspen Graphics Formulas:**

$$\text{MACD\_}(\text{series})=\text{eavg}(\$1,.2)-\text{eavg}(\$1,.1)$$

**Signal\_Line(input)=eavg(macd\_(\$1),.3)**  
**MACD\_Osc(series)= MACD\_(\$1)-Signal\_Line(\$1)**

These formulas, once entered in the Formula Listing, allow you to use the MACD Oscillator study in color rules and alarms, as shown in the following examples.

### Color Rule Example:

**if((MACD\_Osc(\$1)>=0 and MACD\_Osc(\$1)[1]<0),clr\_green, if((MACD\_Osc(\$1)<=0 and MACD\_Osc(\$1)[1]>0),clr\_red,clr\_yellow))**

This three-part color rule will turn the bar green where the MACD Oscillator has changed to a positive value; it will turn the bar red where the MACD Oscillator has changed to a negative value, and all other bars will remain yellow.

### Alarm Example:

**chart((MACD\_Osc(c#)>=0)[-1],30,1,100,1,3)**  
(make sure to set Trigger When State to **Changes**)

This alarm will trigger each time the MACD Oscillator line crosses the “zero” line for the front month of corn. The alarm is based on 30-minute bars.

### Charting Setup Idea:

Oscillators are sometimes graphed as histograms rather than as line charts. To draw this study as a histogram, see the **Charting Setup Idea** section at the end of the Acceleration study.

---

## Momentum

---

Momentum is the difference between the current price and a previous price. Momentum indicates the *rate of change in prices* and helps determine when a trend is “running out of steam.” If prices are going up but momentum is falling, prices are expected to rise *less quickly*, signaling that the current trend may be coming to an end.

The Momentum study can generate buy signals. When momentum has been negative and then becomes positive, a buy may be indicated *if this is also the direction of the current trend*.

Divergence between momentum and price is another important use of this study. A down trend may be coming to an end if prices make new lows, but momentum makes higher lows; the same is true for an up-trend when price and momentum diverge.

Type of Study	Keyboard Command	It works best in
---------------	------------------	------------------

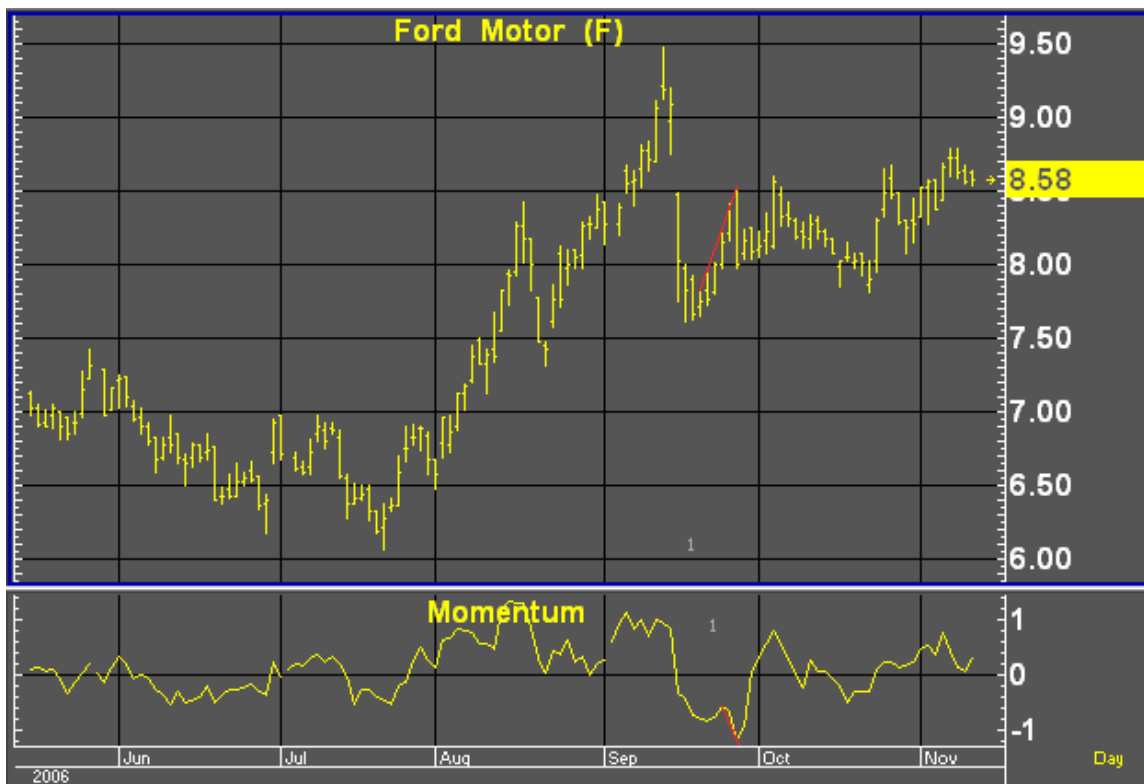
Overbought/Oversold	.mom	Cash and Futures markets, all time frames
---------------------	------	---

**Table 13**

### How Aspen Graphics Calculates It

Momentum is: **Current Price - Price  $n$  periods ago**

The user determines which price (i.e. how many bars back) should be subtracted from the current price.



The trendlines (red) drawn on the chart above, show divergences between price and momentum; price was going up while momentum was going down, and the uptrend was soon reversed.

### Default Parameters Settings:

Field	Value
Color	Yellow
Graph	Line
Line Style	Solid
Line Width	1 pixel
Period	10
Price	Close

## Related Aspen Graphics Functions: mom()

Example: **mom(\$1,21)**

The **mom()** function allows you to use Momentum in color rules and alarms as shown in the following examples.

Key to Example	
<b>\$1</b>	Placeholder for a symbol that will be supplied later.
<b>21</b>	Number of periods in the momentum study.

### Color Rule Example:

```
if(mom($1,21)>0 and mom($1,21)[1]<=0,clr_blue,clr_yellow)
```

This color rule will turn a bar blue when the 21-period momentum becomes positive.

### Alarm Example:

```
chart((ip.high>ip.high[1] and ip.high[1]>ip.high[2] and  
mom(ip,10)<mom(ip,10)[1] and mom(ip,10)[1]<mom(ip,10)[2])[-  
1],15,1,100,1,1)
```

This alarm is monitoring divergence between price and momentum. The alarm will trigger when the high price of International Paper has increased over the last two periods while the 10-period momentum was falling during that same period, based on 15-minute bars.

### Formula Example:

```
LBR_RSI=chart(rsi(mom($1,1),3)[-1],1,2,100,1,3)
```

In their book Street Smarts, Linda Raschke and Laurence Connors talk about a trading technique they call “Momentum Pinball.” This technique uses a 3-period RSI study on a 1-period Momentum study.

This combination can be easily charted in Aspen Graphics using the “Add a Study” option on the Select Study menu and the “First Study” price parameter.

The LBR\_RSI can also be quoted on a quote page using the preceding formula.

## Moving Averages

Moving averages are smoothing techniques. They are the average price of an instrument over a certain number of periods. *Faster* moving averages are based on fewer periods, and *slower* moving averages are indicative of long-term trends. The strength of a trend is indicated by the steepness of the moving average's slope.

Moving averages are always *lagging indicators* because they incorporate historical data. For this reason, they are used more to confirm that a change in trend has already taken place than as a way of predicting when a change will occur.

Type of Study	Keyboard Command	It works best in
Trend Follower	.mav	Cash and Futures markets that are trending.

Aspen Graphics has five different types of moving averages. These five moving averages are listed and explained in the tables below.

Key to Example	
<b>P</b>	Current Price
<b>P1</b>	Price 1 Period ago, etc.
<b>MA<sub>prev</sub></b>	Previous Moving Average Value
<b>n</b>	Number of Periods
<b>a</b>	Smoothing Constant $2/(n+1)$

Description	How Aspen Graphics Calculates It
<b>Simple Moving Average</b>	
Average (mean) of data over $n$ periods	$\frac{P+P1+\dots+P(n-1)}{n}$
<b>Modified Moving Average</b>	
Subtracts last moving average value instead of oldest data	$MA_{prev} + 1/n(P - MA_{prev})$
<b>Exponential Moving Average</b>	
Assigns more weight to newer data using a <i>geometric</i> formula	$\frac{P+a*P1+a^2*P2+\dots+(a^{n-1})*Pn-1}{1+a+a^2+\dots+a^{(n-1)}}$
<b>Weighted Moving Average</b>	
Assigns more weight to newer data using an <i>arithmetic</i> formula	$\frac{n*P+(n-1)*P1+(n-2)*P2+\dots+P(n-1)}{1+2+3+\dots+n}$
<b>Hamming Moving Average</b>	
Weights recent data much more heavily than older data using a sine wave curve function	Proprietary; developed by Aspen Research Group

**Default Parameters Settings:**

Field	Value
Avg. Type	Simple
Color	Green
Graph	Line
Line Style	Solid
Line Width	1 pixel
Period	5
Price	First Study
Shift	0

### Related Aspen Graphics Functions:

<b>savg( )</b>	Simple Moving Avg.	<b>savg(\$1,21)</b>
<b>mavg( )</b>	Modified Moving Avg.	<b>mavg(\$1,14,1)</b>
<b>eavg( )</b>	Exponential Moving Avg	<b>eavg(\$1,10)</b>
<b>wavg( )</b>	Weighted Moving Avg.	<b>wavg(\$1,52)</b>
<b>havg( )</b>	Hamming Moving Avg.	<b>havg(\$1,5,1)</b>

Key to Examples	
<b>\$1</b>	Placeholder for a symbol that will be supplied later.
<b>2<sup>nd</sup></b>	Number of periods in the moving average.
<b>3<sup>rd</sup></b>	(if present) number of bars to shift the moving average.

### Color Rule Example:

```
if(savg($1,5)<savg($1,5)[1] and savg($1,5)[1]>savg($1,5)[2],clr_green,clr_yellow)
```

This color rule will turn the bar green when a 5-period **simple** moving average reverses direction on a high (i.e. the current moving average value is less than the one before, and *that* value was greater than the moving average value two bars back).

### Alarm Example:

```
chart((sp#.low>wavg(sp#,5))[-1],1,2,100,1,3)
```

This alarm will trigger when the low is higher than the 5-day **weighted** moving average.

### Formula Example:

```
doubleEAVG(input)=eavg(eavg($1,14),14)
```

This formula can be charted as an overlay and produces a super-smooth double **exponential** moving average (a moving average of a moving average).

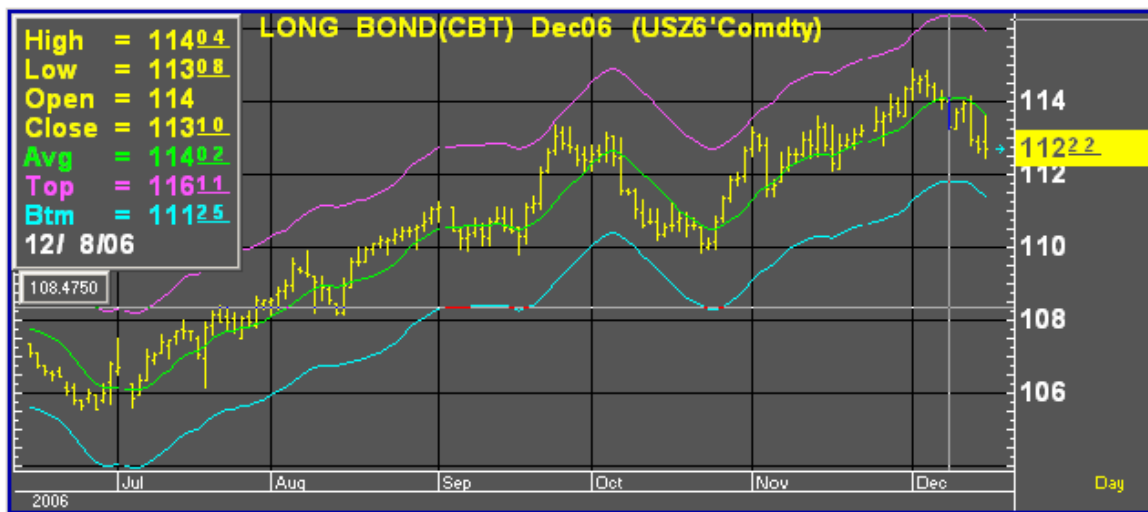
## Moving Average Envelope

The Moving Average Envelope study draws bands around a moving average to form a channel. The purpose of the bands is to show which prices are falling outside of the expected range.

The Moving Average Envelope study is very similar to the Bollinger Band and Keltner Channel studies; the difference lies in the method used to calculate how far the bands should be drawn above and below the moving average line. The Moving Average Envelope bands are drawn above and below the moving average at a distance which is a percentage of the moving average value. For example, if the value of the moving average at a particular bar is 100 and the Percent field is set to 0.5, the top and bottom bands will be drawn at 100.5 and 99.5.

Type of Study	Keyboard Command	It works best in
Trend Follower	<b>.env</b>	Cash and Futures markets that are trending

The figure below shows a Moving Average Envelope around a 10-day simple moving average with bands set at 2% above and below the average.



### Default Parameters Settings:

Field	Value
Avg. Type	Simple
Color: Envelope Bottom	Cyan



Color: Envelope Top	Violet
Color: Moving Average	Green
Graph: Envelope Bottom	Line
Graph: Envelope Top	Line
Graph: Moving Average	Line
Line Style: Envelope Bottom	Solid
Line Style: Envelope Top	Solid
Line Style: Moving Average	Solid
Line Width: Envelope Bottom	1 pixel
Line Width: Envelope Top	1 pixel
Line Width: Moving Average	1 pixel
Percent: Envelope Bottom	2.0
Percent: Envelope Top	2.0
Period	10.0
Price	First Study

### Custom Aspen Graphics Formulas:

**EnvAverage(input,per=10)=savg(\$1,per)**

**EnvTop(input,per=10,prcnt=0.005)=savg(\$1,per)+prcnt\*savg(\$1,per)**

**EnvBottom (input,per=10,prcnt=0.005)=savg(\$1,per)-prcnt\*savg(\$1,per)**

These formulas, once entered in the Formula Listing, allow you to use the Moving Average Envelope study in color rules and alarms, as shown in the following examples.

#### Color Rule Example:

**if(\$1.high<EnvBottom(\$1) or \$1.low>EnvTop(\$1),clr\_red,clr\_yellow)**

This color rule will turn a bar red when the entire price range for that bar lies outside of the Moving Average Envelope.

#### Alarm Example:

**chart((sp#.high<EnvBottom(sp#) or sp#.low>EnvTop(sp#))[-1],10,1,100,1,3)**

This alarm will trigger when the entire price range lies outside of the Moving Average Envelope. The alarm is based on a 10-minute bar chart of the current S&P contract.

## Moving Average Momentum

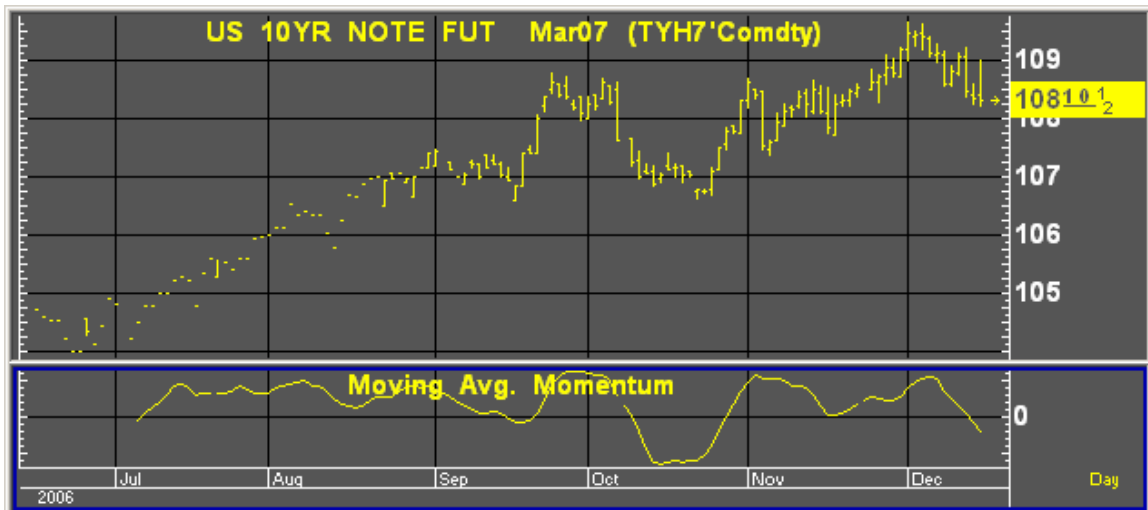
The Moving Average Momentum study measures the rate of change of a moving average. It is very similar to the Acceleration study except that instead of comparing momentum values, this study compares moving average values.

Type of Study	Keyboard Command	It works best in
Overbought/ Oversold	<b>.mavmom</b>	Cash and Futures markets, all time frames.

### How Aspen Graphics Calculates It:

Moving Average Momentum is:

**Current Moving Avg.-Moving Avg  $n$  periods back**



### Default Parameters Settings:

Field	Value
Avg. Type	Simple
Color	Yellow
Graph	Line
Line Style	Solid
Line Width	1 pixel
Mav. Periods	10
Period	5
Price	Close

The user determines how many periods should be used in the moving average from the **Mav. Periods** field of the study's parameter menu. The number of periods back to be compared against the current moving average value is determined in the **Period** field of the study's parameter menu.

### Custom Aspen Graphics Formulas:

```
MovAvgMom(series,per=5)=savg($1,10)-savg($1,10)[per]
```

This formula, once entered in the Formula Listing, allows you to use Moving Average Momentum in color rules and alarms as shown in the following examples.

### Color Rule Example:

```
if(MovAvgMom($1)>1,clr_green,  
if(MovAvgMom($1)<-1,clr_red,clr_yellow))
```

This three-part color rule will turn a bar green when the Moving Average Momentum is greater than 1, red when the value is less than -1, and leave all other bars yellow. The color rule is based on a 10-period moving average.

### Alarm Example:

```
chart(MovAvgMom(us#)<-1.5[-1],1,2,100,1,3)
```

The alarm will trigger when the Moving Average Momentum for the front month of bonds is less than -1.5. The alarm is based on daily bars.

### Charting Setup Idea:

The Moving Average Momentum study is an oscillator. By default, the study is drawn as a line but can be graphed as a histogram or a variety of other methods. See the **Charting Setup Idea** at the end of the Acceleration section.

---

## Moving Average Oscillator

---

This study subtracts one moving average from another. The MACD study, which uses two moving averages of the same average type (exponential) but a different number of periods, is different from the Moving Average Oscillator. This study uses (as default) two different average *types* (simple and modified) with the *same* number of periods.

The emphasis of this study lies more in the difference between the two average types than in comparing long and short term trends. Comparing the trends is the job of the MACD.

Type of Study	Keyboard	It works best in
---------------	----------	------------------

	Command	
Overbought/ Oversold	.mao	Cash and Futures markets that are trending.

### How Aspen Graphics Calculates It:

The Moving Average Oscillator is:

$$\text{Moving Avg\#1-Moving Avg\#2}$$

The user determines the type of moving averages to be used and the number of periods in each moving average.

### Default Parameters Settings:

Field	Value
Avg: 1	Simple
Avg: 2	Modified
Color	Green
Graph	Line
Line Style	Solid
Line Width	1 pixel
Period: Avg 1	10
Period: Avg 2	10
Price: Avg 1	Close
Price: Avg 2	Close
Shift: Avg 1	0
Shift: Avg 2	0

### Custom Aspen Graphics Formula:

$$\text{MovAvgOsc(series)=savg(\$1,10)-mavg(\$1,10)}$$

This formula, once entered in the Formula Listing, allows you to use Moving Average Momentum in color rules and alarms as shown in the following examples.

### Color Rule Example:

`if(MovAvgOsc($1)>0 and MovAvgOsc($1)>MovAvgOsc($1)[1], clr_red,clr_yellow)`

This color rule will turn a bar red when the Moving Average Oscillator is positive and rising and will leave all other bars yellow.

### Alarm Example:

**chart((MovAvgOsc(s#)>MovAvgOsc(s#)[1] and MovAvgOsc(s#)[1]> MovAvgOsc(s#)[2] and MovAvgOsc(s#)[2]>MovAvgOsc(s#)[3])[-1], 1,2,100,1,3)**

The alarm will trigger when the Moving Average Oscillator for the front month of soybeans has risen for the last three daily bars.

### Charting Setup Idea:

The Moving Average Oscillator study is, by default, drawn as a line but can be graphed as a histogram or a variety of other methods; see the **Charting Setup Idea** at the end of the Acceleration section.

---

## On Balance Volume

---

On Balance Volume is a volume accumulator. All of the volume in an up-period (a period which closes higher than the previous period) is added to the previous On Balance Volume, while all of the volume in a down-period (a period which closes lower than the previous period) is subtracted from the previous On Balance Volume.

Type of Study	Keyboard Command	It works best in...
Activity Indicator	<b>.obv</b>	Cash and Futures markets which are active, all time frames

The important aspect of this study is the direction and not the exact volume level of the On Balance Volume line. Divergence between price and the On Balance Volume can be a signal of trend reversal. This study can also lend some clues as to supply and demand as measured by the volume in up-periods and the volume in down-periods.

### How Aspen Graphics Calculates It:

The On Balance Volume study is calculated as follows:

**If the current close is *greater* than the previous close, all the volume for the period is *added* to the previous On Balance Volume.**

**If the current close is *less* than the previous close, all the volume for the period is *subtracted* from the previous On Balance Volume.**

The On Balance Volume uses an arbitrary positive integer as a starting point for the calculations. For this reason, the Custom Aspen Formula (below) may not have the same value as the On Balance Volume that is preprogrammed in Aspen Graphics. The extent of your database may also have an effect on this value. The *shapes* of the two graphs, however, should look the same.

### Default Parameters Settings:

Field	Value
Color	Yellow
Graph	Line
Line Style	Solid
Line Width	1 pixel

### Custom Aspen Graphics Formula:

**OBVol(series)=if(\$1.close>\$1.prev,obvol[1]+\$1.volume,if(\$1.close<\$1.prev,obvol[1]-\$1.volume,obvol[1]))**

This formula, once entered in the Formula Listing, allows you to use the On Balance Volume study in color rules and alarms, as shown in the following examples.

### Color Rule Example:

**if(OBVol(\$1)>OBVol(\$1)[1] and OBVol(\$1)[1]>OBVol(\$1)[2] and OBVol(\$1)[2]>OBVol(\$1)[3],clr\_green, if(OBVol(\$1)<OBVol(\$1)[1] and OBVol(\$1)[1]<OBVol(\$1)[2] and OBVol(\$1)[2]<OBVol(\$1)[3], clr\_red,clr\_yellow))**

This three-part color rule will turn a bar green when the On Balance Volume has increased for three consecutive periods, turn a bar red when the On Balance Volume has declined for three consecutive periods, and leave all other bars yellow.

### Alarm Example:

**chart((OBVol(sp#)>OBVol(sp#)[1] and sp#<sp#[1]) or (OBVol(sp#)<OBVol(sp#)[1] and sp#>sp#[1])[-1],15,1,100,1,3)**

This alarm will trigger when the direction of the On Balance Volume line is diverging from price action. The alarm is based on 15-minute bars of the front month of the current S&P contract.

### Charting Setup Idea:

When graphed, the On Balance Volume can sometimes appear as a type of oscillator. It can, like other oscillators, be graphed as a histogram rather than as a line chart.

To draw this study as a histogram, see the **Charting Setup Idea** at the end of the Acceleration study section.

---

## Open Interest

---

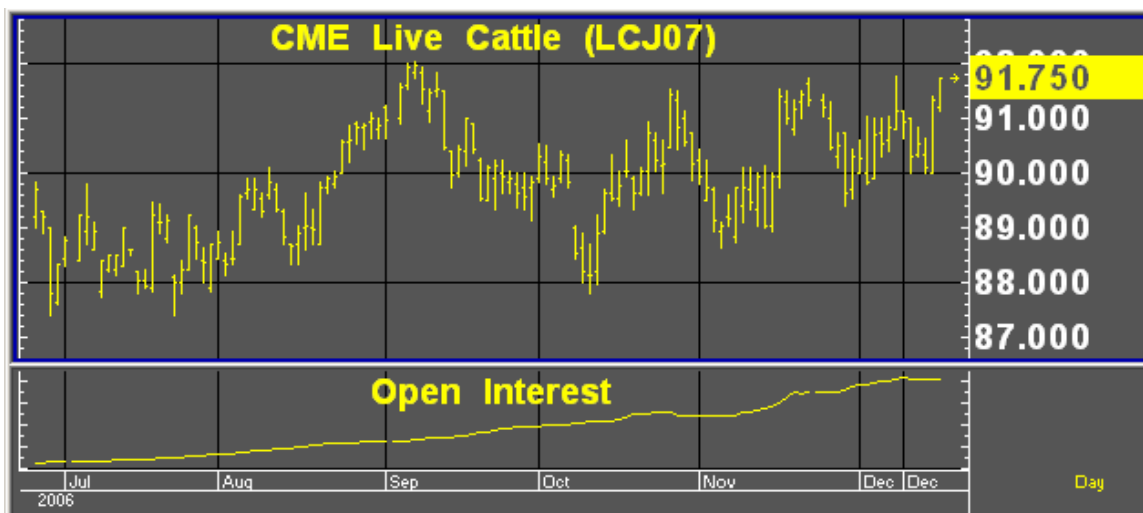
Open Interest is the number of outstanding future contracts at the end of a trading day. This study is not available on stocks, nor is it available in intraday time frames.

Type of Study	Keyboard Command	It works best in...
Activity Indicator	<b>.opint</b>	Futures and Options markets, daily and longer time frames

When a new contract is written, open interest is increased by a value of one. If an existing contract is *traded*, open interest remains unchanged, but if a contract is *liquidated*, open interest is decreased by a value of one.

### How Aspen Graphics Calculates It:

Calculations don't take place within the Aspen Graphics program for this study. The values for Open Interest are sent by the datafeed just like the price data.



### Default Parameters Settings:

Field	Value
Color	Yellow
Graph	Line
Line Style	Solid
Line Width	1 pixel

### Custom Aspen Graphics Formulas:

You can make reference to Open Interest values by using the \$1.oi quote code in formulas, color rules and alarms, as shown in the following examples.

### Color Rule Example:

```
if($1.oi>100000,clr_cyan,clr_yellow)
```

This color rule will turn a bar cyan when open interest exceeds 100,000.

### Alarm Example:

```
spm7.oi>=200000
```

This alarm will trigger when the open interest of the June '97 S&P's reaches or exceeds 200,000.

---

## Parabolic

---

The Parabolic study sets a stop price for each bar based on the direction of the trend. When the price penetrates the “trail” of Parabolic stops, it is an indication that the position should be reversed. This is called the Stop and Reverse point (SAR).

This study works well in trending markets but can give many false signals that might stop you out of a trade too early when the market is flat. For this reason, the Parabolic study is often used in conjunction with trend identifying indicators like the Directional Indicator or Directional Oscillator.

Type of Study	Keyboard Command	It works best in
Trend Follower	<b>.parab</b>	Cash and Futures markets that are trending.

### How Aspen Graphics Calculates It:

The initial SAR point represents the last significant high or low. If the market is trending up, stops are placed *below* the price activity. Stops are placed *above* the bars during down trends.

At first, these stops are set “loosely” so that you will not be stopped out by the minor volatility of a change in trend. As the trend continues, the stops are “tightened up” in the direction of the trend using an acceleration factor. This factor begins at .02 and increases by .02 to a maximum acceleration factor of .2. *This acceleration formula is hard coded into the Aspen Graphics software and cannot be changed by the user.*



Once the price penetrates a stop, a new series of Parabolic trailing stops begins on the other side of the price activity and continues until it is penetrated by price.

In the chart below, its sloping down above the bars are the trailing stops for a short position starting on Sept 6. On October 18, the stop is penetrated by price, an indication that the position should be reversed. A new series of SAR points begins building below the bars.



**Default Parameters Settings:**

Field	Value
Accelerator	0.020
Color	Green
Graph	Dots
Limit	0.2
Line Style	Solid
Line Width	1 pixel

**Figure 46**

**Custom Aspen Graphics Formula:**

Because Aspen Graphics has no Parabolic function, and a custom Parabolic study cannot be written as a formula in the Formula Listing menu, no color rules or alarms can be set on Parabolics.

**Color Rule Example:**

We cannot use the results of the Parabolic function directly in a formula or color rule but we can use the values on the chart to create a color rule. The following color rule colors descending values red and ascending values blue.

if(\$1<rawdata[1],clr\_blue,clr\_red)

---

## Relative Strength Index (RSI)

---

Developed by J. Welles Wilder, the RSI is used to determine the strength of a trend and to predict market reversals. This index is an overbought/oversold indicator plotted on a vertical scale from 0 to 100.

Type of Study	Keyboard Command	It works best in...
Overbought/Oversold	<b>.rsi</b>	Cash and Futures markets that are trending; in all time frames.

Values under 30 were considered by Wilder to represent oversold conditions, and RSI values over 70 were considered overbought conditions. Today, RSI values of 80 and 20 are more commonly used.

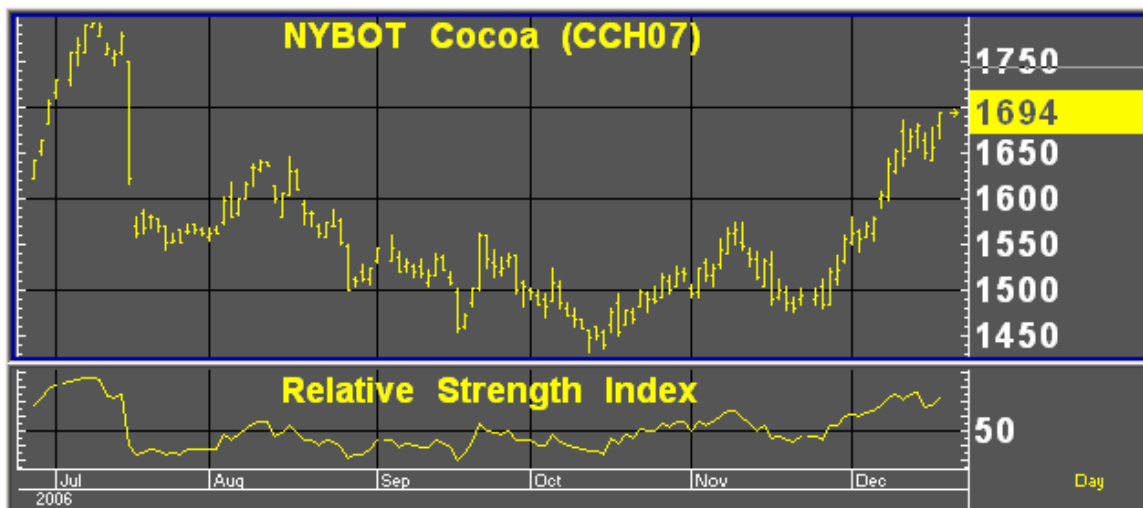
### How Aspen Graphics Calculates It:

The Relative Strength Index is calculated as follows:

$$RSI = 100 - \left[ \frac{100}{1 + RS} \right]$$

where RS is:

**modified moving average of x day's up closes**  
**modified moving average of x day's down closes**



The RSI study in the chart above reveals several important aspects of the market activity on the March '07 Coffee futures:

- The periods of strongest trend are reflected in the steepness of the RSI's slope.
- While the highest RSI value in July, didn't signal an immediate reversal, the market began to consolidate which was an indication that the current uptrend had lost momentum.

**Default Parameters Settings:**

Field	Value
Color	Yellow
Graph	Line
Line Style	Solid
Line Width	1 pixel
Period	14
Price	Close

Wilder's original RSI employed a number of periods equal to half of the normal cycle. For example, if an instrument was presumed to have a 28-day cycle, 14 periods were used in the RSI calculation.

**Related Aspen Graphics Functions: rsi()**

Example: **rsi(sp#,14)**

Key to Examples	
<b>\$1</b>	Placeholder for a symbol that will be supplied later.
<b>14</b>	Number of periods in the RSI.

This function will allow you to use the Relative Strength Index study in color rules and alarms as shown in the following examples.

**Color Rule Example:**

**if(rsi(\$1,14)>75,clr\_cyan,if(rsi(\$1,14)<25,clr\_red,clr\_yellow))**

This three-part color rule will turn a bar cyan when the RSI has a value over 75 and will turn a bar red when the RSI has a value under 25; all other bars will remain yellow.

**Alarm Example:**

**chart((rsi(sp#,14)>70 or rsi(sp#,14)<30)[-1],40,0,100,1,1)**

This alarm will trigger when the 14-period RSI has a value over 70 or under 30. The alarm is based on a 40-EqTick chart of the current S&P contract.

---

## Stochastic, Fast

---

Two lines make up this study: %K and %D. These lines oscillate between 0 and 100. The Fast Stochastic gives a variety of signals:

Overbought: when the %K is above 80\* and crosses below the %D line

Oversold: when the %K is below 20\* and crosses above the %D line



These values are left to the discretion of the user. Overbought conditions often range between 70 and 90, and oversold conditions range anywhere from 10 to 30.

Type of Study	Keyboard Command	It works best in
Overbought/ Oversold	<b>.fstoch</b>	Cash and Futures markets

According to its developer George Lane, a divergence between the %D line and price produces the most important stochastic signal. Divergence occurs when price is making a series of lower lows while the %D line is making a series of higher lows. This signals an oversold market. A divergence when the %D line is below 15 is commonly thought of as a signal to buy. Overbought conditions are indicated when prices are reaching higher highs while the %D is making lower highs. A divergence when the %D line is above 85 is commonly thought of as a signal to sell.

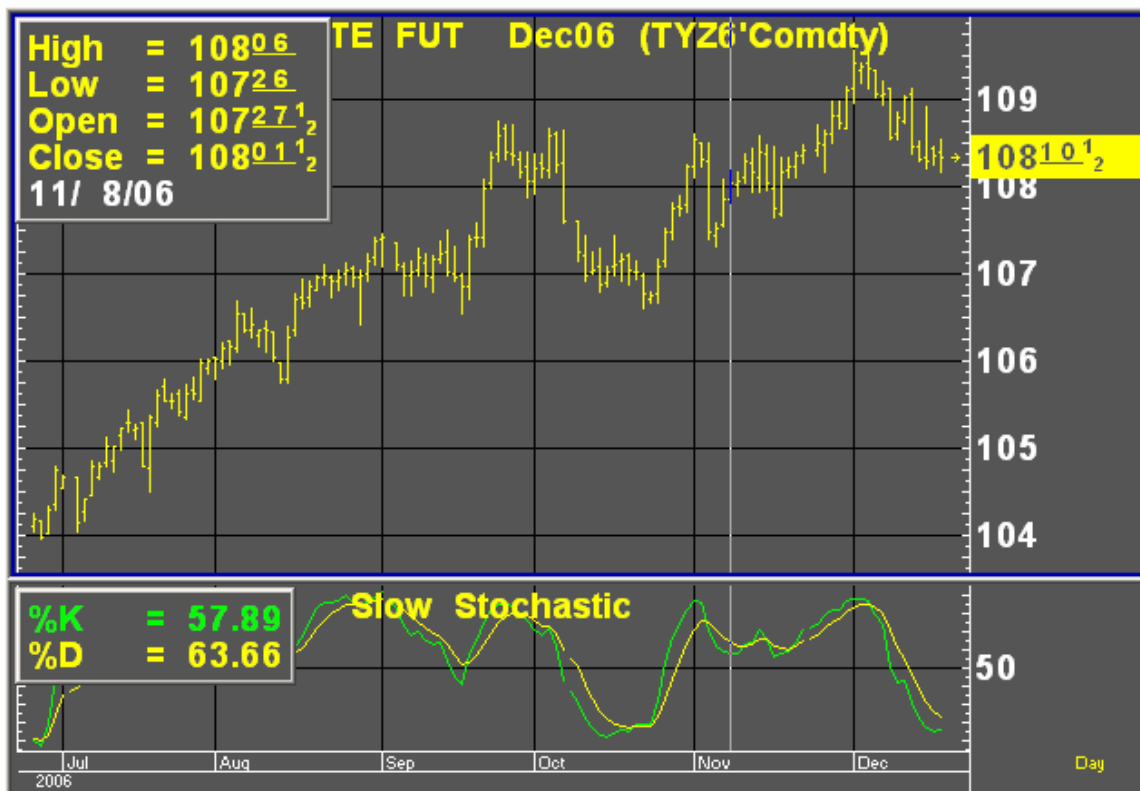
### How Aspen Graphics Calculates It:

The Fast Stochastic study is calculated as follows:

Fast %K line is:  $100 * \frac{\text{current close} - \text{lowest low in } n \text{ periods}}{\text{highest high in } n \text{ periods} - \text{lowest low in } n \text{ periods}}$

Fast %D line is: **3 period modified moving average of the Fast %K**

The chart below shows a buy signal on 6/29/06 where the Fast %K line crosses above the Fast %D line. Later that month and into early August, prices continued to make higher highs while the Fast %D line began to taper off flat. This divergence signaled that a reversal was on its way, a reversal which came when prices broke in August.



**Default Parameters Settings:**

Field	Value
Color %D	Yellow
Color %K	Green
Graph %D	Line
Graph %K	Line
Line Style %D	Solid
Line Style %K	Solid
Line Width %D	1 pixel
Line Width %K	1 pixel
Period	9

**Related Aspen Graphics Functions:**

**fstoch()** (for the Fast %K line)      **fstoch(\$1,14)**  
**sstoch()** (for the Fast %D line)      **sstoch(\$1,14,3)**

Key to Examples	
<b>\$1</b>	Placeholder for a symbol that will be supplied later.
<b>14</b>	Number of periods in the Fast

3	%K line. Number of periods in the Fast %D line.
---	---

These functions allow you to use the lines of the Fast Stochastic study in color rules and alarms, as shown in the following examples.

### Color Rule Example:

```
if(fstoch($1,14)>sstoch($1,14,3) and fstoch($1,14)[1]<sstoch($1,14,3)[1]and
fstoch($1,14)<30,clr_green,if(fstoch($1,14)<sstoch($1,14,3) and
fstoch($1,14)[1]>sstoch($1,14,3)[1] and fstoch($1,14)>70, clr_red,clr_yellow))
```

This three-part color rule will turn a bar green when the Fast %K line has a value under 30 and has crossed above the Fast %D line; it will turn a bar red when the Fast %K line has a value over 70 and has crossed below the Fast %D line, and it will leave all other bars yellow.

### Alarm Example:

```
chart((fstoch(sp#,14)>=sstoch(sp#,14,3))[-1],60,1,100,1,1)
(make sure to set Trigger When State: to Changes)
```

This will trigger each time the Fast %K and Fast %D lines cross, based on hourly bars.

---

## Stochastic, Modified

---

The Modified Stochastic is identical to the Slow Stochastic study, but it allows the user more flexibility. The Fast and Slow Stochastic studies use a 3-period modified moving average to calculate the %D lines. In the Modified Stochastic, the number of periods and the moving average type, as well as the price used to calculate the Fast %K, can be changed by the user.

Type of Study	Keyboard Command	It works best in
Overbought/ Oversold	<b>.mstoch</b>	Cash and Futures markets

The ways in which the signals are generated, and the values used to calculate overbought and oversold conditions, are the same as for the Slow Stochastic study.

### Default Parameters Settings:

Field	Value
Avg. Type: %D	Modified

Avg. Type: %K	Modified
Color: %D	Yellow
Color: %K	Green
Graph: %D	Line
Graph: %K	Line
Line Style: %D	Solid
Line Style: %K	Solid
Line Width: %D	1 pixel
Line Width: %K	1 pixel
Period: %D	3.0
Period: %K	3.0
Stochastic	14
Price	Close

### Related Aspen Graphics Functions and Formulas:

**sstoch()** (for the Slow %K line)      **sstoch(\$1,14,3)**  
**ssstoch()** (for the Slow %D line)      **ssstoch(\$1,14,3,3)**

These functions allow you to change the number of periods used for the lines of the Modified Stochastic study. Note, however, that they do not allow you to change the Average Type; a modified moving average is used by default. For a different Average Type, use one of the moving average functions in a custom formula as shown in the following examples:

**SlowK(input)=eavg(fstoch(\$1,14),3)**  
**SlowD(input)=savg(wavg(fstoch,\$1,14),3,3)**

Entering these formulas and using the preceding functions allow you to use the Modified Stochastic study in color rules and alarms as shown in the following examples.

### Color Rule Example:

**if(\$1.high>\$1.high[1] and \$1.high[1]>\$1.high[2] and \$1.high[2]>\$1.high[3]  
and SlowD(\$1)<SlowD(\$1)[1] and SlowD(\$1)[1]<SlowD(\$1)[2] and  
SlowD(\$1)[2]<SlowD(\$1)[3],clr\_blue,clr\_white)**

This color rule illustrates a way of signaling divergence. When price has made three consecutive highs but the Slow %D line has been decreasing over the same periods, this color rule will turn the bars blue to denote this divergence; otherwise the bars will remain white.

### Alarm Example:

```
chart((sstoch(pbg8,9,3)>=SlowD(pbg8))
[-1],1,2,100,1,1)
(make sure to set Trigger When State: to Changes)
```

This alarm will trigger each time the Slow %K and Slow %D lines cross. The alarm is based on daily bars for February '98 pork bellies.

---

## Stochastic, Slow

---

The Slow Stochastic is a smoothed variation of the Fast Stochastic. There are fewer crossovers, and therefore fewer signals than with the Fast Stochastic.

Type of Study	Keyboard Command	It works best in
Overbought/ Oversold	<b>.sstoch</b>	Cash and Futures markets.

Just like the Fast Stochastic, two lines make up this study. In the Slow Stochastic study these lines are referred to as the Slow %K and Slow %D. The ways in which the signals are generated, and the values used to calculate overbought and oversold conditions, are the same as for the Fast Stochastic study.

The Slow %K line in the Slow Stochastic is exactly the same as the Fast %D line from the Fast Stochastic. This line is then smoothed with a 3-period modified moving average to create the Slow %D line.

### How Aspen Graphics Calculates It:

Slow %K line is:

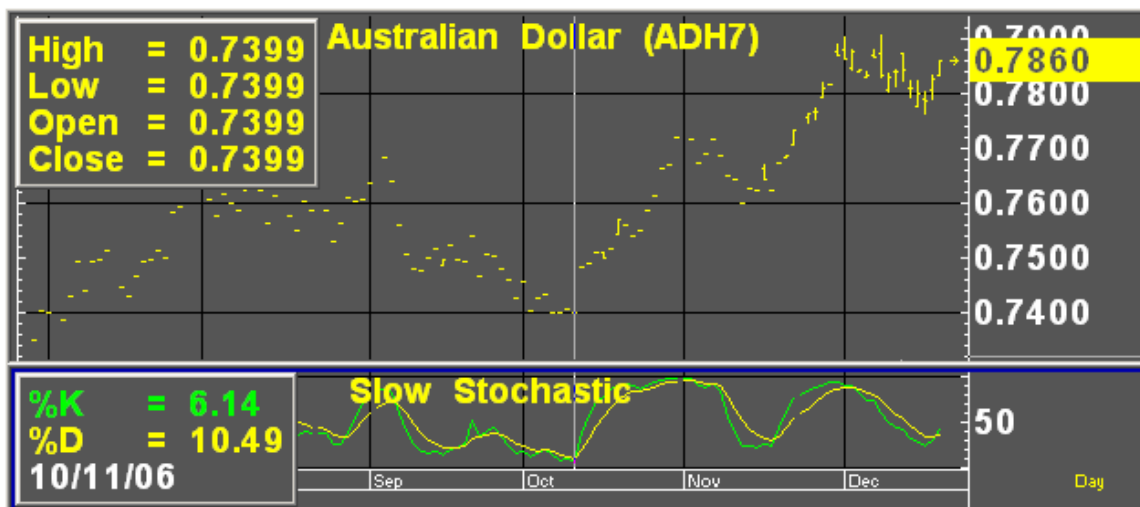
**3 period modified moving average of the Fast%K (same as Fast%D line)**

Slow %D line is:

**3 period modified moving average of the Slow %K line**

The chart in Figure 52 shows a strong buy signal on 10/11/06 where the Slow %K line crosses above the Slow %D line at a value under 15.





### Default Parameters Settings:

Field	Value
Color: %D	Yellow
Color: %K	Green
Graph: %D	Line
Graph: %K	Line
Line Style: %D	Solid
Line Style: %K	Solid
Line Width: %D	1 pixel
Line Width: %K	1 pixel
Period:9	9.0

### Related Aspen Graphics Functions:

**sstoch()** (for the Slow %K line)      **sstoch(\$1,14,3)**  
**ssstoch()** (for the Slow %D line)      **ssstoch(\$1,14,3,3)**

Key to Examples	
<b>\$1</b>	Placeholder for a symbol that will be supplied later.
<b>14</b>	Number of periods in the Fast %K line.
<b>3</b>	Number of periods in the Fast %D line.
<b>3</b>	Number of periods in the Slow %D.

These functions allow you to use the lines of the Slow Stochastic study in color rules and alarms, as shown in the following examples.

### Color Rule Example:

```

if(ssstoch($1,14,3)>ssstoch($1,14,3,3) and
ssstoch($1,14,3)[1]<ssstoch($1,14,3,3)[1] and sstoch($1,14,3)<30,clr_green,
if(ssstoch($1,14,3)<ssstoch($1,14,3,3) and
ssstoch($1,14,3)[1]>ssstoch($1,14,3,3)[1] and sstoch($1,14,3)>70,
clr_red,clr_yellow))

```

This three-part color rule will turn a bar green when the Slow %K line has a value under 30 and has crossed above the Slow %D line; it will turn a bar red when the Slow %K line has a value over 70 and has crossed below the Slow %D line, and it will leave all other bars yellow.

**Alarm Example:**

```

chart((sstoch(sp#,14,3)>=ssstoch(sp#,14,3,3))[-1],60,1,100,1,1)

```

(make sure to set Trigger When State: to **Change**). This alarm will trigger each time the Slow %K and Slow %D lines cross. The alarm is based on hourly bars for the front month of the S&P contract.

---

## Variable Accumulation Distribution

---

Variable Accumulation Distribution modifies the concept of the On Balance Volume study by comparing the opening and closing prices to the range of prices for a given period. Accumulation, or acquisition of long positions in anticipation of a bull market, is reflected in positive values of the Variable Accumulation Distribution. Negative values reflect distribution or selling in the anticipation of a market decline.

Type of Study	Keyboard Command	It works best in
Activity Indicator	<b>.vad</b>	Cash, Futures and Options markets in all time frames and all market conditions.

**How Aspen Graphics Calculates It:**

Variable Accumulation Distribution is:

$$\frac{\text{(Close-Open)} * \text{Volume}}{\text{(High-Low)}}$$

Once this is calculated, a moving average of this value is taken. It is this moving average that is charted as the Variable Accumulation Distribution study.

**Default Parameters Settings:**

Field	Value
Color	Yellow
Graph	Line
Line Style	Solid
Line Width	1 pixel
Period	10

### Custom Aspen Graphics Formula:

**VADist(series)=savg(\$1.volume\*((\$1.close-\$1.open)/(\$1.high-\$1.low)),10)**

Once this formula is entered in the Formula Listing, the study may be used in color rules and alarms, as shown in the following examples.

### Color Rule Example:

**if(VADist(\$1)>=0,clr\_green,clr\_red)**

This color rule will turn a bar green when the Variable Accumulation Distribution study has a positive value and will turn a bar red when the value is negative.

### Alarm Example:

**chart((VADist(kc#)>2000)[-1],1,2,100,1,3)**

This alarm will trigger when the Variable Accumulation Distribution study has a value exceeding 2,000 based on daily bars of the front month of coffee.

### Charting Setup Idea:

Oscillators like the Variable Accumulation Distribution study are sometimes graphed as histograms rather than as line charts. To draw this study as a histogram, see the **Charting Setup Idea** section at the end of the Acceleration study section.

---

## Volume

---

Volume measures the activity on an instrument during any given period. The Volume study measures different things depending on the instrument type and time frame that you are examining.

Type of Study	Keyboard Command	It works best in...
Activity Indicator	<b>.vol</b>	Cash and Futures markets which are

	active, all time frames
--	-------------------------

The Volume study can offer a variety of signals. When markets are trending upward in price, the strength of the trend can be confirmed by rising volume. If the volume is stagnating or decreasing while prices are rising, it can be a signal that the market is weakening, and a top may soon be reached. Because there is often less activity in a bear market, the opposite isn't always true when prices are falling.

High volume on reversals and breakouts tends to confirm those signals.

### How Aspen Graphics Calculates It:

Calculations don't take place within the Aspen Graphics program for this study. The values in the Volume study are sent by the datafeed just like the price data.

Futures exchanges do not transmit information on the number of contracts involved in any one trade. Instead, each time a trade occurs, a volume of one is recorded; for futures and options, this is referred to as a *tick*. At the end of the day, the exchange estimates and reports a daily summary for the total number of contracts traded during the day. See the following table for explanations of the Volume study for different instrument types and time frames.

Instrument Type: Stocks	
Time Frame	Volume Value Represents
Tick	Volume reflects the number of shares for a given trade. This is referred to as <i>tick volume</i> and represents the same value you'd see in a quote window under the heading TICVOL.
Intraday, Daily and Historical	Volume reflects the total number of shares traded during that period.
Instrument Type: Futures	
Time Frame	Volume value represents....
Tick	Volume reflects a value of one for each trade.
Intraday	Volume reflects the total number of price changes during that period.
Daily	Volume reflects the estimated number of contracts traded on the <i>previous</i> day.
Historical	Volume reflects the total number of contracts traded during the time period.

### Default Parameters Settings:

Field	Value
Color	Yellow
Graph	Histogram
Line Style	Solid
Line Width	1 pixel

### Custom Aspen Graphics Formula:

You can make reference to Volume values by using the \$1.volume quote code in formulas, color rules and alarms as shown in the following examples.

**Color Rule Example:**

```
If($1.volume>$1.volume[1],clr_purple,if($1.volume<$1.volume[1],clr_red,clr_yellow))
```

This color rule will turn the bar purple if the volume for that bar is greater than the previous bar and red if it is less than the previous bar.

**Alarm Example:**

```
chart((spm7.volume>=rmax(spm7.volume,21))
[-1],1,2,100,1,1)
```

This alarm will trigger when the daily volume reaches or exceeds the highest volume of past 21 days.

---

## Volume Accumulation Oscillator

---

The Volume Accumulation Oscillator combines the On Balance Volume and Accumulation/Distribution Oscillator studies into one oscillator. It assigns a proportional amount of volume to a period depending on where the close falls in the total range of prices.

This study assigns all volume to buying or selling only if the close is the high or the low for the period.

Type of Study	Keyboard Command	It works best in
Activity Indicator	<b>.vao</b>	Cash, Futures, and Options markets in all time frames and all market conditions.

**How Aspen Graphics Calculates It:**

The Volume Accumulation Oscillator is:

$$\frac{(\text{Close-Low}) - (\text{High-Close})}{(\text{High-Low})} * \text{Volume}$$

Once this is calculated, a 10-period moving average of this value is subtracted from three-period moving average.

### Default Parameters Settings:

Field	Value
Color	Yellow
Graph	Line
Line Style	Solid
Line Width	1 pixel

### Custom Aspen Graphics Formula:

**VAOsc(series)=savg(\$1.volume\*(\$1.close-\$1.low)-(\$1.high-\$1.close))/(\$1.high-\$1.low),3)-savg(\$1.volume\*(\$1.close-\$1.low)-(\$1.high-\$1.close))/(\$1.high-\$1.low),10)**

This formula, once entered in the Formula Listing, allows you to use the Volume Accumulation Oscillator study in color rules and alarms as shown in the following examples.

### Color Rule Example:

**if(VAOsc(\$1)>=0,clr\_green,clr\_red)**

This color rule will turn a bar green when the Volume Accumulation Oscillator has a positive value and will turn a bar red when the value is negative.

### Alarm Example:

**chart((VAOsc(s#)>40000)[-1],1,2,100,1,3)**

This alarm will trigger when the Volume Accumulation Oscillator has a value exceeding 40,000. The alarm is based on daily bars of the front month of soybeans.

### Charting Setup Idea

Oscillators like the Volume Accumulation Oscillator are sometimes graphed as histograms rather than as line charts. To draw this study as a histogram, see the **Charting Setup Idea** section at the end of the Acceleration study section.

## Williams' %R

The scale in Williams' %R is reversed from that of the Fast and Slow Stochastics; that is, it runs from -100 to 0. When the %R line is above -20, overbought conditions are said to exist, and when the %R line is below -80, it signals oversold conditions.

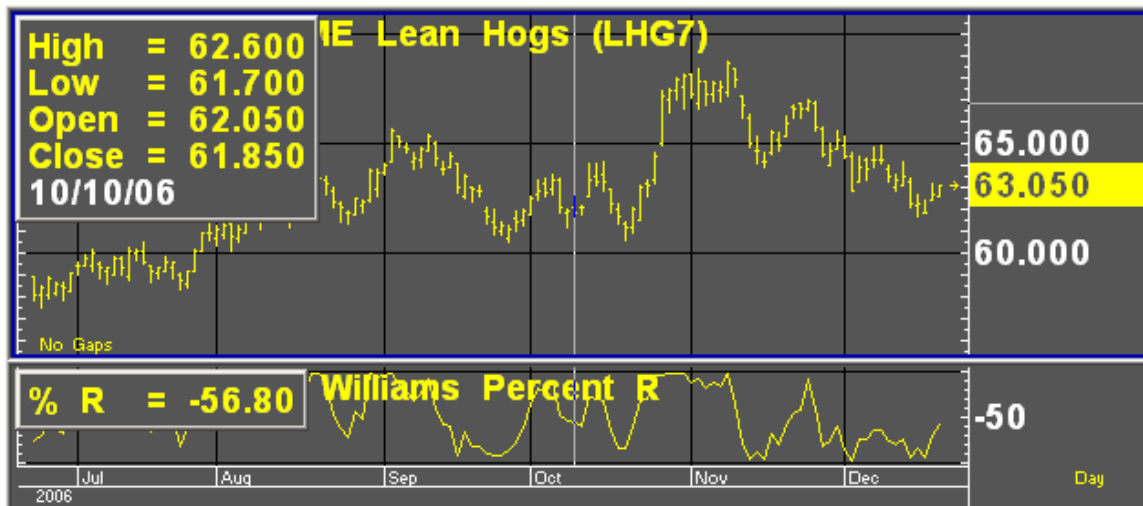
The Williams' %R study is displayed as a single line which often fluctuates dramatically. Values near the top of the scale (closer to zero) indicate market strength, while weakness in the market is signaled by values near the bottom of the scale. As with the other stochastic studies, divergence between this study and price movement can be a warning that a reversal is about to occur.

Type of Study	Keyboard Command	It works best in
Overbought/Oversold	<b>.%r</b>	Cash and Futures markets in trading ranges, and in all time frames.

### How Aspen Graphics Calculates It:

The Williams' %R study is:

$$100 * \frac{(\text{highest high in } n \text{ periods} - \text{current close})}{(\text{lowest low in } n \text{ periods} - \text{highest high in } n \text{ periods})}$$



### Default Parameters Settings:

Field	Value
Color	Yellow
Graph	Line
Line Style	Solid
Line Width	1 pixel
Period	10

### Custom Aspen Graphics Formula:

**PerCentR(series)=100\*(RMAX(\$1.HIGH,10)-\$1.CLOSE)/(RMIN(\$1.LOW,10)-RMAX(\$1.HIGH,10))**

This formula, when entered in the Formula Listing, allows you to use the Williams' %R study in color rules and alarms as shown in the following examples.

### Color Rule Example:

**if(PerCentR(\$1)<=-80,clr\_green,if(PerCentR(\$1)>-20,clr\_red,clr\_yellow))**

This three-part color rule will turn a bar green when the Williams' %R value is under -80, red when the Williams' %R value is over -20, and all other bars will turn yellow.

### Alarm Example:

**chart((PerCentR(dm#)<=-80 or PerCentR(dm#)>=-20)[-1],60,1,100,1,1)**

This alarm will trigger when the Williams' %R value is below -80 or above -20. The alarm is based on hourly bars for the front month of Deutschemarks.