
MetaStock® Professional

For Windows 98™ and higher

User's Manual
Version 8.0

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Getting Started

Welcome

When you need to make an investment decision, the last thing you want is to have your computer get in the way. Technology should help you reach a decision, not hinder you.

Which is why MetaStock Professional is based on visual investing. Visual investing lets your eyes operate the software, freeing your mind to concentrate on more important matters--like your trades.

Visual investing is made possible through object orientation. Simply put, “object orientation” means that the commands for objects are contained within the objects themselves. Rather than having to search a maze of menus and toolbars, you access commands directly from the objects.

To use MetaStock Professional, you only need to know two commands:

- **Right-click on everything.** The object will display a menu of its commands.
- **Drag and drop everything.** The on-screen animation of line studies and the fluid manner in which you can move indicators, prices, and inner windows greatly simplify the interface while helping you see investment opportunities.

By mastering these two commands, you will be positioned to make better trades using MetaStock Professional’s extensive collection of analysis tools.

Thank you for using MetaStock Professional.

What You Need to Run MetaStock Pro

Minimum Configuration

- Microsoft Windows 98 (or higher)
- Pentium 166 MHz
- 32 megabytes of RAM
- 50 megabytes of free hard disk space

Minimum Configuration for Real-time Data Collection

- Microsoft Windows 98 (or higher)
- Pentium 233 MHz
- 64 megabytes of RAM
- 50 megabytes of free hard disk space for installation. An additional 100 megabytes for real-time data.
- A real-time data feed compatible with MetaStock Pro (e.g., DBC Signal, etc.)

Recommended Configuration

- Microsoft Windows 98 (or higher)
- Pentium 233 MHz (or faster)
- 128 megabytes of RAM
- 50 megabytes of free hard disk space for installation. An additional 200 megabytes (or more) for real-time data.
- A real-time data feed compatible with MetaStock Pro (e.g., DBC Signal, etc.)

Detailed information about your computer system is available from the About MetaStock command in the Help menu (see page 541).

Two Quick Steps for Getting Up to Speed Fast

The following steps will help you get up to speed as fast as possible.

Ten Steps to Productivity

The Ten Steps to Productivity, found in your Getting Started manual, are a quick and easy way to immediately begin using MetaStock Pro. They provide clear, illustrated, step-by-step instructions for getting around MetaStock Pro's visually oriented interface. It only takes 30 to 45 minutes to go through these steps.

The Quickstart Tutorials



Quickstart button

The Quickstart Tutorials are on-screen tutorials of MetaStock Pro. Choose Quickstart Tutorials from the Help menu, or the Quickstart button wherever it appears in Help.

Installing MetaStock Pro

To install MetaStock Pro from a CD

1. Insert the Program CD into your drive. The setup program should start automatically.

If the auto-run feature of Windows isn't enabled on your system, click the **Start** button and choose the **Run** command. Type "D:\SETUP.EXE" in the Open box and click the **OK** button. (Note that "D" represents the letter assigned to your CD-ROM drive. If your drive is assigned a different letter, use it instead of "D".)

2. Follow the on-screen instructions. You will be prompted to enter a Setup Key. Your Setup Key is found on the back of the CD case.

To remove (uninstall) MetaStock Pro from your hard disk

1. Choose **Settings** from the Windows Start menu.
2. Choose **Control Panel**.
3. Choose **Add/Remove Programs**.
4. Choose **MetaStock Professional** and click the **Add/Remove** button.

Running MetaStock Pro

Important: Before your charts can receive real-time updates, you must be certain that the software supplied by your real-time data vendor is installed and operating correctly. For more information, see your Getting Started manual.

To run MetaStock Pro

1. Choose **Programs** from the Start menu.
2. Choose the **Equis International** folder.
3. Choose MetaStock Professional.



MetaStock icon

Tip of the Day

Every time you run MetaStock Pro you can see a MetaStock Pro tip to help you use MetaStock Pro more productively. You can display the Tip of the Day dialog at any time by choosing Tip of the Day from the Help menu. You can control the complexity of tips with the Options button.

Getting Help

Equis International stands ready to help you with problems you may encounter or questions you may have with the operation of MetaStock Pro. However, before picking up the phone, please consider using some of Equis' other support alternatives.

Windows Related Problems

If the problem is related to the Windows operating environment, please contact Microsoft via the Internet at <http://www.microsoft.com/support>.

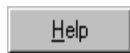
User's Manual

The first place to check when you have a question about the operation of MetaStock Pro is in the user's manual (or help system). The manual can be a great help if you run into a snag. We have tried to provide every answer you will need to operate your software in the pages of your manual. For immediate answers to most of your questions, please consult the manual.

Context Sensitive Help

Every dialog in MetaStock Pro contains a Help button. Click the mouse on a Help button and MetaStock Pro will display a detailed help screen about the dialog or feature. In fact, almost all the information contained in the manual is just a mouse click away. Many of the help screens provide step-by-step examples of how to accomplish a task.

MetaStock Pro's help system can also be accessed by simply pressing the F1 key.



Help button

Quickstart Tutorials

Some help topics have a Quickstart Tutorial associated with them. Click the Quickstart button to start the tutorial for that help topic.



Quickstart Button

Equis Web Site

You may also want to check out our web site on the Internet at <http://www.equis.com>. Not only do we offer information about our products, we also offer valuable free services and information.

Equis User Groups

Equis has users all over the world. In many of these areas, user groups have formed. Contact Equis to find out if there is an Equis user group in your area. Not only is this a great way to meet people with similar

interests, these clubs also offer a wealth of information and help not available elsewhere.

Contact Technical Support

If the problem or question relates to data or your data vendor, please contact your data vendor's technical support.

If you've checked the manual and still cannot find the answer to your problem or question, Equis has a full staff of technical support representatives ready to help you.

Please try to call us by phone only if the situation is urgent and you need an immediate answer. This will ensure that lines are free when you and others have an urgent matter.

There are several ways to reach our support staff:

By E-mail

support@equis.com

By Fax

801-265-2114

By Mail

Equis International
Technical Support Dept.
3950 South 700 East, Suite 100
Salt Lake City, UT 84107

By Phone

801-265-9998 (8:00 AM to 5:00 PM Mountain Standard Time except Wednesdays, 9:00 AM to 5:00 PM)

When calling technical support the first time, you will be provided with a customer number. Please write it here for future reference.

Customer # _____

When you call technical support, it is helpful if you can provide your version number and build date. This information is displayed by choosing About MetaStock from the Help menu.

Due to the inherent complexity in the design and creation of custom indicators, explorations, system tests, and experts, Equis cannot provide free support for these tools. However, support is available for a reasonable fee. Call Equis at 801-265-9998 for details or fill-out the FORMULA HELP.DOC file found in the MetaStock folder. This file is viewable with Wordpad.

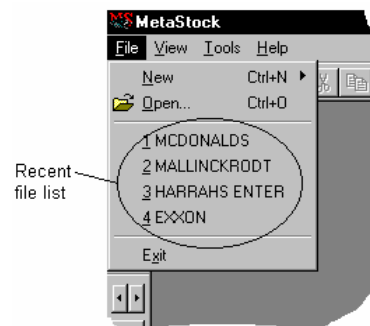
The Workplace

Microsoft Windows Standard Features

This section explains the commands in MetaStock Pro that are standard to Microsoft Windows.

Recent File List

The four most recently opened or closed charts, Smart Charts, or layouts are displayed at the bottom of the File menu.



To open one, you can either click it with the mouse, highlight it and press ENTER, or choose the number (with the File menu displayed) that corresponds to the one you want to open.

An expanded list of your most recently opened items is available in the Open dialog by choosing the History shortcut (see page 67).

You can also create a list of favorite charts, Smart Charts, layouts, and folders which is accessed in the Open dialog by choosing the Favorites shortcut (see page 67).

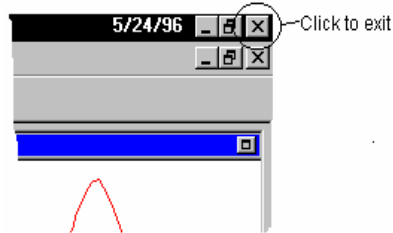
Exiting MetaStock Pro

Choose Exit from the File menu to exit MetaStock Pro. If any of your open charts or layouts have been changed, you will be asked if you want to save them prior to exiting. Smart Charts will be saved automatically.

You can also exit MetaStock Pro by clicking the close button in the upper-right corner of the screen.



Close button



To exit MetaStock Pro

1. Choose **Exit** from the File menu.
2. Save any open charts or layouts when prompted.

Undo, Redo

Choose Undo and Redo from the Edit menu or toolbar. Use the Undo command to cancel the most recent command or action completed. The Undo command is useful if you've deleted something by accident or if you don't like the results of your last action. Choose the Undo command to return to the condition prior to your last action.

If nothing is available to "undo," the command is disabled.

Use the Redo command to cancel the results of the most recent Undo command. The Redo command restores the command or action you undid.

If nothing is available to "redo," the command is disabled.

Cut, Copy, Paste

Choose the Cut, Copy, and Paste commands from the Edit menu. Use the Cut command to move the selected object's data (i.e., price values, indicator values, or moving average values) to the Windows clipboard. You can then transfer the clipboard information to another Windows application (such as a word processor or spreadsheet) using the Paste command. For information on creating OLE links using these commands see page 9.



Undo button



Cut button



Copy button

The Copy command is used to copy the selected chart or the selected object's data (e.g., price values, indicator values, etc.) to the Windows clipboard. You can then transfer the clipboard information to another Windows application (such as a word processor or spreadsheet) using the Paste command.

You can also press CTRL+SHIFT+Print Scrn to copy a chart to the clipboard.



Paste button

The Paste command is used to transfer the information in the Windows clipboard to the insertion point of the current window.

See your Windows User's Manual for additional information concerning the Cut, Copy, and Paste commands.

To copy indicator or price values to a Windows spreadsheet

1. Display the desired indicator or security plot.
2. Select the plot by clicking the left mouse button anywhere on the indicator or price plot. Small black handles will appear on the plot to show that it is selected.
3. Choose **Copy** from the Edit menu.
4. Open (or switch to) your spreadsheet.
5. Click on the cell you wish to copy the plot's data to.
6. Choose **Paste** from the spreadsheet's Edit menu.

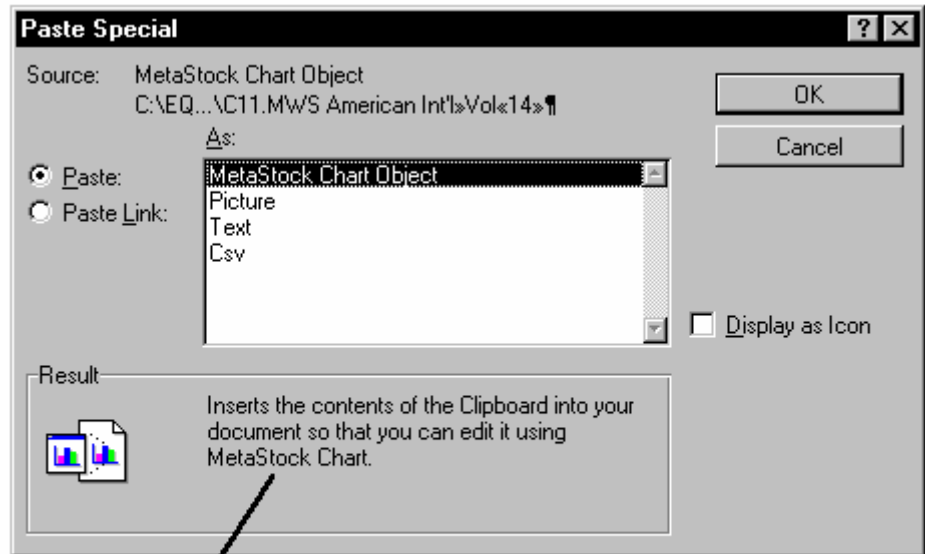
To copy a chart to a Windows word processor document

1. Display the desired chart in MetaStock Pro.
2. Select the chart by clicking anywhere on the chart's background. Make sure you have *not* selected an individual object within the chart. You should also make sure that the chart is *not* maximized; otherwise the toolbar will be included.
3. Choose **Copy** from the Edit menu.
4. Open (or switch to) your word processor document.
5. Position the cursor at the desired location within the document.
6. Choose **Paste** from the word processor's Edit menu.

Creating OLE links

One of the great features found in many programs designed for Windows 98 or NT 4.0 is the ability to create links between programs using OLE (object linking and embedding). For example, you could create an OLE link between MetaStock Pro and Excel. Data that exists in the Excel spreadsheet could be plotted in MetaStock Pro. If the data changes in Excel, the changes will also be made in MetaStock Pro because of the OLE link. (Note that Excel 7.0 can only handle a Paste Link of about 1,000 records. Excel 97 doesn't have this limitation).

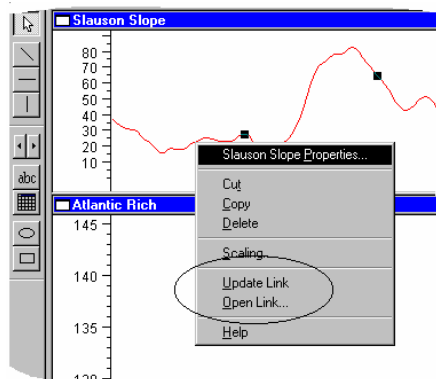
OLE links are created by copying data from one OLE compatible Windows application and then pasting it (using the Paste Special command in the Edit menu) to the other application. The following illustration shows the Paste Special dialog found in Microsoft Excel (typical of others).



Helpful instructions are provided in this area of the Paste Special dialog.

When using the Paste Special dialog, be sure to look at the helpful messages at the bottom of the dialog. These instructions will guide you through the process of creating the link.

If you right click on an indicator in MetaStock Pro that has been paste linked from another application (i.e., Excel, Lotus 123, etc.), two options appear in the shortcut menu—Update Link and Open Link.



Use the Update Link command to refresh the indicator in MetaStock Pro with the data from the server application (i.e., Excel, Lotus 123, etc.). Choose Open Link to open the server application so that you can edit the data in the server application.

Note that links to a real-time chart in MetaStock Pro can adversely affect MetaStock Pro's performance, especially if intense calculations are involved. A warning message appears if you attempt to create an OLE link to a real-time chart.

To create an OLE link between an indicator in a MetaStock Pro chart and an Excel spreadsheet

1. Display the desired chart and indicator in MetaStock Pro.
2. Right-click on the indicator plot and choose **Copy** from the shortcut menu. Note that you could also copy the security's prices instead of the indicator (if desired).
3. Open (or switch to) your spreadsheet.
4. Position the cursor at the desired location within the spreadsheet.
5. Right-click on the cell and choose **Paste Special** from the shortcut menu.
6. Choose the **Paste Link** radio button and choose **Csv** from the list. Click **OK**. Csv stands for "comma separated values."

| | A | B | C |
|-----|----------|---------------|---|
| 1 | Date | Slauson Slope | |
| 243 | 9/22/93 | | |
| 244 | 9/23/93 | | |
| 245 | 9/24/93 | | |
| 246 | 9/27/93 | | |
| 247 | 9/28/93 | | |
| 248 | 9/29/93 | | |
| 249 | 9/30/93 | | |
| 250 | 10/1/93 | 93.5114 | |
| 251 | 10/4/93 | 92.4765 | |
| 252 | 10/5/93 | 91.2976 | |
| 253 | 10/6/93 | 89.9309 | |
| 254 | 10/7/93 | 88.3607 | |
| 255 | 10/8/93 | 86.5572 | |
| 256 | 10/11/93 | 84.6585 | |
| 257 | 10/12/93 | 82.666 | |
| 258 | 10/13/93 | 80.5878 | |
| 259 | 10/14/93 | 78.5167 | |
| 260 | 10/15/93 | 76.4648 | |
| 261 | 10/18/93 | 74.3781 | |
| 262 | 10/19/93 | 72.3596 | |

(Note that Excel 7.0 and earlier can only handle a Paste Link of about 1,000 records. Excel 97 doesn't have this limitation).

The link has now been created. If changes are made to the indicator in MetaStock Pro (e.g., different number of time periods, etc.) the changes

will automatically be reflected in the spreadsheet—even if the spreadsheet is not open.

To link data in an Excel spreadsheet to MetaStock Pro

At this point you can perform further calculations on the indicator values in Excel if desired. Once these new values are calculated, they can be linked back to MetaStock Pro and plotted in a new inner window by doing the following:

1. Select the entire column of newly calculated values in the spreadsheet by clicking on the column heading.
2. Right-click on the selected column and choose **Copy** from the shortcut menu. In the illustration below, columns A and B are the values linked from MetaStock Pro. Column D is the newly calculated values that will be linked back to MetaStock Pro.

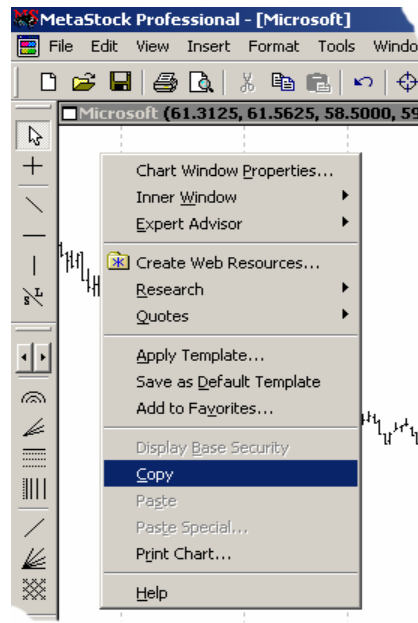
| | A | B | C | D | E | F |
|----|---------|--------|--------|----------|---|---|
| 1 | Date | Volume | | ModVol | | |
| 2 | 6/6/94 | 23442 | | | | |
| 3 | 6/7/94 | 13991 | | | | |
| 4 | 6/8/94 | 16515 | | | | |
| 5 | 6/9/94 | 10877 | | | | |
| 6 | 6/10/94 | 13249 | | | | |
| 7 | 6/13/94 | 21645 | | | | |
| 8 | 6/14/94 | 27786 | | | | |
| 9 | 6/15/94 | 17893 | | | | |
| 10 | 6/16/94 | 14326 | | | | |
| 11 | 6/17/94 | 30341 | 0.1414 | 2145 | | |
| 12 | 6/20/94 | 15592 | 0.0081 | 1924 | | |
| 13 | 6/21/94 | 24773 | 0.0407 | 6086 | | |
| 14 | 6/22/94 | 13270 | 0.2263 | 586.3 | | |
| 15 | 6/23/94 | 11543 | 0.5934 | 194.8 | | |
| 16 | 6/24/94 | 22653 | 0.8578 | 264.0 | | |
| 17 | 6/27/94 | 38760 | 0.748 | 518.1 | | |
| 18 | 6/28/94 | 17364 | 0.6082 | 285.4982 | | |
| 19 | 6/29/94 | 22711 | 0.5403 | 420.3406 | | |
| 20 | 6/30/94 | 27335 | 0.5527 | 494.5721 | | |
| 21 | 7/1/94 | 38181 | 0.5767 | 662.06 | | |
| 22 | 7/5/94 | 27900 | 0.6804 | 410.0529 | | |
| 23 | 7/6/94 | 19391 | 0.7826 | 247.7768 | | |
| | 7/7/94 | 17179 | 0.7661 | 224.2387 | | |

3. Switch back to MetaStock Pro.
4. Choose **New Inner Window** from the Window menu to open a new inner window in the chart.
5. Right-click on the new inner window and choose **Paste Special** from the shortcut menu.
6. Choose the **Paste Link** radio button and choose **Csv** from the list. Click **OK**.

To link a chart in MetaStock Pro to a Word document

Now to really exploit the power of OLE, you could create a third link between the MetaStock Pro chart and your Word document.

1. Right-click on the chart and choose **Copy** from the shortcut menu.



2. Open (or switch to) your Word document.
3. Position the cursor at the desired location within the document.
4. Choose **Paste Special** from Word's Edit menu.
5. Choose the **Paste Link** radio button and choose **MetaStock Pro Chart Object** from the list. Click **OK**.
6. Switch back to MetaStock Pro and draw a trendline on the chart. Watch the chart in Word as the trendline magically appears through the power of OLE.

Now whenever you change the parameters (e.g., the number of periods in a moving average) in the original indicator within MetaStock Pro, the spreadsheet will automatically reflect the changes. The spreadsheet will then perform the additional calculations and plot the results in the new inner window back in MetaStock Pro. The chart in the Word document will also be updated. And what's more, MetaStock Pro's Smart Chart feature keeps the OLE links. So the next time you load the chart, all of the above steps and calculations will be performed seamlessly.

OLE Tips

- To insure proper date alignment when creating a link from an Excel spreadsheet to a MetaStock Pro chart, you can copy the Date column along with the data values.



"Not" sign

- You can drag and drop an indicator or price plot from MetaStock Pro to a spreadsheet. Before dropping the plot into the spreadsheet, however, make sure that the "not" sign next to the mouse pointer has disappeared (This may take a moment, depending on the speed of your computer and the amount of data).
- The faster your computer and the more memory it has, the better OLE links will perform.
- When creating a link from a spreadsheet to MetaStock Pro, the text in the top cell of the column is automatically displayed in the inner window title bar.
- When using the Paste Special dialog, look at the information at the bottom of the dialog if you need help.
- You don't have to have all the applications open in order for the OLE links to remain up-to-date. Once an OLE link is established the exchanging of information occurs seamlessly in the background.

Delete

Choose the Delete command from the Edit menu to delete the selected object. For example, if you want to delete a moving average, select the moving average, and choose Delete. The Delete command is also available from an object's shortcut menu.

If you have the "Confirm Deletion of Objects" option enabled in the Applications Properties dialog (see page 32), a dialog will appear after you choose Delete prompting you to confirm the deletion.

See page 157 for more information on deleting price plots. See page 173 for more information on deleting indicators. See page 214 for more information on deleting line studies.

To delete an object from a chart

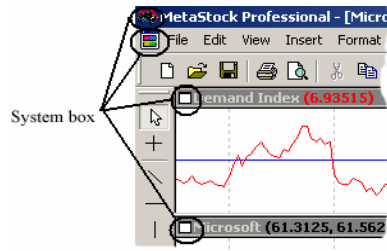
1. Right-click on the desired object (i.e., line study, indicator, or price plot).
2. Choose **Delete** from the object's shortcut menu.

System Menus

The upper-left corner of every window contains a square box called the system box. The application window, the chart windows, and even the charts' inner windows have a system box. Click the system box to display the window's system menu.



System box



The System menu contains commands to move, resize, and close the window. The Next command in a chart window's system menu is used to switch to the next open chart.

Windowing Commands

The Tile, Cascade, and Arrange Icons commands in the Windows menu are common to most Windows applications. The Stack and Column commands are unique to MetaStock Pro.



Cascade button



Column button



Stack button



Tile button

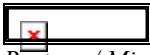
The Cascade command arranges the open chart windows alphabetically in an overlapping formation so that only the title bars of all but the front chart are visible.

The Column command arranges the open chart windows alphabetically from left to right in vertical columns alphabetically so that all are completely visible on the screen.

The Stack command arranges the open chart windows alphabetically so that the charts are stacked on top of each other and are fully visible. Arranging them in a stacked formation allows you to easily compare charts across their date axes.

The Tile command arranges the open chart windows alphabetically from left to right and top to bottom so that all are completely visible on the screen.

The Arrange Icons command arranges all chart icons at the bottom of MetaStock Pro's workspace.



*Restore / Minimize
Maximize / Close buttons*

All windows, including the MetaStock Pro application window, can be minimized by clicking on the minimize button, or maximized by clicking on the maximize button, in the top right corner of the chart.

To restore a minimized or maximized window to its previous position, click on the Restore button.

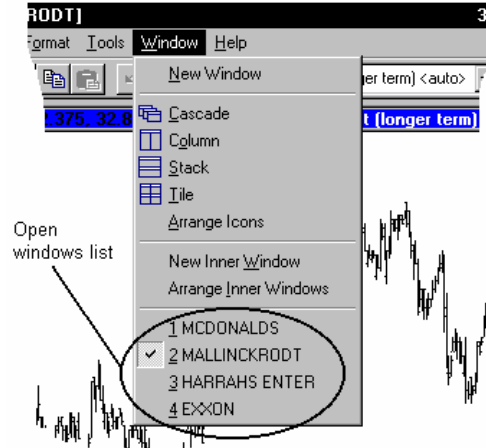
An inner window is a window within a chart window that can be controlled within the confines of the chart window. A chart can contain up to 10 inner windows. The most common reason for opening an inner window is to plot an indicator. However, price plots are also contained within an inner window.

The Arrange Inner Windows command is available from the Chart shortcut menu by right-clicking on an inner window. You can also choose Arrange Inner Windows from the Window menu. The Arrange Inner Windows command resizes the inner windows within a chart so they are equally sized.

Any window can be closed by clicking on the Close button.

Open Windows List

The bottom section of the Window menu lists the names of each of the open charts (or layouts) in the order in which they were opened. A check mark designates the currently selected chart.



To switch between charts using the Window menu, click on the desired name. You can also switch by simply clicking directly on the desired chart in the MetaStock Pro workspace. The selected chart has a unique heading background color.

For more information see page 103.

Accessibility Options

MetaStock supports all of the Accessibility Options found in your Windows Control Panel. These options allow you to customize windows to suit varying eyesight, hearing, and motor skills without requiring any additional expenditure on software or hardware. Refer to your Windows Help system for more information on using these options.

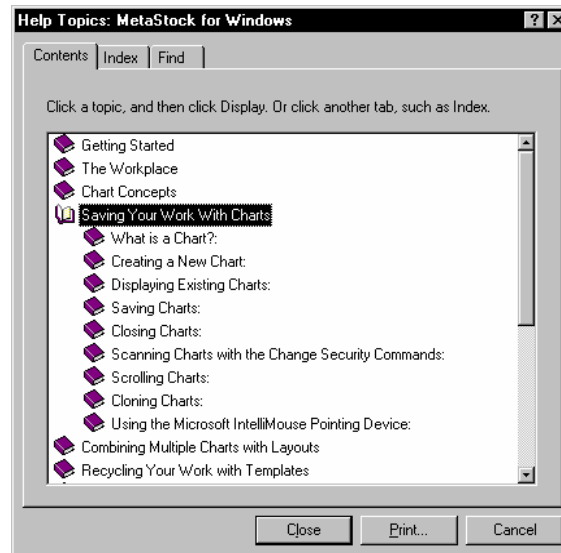
To adjust the Accessibility Options on your computer system

1. Click the Windows **Start** button.
2. Choose **Control Panel** from the **Settings** menu.
3. Double-click the **Accessibility Options** icon.

If the Accessibility Options icon is not displayed in your Control Panel, you will need to install it using Windows Setup. Choose **Add/Remove Programs** from the **Control Panel** to access Windows Setup.

Help

The Help menu provides three different ways to access MetaStock Pro's help system. For more information on using the help system, see page 29.



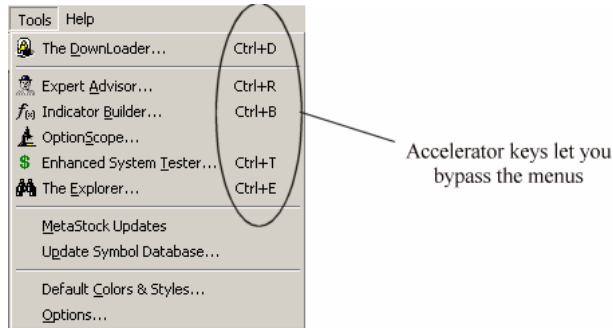
For information on contacting Equis technical support, see page 5.

Using the Menus

MetaStock Pro's menu organization, and many other program features, are similar to Microsoft Office applications. Notice the similarities between MetaStock Pro's and Word's menu bars.



Many of the menu commands can be accessed with special keystroke combinations called "accelerator keys." For example, instead of choosing System Tester from the Tools menu, you could press the accelerator key CTRL+T. If a command has an accelerator key, it is shown in the menu next to the command. Many menu items also have a picture displayed next to them. Choose this same icon from a toolbar to access the command without using the menus.



To select a command using the menus

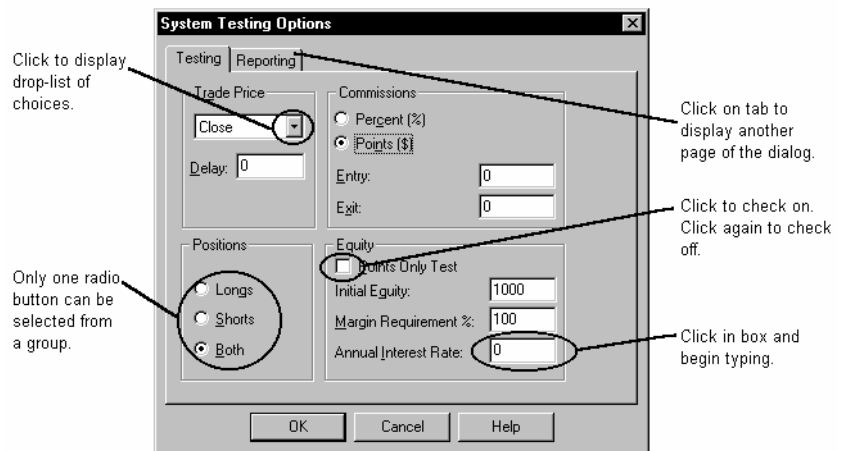
1. Click the left mouse button once directly on the menu item (i.e., File, Edit, View, etc.).
2. When the menu drops down, click once on the desired command.

Using Dialogs

After you choose a command, a dialog often appears. A dialog is used to select options pertaining to the command or feature. If an option in a dialog is dimmed, this means the option is not available.

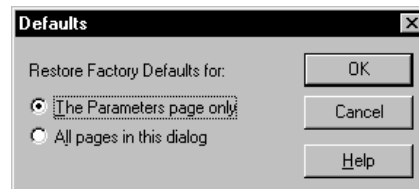
Some dialogs provide various sets of options. These sets of options are divided into tabbed pages. For example, the System Testing Options dialog has two tabs: Testing and Reporting. Click on the tab to display the page's options.

The System Testing Options dialog is a good example of the various controls within a dialog.



Restoring Factory Defaults

The Defaults button in a dialog sets the options in the dialog to the original default settings as they were shipped. Every Properties dialog in MetaStock Pro contains a Defaults button. When the Defaults button is clicked, the Defaults dialog appears.



Using the Toolbars

The tools on the toolbars give you quick access to many of the commonly used commands and features in MetaStock Pro.

To find out the name of a tool, hold the mouse pointer motionless over the tool for about a second and a ScreenTip will appear showing the name of the tool.



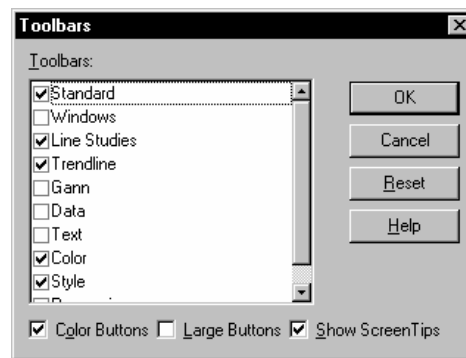
The status bar also provides a brief description of the tool on which the mouse is positioned (see page 27).

To select a command using the toolbar

1. Position the mouse over the desired button.
2. Click the left mouse button once.

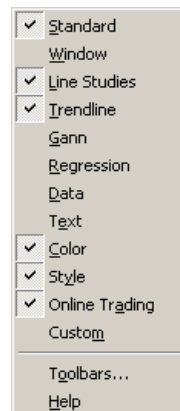
Displaying/Removing Toolbars

You can control which toolbars appear by choosing Toolbars from the View menu.



You can control the color, size, and ScreenTip display with the checkboxes at the bottom of the Toolbars dialog.

You can also right-click on any toolbar and check/uncheck the desired toolbars from the shortcut menu.



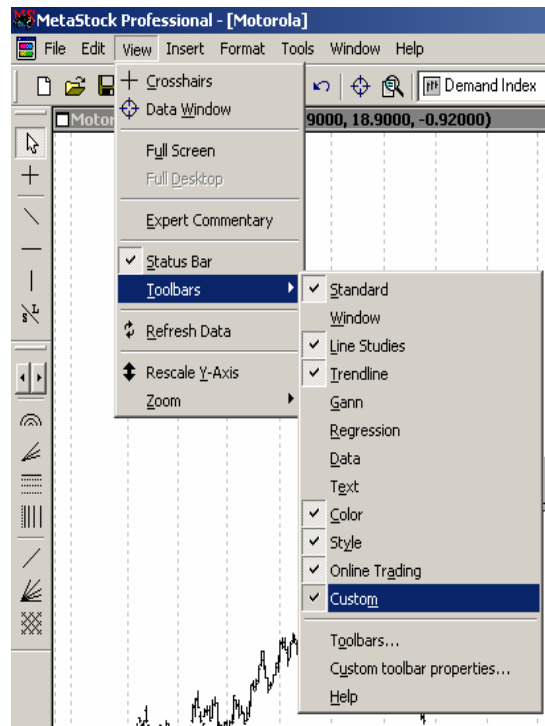
Note that you can choose to have separately displayed toolbars for each of the groups of line studies (i.e., Trendline, Gann, and Text). Or you can just choose the Line Studies toolbar. The Line Studies toolbar contains rotator arrows that allow you to rotate between the three groups of line studies.

Some people like to remove the toolbars to provide more space for charts.

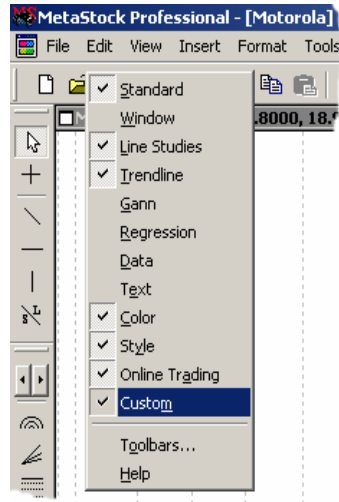
Custom Toolbar

The custom toolbar provides shortcut buttons to your favorite charts, layouts, templates, and even other documents and programs.

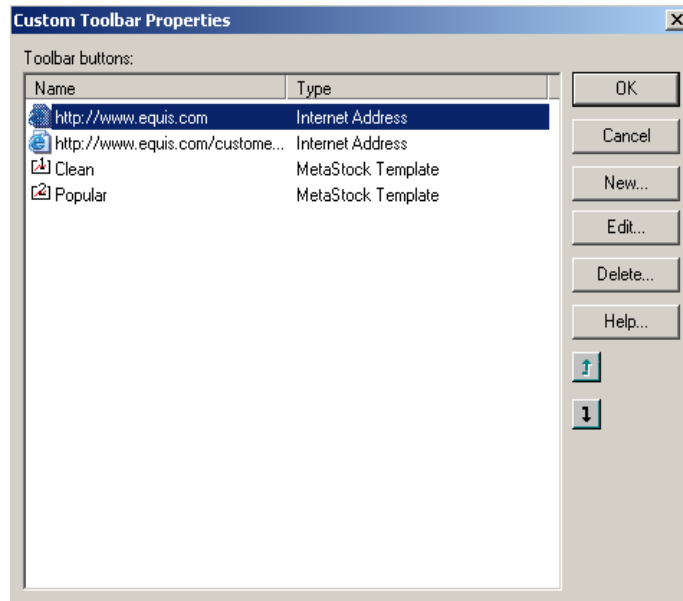
To display the custom toolbar, choose Toolbars from the View menu, then choose Custom.



You can also right click on any toolbar and choose Custom from the shortcut menu to display the Custom toolbar.



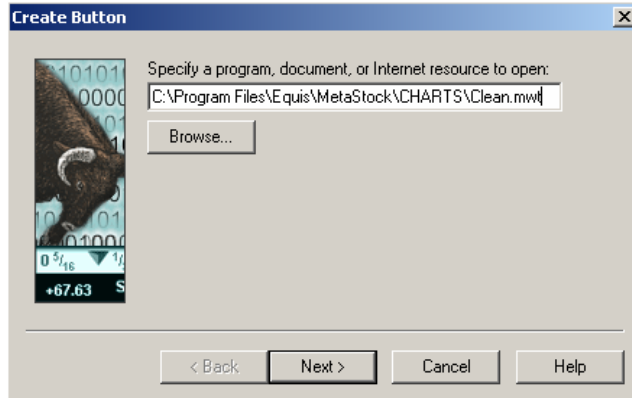
To edit the items shown on the custom toolbar, choose Toolbars from the View menu, then choose Custom Toolbar Properties, or right click on the custom toolbar and choose Custom Toolbar Properties from the shortcut menu. The Customize dialog will appear from which you can edit, delete, and create new custom shortcut buttons.



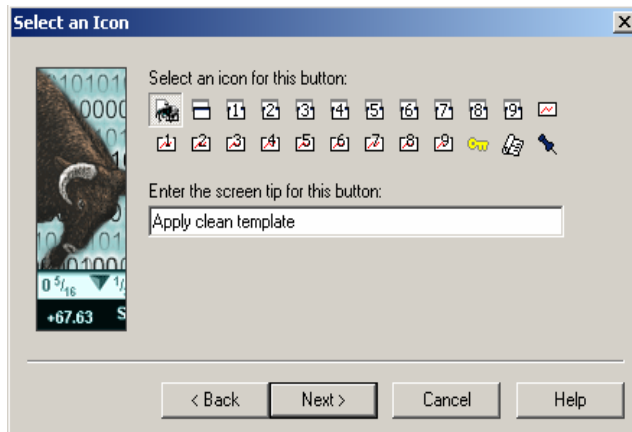
To change the path, icon, or screen tip for an existing shortcut, select the item, then choose Edit.

To change the order in which the icons are displayed, use the arrows displayed to the right of the shortcut list.

To add a new item to the toolbar, choose New. The Create Button dialog will appear.

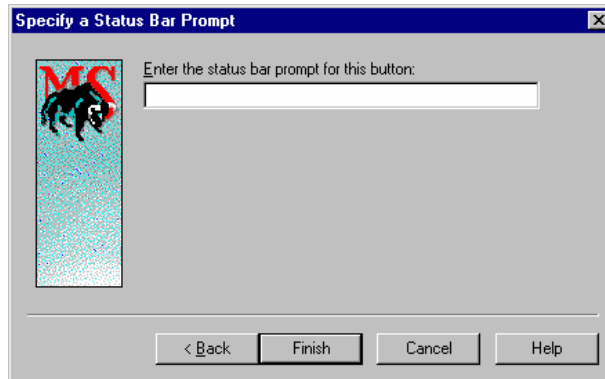


Click the Browse button to navigate to the item you are adding. This can be a chart, layout, template, document, application, URL, etc. If you choose a document, the application used to edit that type of document will start when you click on that shortcut. If you know the path to the item you are adding, you may simply type the path in the box (ie. c:\program files\equis\metastock\charts\colorful.mwt). After you have selected the item or typed the path, click Next. The Select An Icon dialog will appear.



Select an icon for this button. Choose an icon to represent this item on the toolbar. The first selection is the icon windows uses for this file.

Enter the screen tip for this button. Type a label for this button that will appear when you hold the mouse pointer over it.



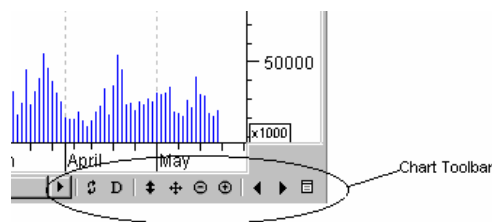
Enter the status bar prompt for this button. Type a label for this button that will appear in the status bar when you hold the mouse pointer over it.

To add an item to the custom toolbar:

1. Choose **Toolbars** from the View menu, then choose **Custom Toolbar Properties**, or right click on the Custom toolbar and choose **Custom Toolbar Properties** from the shortcut menu.
2. Click the **New** button.
3. Click the **Browse** button and navigate to the item you are adding, or type the path in the box, then click **Next**.
4. Choose an icon to represent this item on the toolbar.
5. Type the name of this icon as you want it to appear in the screentip. Click **Next**.
6. Type the name of this icon as you want it to appear in the status bar, then click **Finish**.

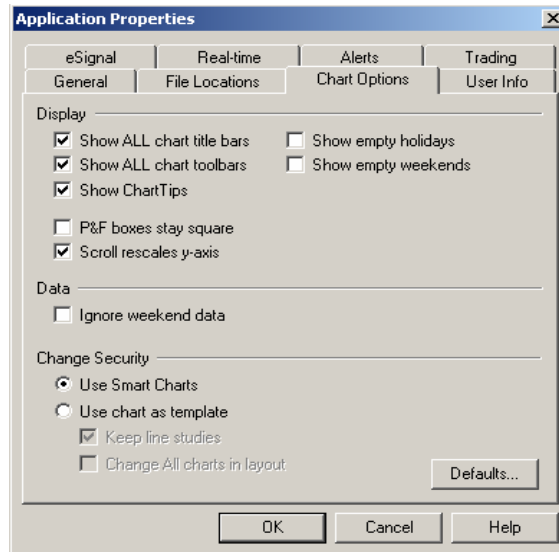
Chart Toolbar

The chart toolbar appears at the bottom right corner of a chart. You can turn all chart toolbars on and off from the Application Properties dialog (see page 31). You can remove an individual chart's chart toolbar by right-clicking on the chart toolbar and choosing Remove Toolbar from the shortcut menu.



The chart toolbar can be displayed or removed using any of the following methods:

- Use the Show All Chart Toolbars option in the Application Properties dialog. The Application Properties dialog is displayed by right-clicking on the Application's menu bar or by choosing Options from the Tools menu.



Note that the Show All Chart Toolbars box in the Application

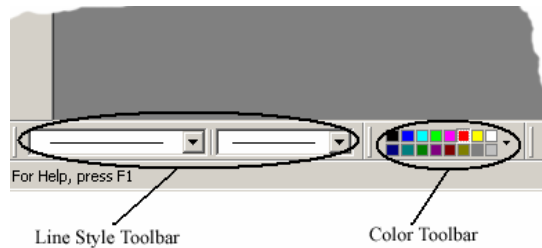
Properties dialog has a gray square in it if you have removed a data toolbar from a currently displayed individual chart. This is just a visual reminder that checking the box will turn on an individual chart's chart toolbar that you have previously turned off.

- Right-click directly on the chart toolbar and choose Remove Toolbar. Note that this only removes the toolbar for the selected chart.
- Use the Show Chart Toolbar option in the Chart Window Properties dialog (see page 104). Note that this only removes the toolbar for the selected chart.

For more information on the options in the Applications Properties dialog, see page 31.

Color and Line Style Toolbars

The Color and Style toolbars allow you to quickly change the color, line style, and weight of the selected plot (i.e., indicator, price, or line study).



To change the color or line style of a plot

1. Select the plot (i.e., indicator, price, or line study) by clicking directly on the plot. Small black boxes appear on the plot showing that it is selected.
2. Choose the desired color or line style from the toolbar. To see more colors or to create custom colors, click the small triangle on the right side of the color toolbar and click **More Colors**.

Note: If you select a heavier line weight, the Style will always appear as a solid line.

To create custom colors

1. Click the small triangle on the right side of the color toolbar. The color toolbar expands, and the More Colors buttons appears.
2. Click the More Colors button. The Color dialog appears.
3. In the Color dialog, click anywhere in the color swatch to set the hue and saturation.
4. Use the slider on the right side of the dialog to adjust the luminosity (brightness).
5. Click the Add to Custom Colors button. The new color appears in one of the Custom Colors boxes in the lower left corner of the dialog.

Floating and Docking Toolbars

All toolbars (except for chart toolbars) can be moved anywhere on the screen you desire. Perhaps you are doing a lot of work with trendline studies. To decrease the distance the mouse must travel when using the trendline toolbar, you may want to move the toolbar closer to the area of the chart in which you are working.

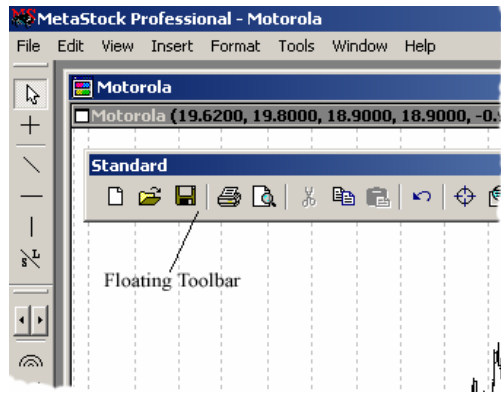


QuickList button

If the Standard toolbar is docked on either the left or right side of the screen (so it appears vertically), the Indicator QuickList changes to a button that displays the Indicators dialog.

To float and dock a toolbar

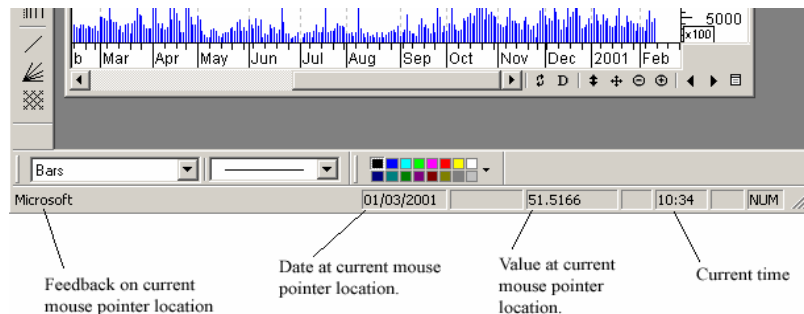
1. Double-click on the toolbar. Note that you must double-click on an area between or below the toolbar buttons. The tools will now appear in a floatable window.



2. Click and drag the toolbar to the desired location. If you want the toolbar docked on the screen's edge, drag the toolbar until the mouse appears over the edge. The drag box will change shape to indicate that it can be docked.
3. To return a floating toolbar to its docked location, simply double-click on the title bar of the floating toolbar's window.

Using the Status Bar

The status bar appears at the bottom of the screen. It provides you with feedback on the location of the mouse pointer (i.e., menu commands, tools, line studies on a chart, and x-/y-axis coordinates). It also displays the current time.



As you move through menu commands, the status bar gives you a more detailed explanation of the highlighted command. When the mouse is positioned over a tool on the toolbar, a brief explanation of the tool is provided.

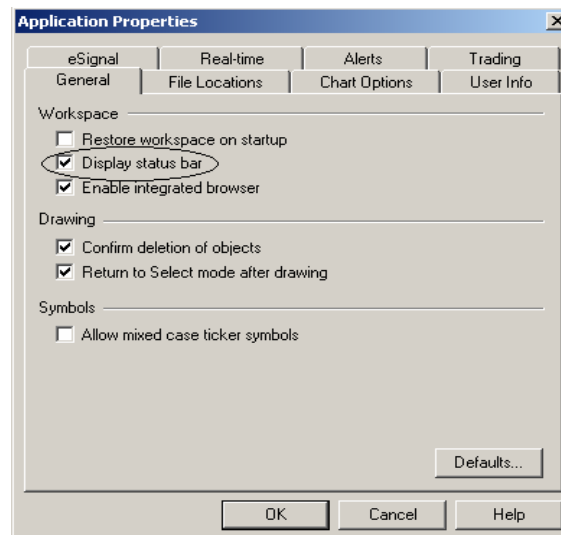
The status bar is also very helpful when selecting and modifying objects on a chart, such as indicators, price plots, and line studies. If you have numerous objects on a chart, the status bar is helpful in telling you which one the mouse is currently positioned over. This can be very helpful, especially when the objects are grouped close together.

As you move the mouse around on a chart, the x-axis (i.e., date/time) and y-axis values at the mouse location are continuously updated. This can be useful for such tasks as drawing support/resistance lines (see page 444) to help you locate an exact price level, drawing trendlines (see page 529) to help locate more precise date and price coordinates, etc.

You can use the Data Window for more detailed information on price values at the mouse pointer location (see page 160).

Displaying/Removing the Status Bar

The status bar can be displayed or removed using the Application Properties dialog. To display this dialog choose Options from the Tools menu or right-click on the application menu bar and choose Application Properties.



To display/remove the status bar

1. Choose **Options** from the Tools menu.
2. From the General page, (un)check the **Display Status Bar** box.
3. Click the **OK** button.

For more information on the options in the Applications Properties dialog, see page 31.

HELP! Using MetaStock Pro's Help System



The quickest way to find out how a specific feature in MetaStock Pro operates is to use the online help system. MetaStock Pro's help system can be accessed from every dialog within MetaStock Pro by simply clicking the Help button or pressing the F1 key.

The MetaStock Pro's User's Manual and the help system are based on the same material. The help system is like having a User's Manual that automatically turns its pages based on what you are doing.

If you find that you need more help than what the manuals or help system provide, you can contact Equis' technical support (see page 5).

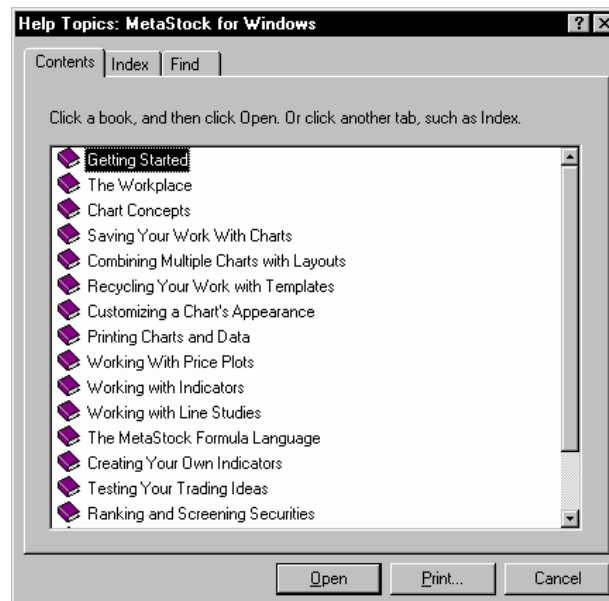
Getting Around with the Help System

There are three primary ways of using the system. The method you choose depends on how you prefer to obtain information. When you are looking in a book for information on a specific topic, do you usually use the Table of Contents or do you use the Index?

If you use the Table of Contents, then you'll probably feel more comfortable using the Contents page in the Help dialog. If you prefer the Index, you'll want to use the Index or Find pages in the Help dialog.

Contents

The Contents page is used to access MetaStock Pro's Help Contents page. The Contents page is the main jumping off point for the on-line help system. It is organized very similarly to a Table of Contents in a book. But instead of turning the pages to reach the desired subject, you simply double-click on the topics.



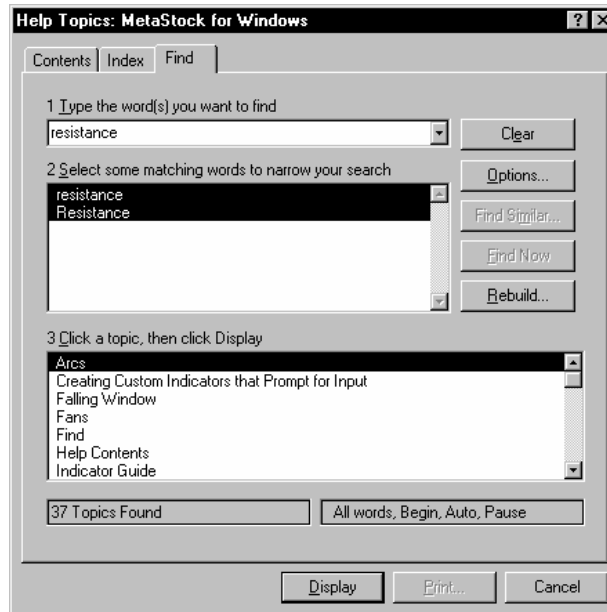
Index

The Index page is used to search for help on a specific topic. Begin by typing the first few letters of the topic you are looking for. For example, suppose you want to find out how to print a chart. If you type the word "print" in the edit box, the index entry list will quickly display those keywords beginning with "Print." Double-click "Print - charts" to display the corresponding help page.



Find

The Find page is used to search for every occurrence of a word or phrase within MetaStock Pro's help topics. This search is more extensive yet less selective than using the Index page. For example, suppose you want to find every occurrence of the word "resistance" within the help topics. If you type the word "resistance" in the edit box, every help topic containing the word "resistance" will appear in the list. Double-click the desired help topic to view.



Context Sensitive Help button

Context Sensitive Help

The Context Sensitive command displays a "question mark" next to the mouse pointer indicating that you are in help mode. You can click the special help mode pointer on any of the menu commands, toolbar, or chart objects to display the corresponding help page. For example, clicking the help mode pointer on a chart's x-axis will display a help screen on the x-axis scales. Likewise, clicking on the Print button will display a help screen on printing.

You can also press the F1 key when a menu command is highlighted to display help for that command.



Quickstart button

Quickstart Tutorials

The Quickstart Tutorials are a quick and easy way to get up to speed with MetaStock Pro. These interactive videos are fun and informative for both the beginner and the experienced MetaStock user. To run the Quickstart Tutorials, choose Quickstart Tutorials from the Help menu, or watch for the Quickstart button when viewing MetaStock help topics.

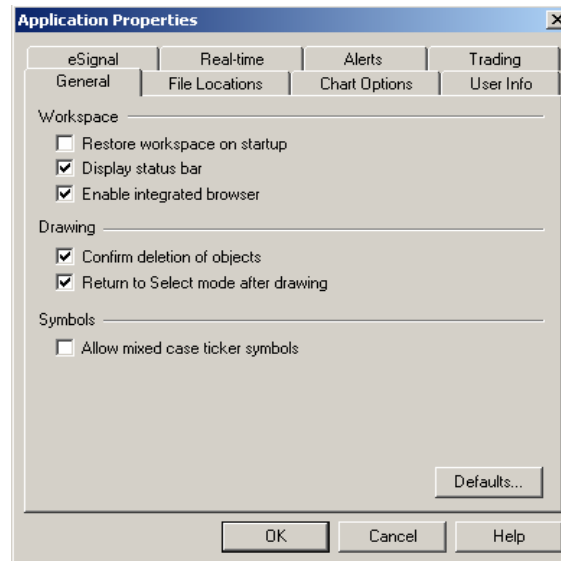
Changing the Appearance of MetaStock Pro's Workplace

Changing the Application Properties

Use the Application Properties dialog to choose from various options pertaining to the overall MetaStock Pro application. You use this dialog to control the appearance of the general workspace, the location of files, your network user name, etc.

Access the Application Properties dialog by choosing Options from the Tools menu or right-click on the application's menu bar.

General Page



Restore workspace on startup. Check this box if you want MetaStock Pro's workspace to appear exactly as it did when you last exited the program. This includes all charts that were open.

Display status bar. Check this box if you want the status bar displayed (see page 27).

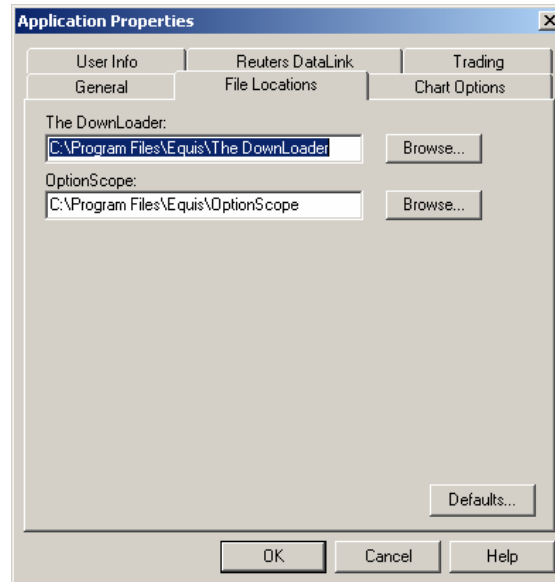
Enable integrated browser Check this box if you want to view web pages requested by MetaStock in MetaStock's built-in web browser. If you do not check this box, your default web browser will be launched when you access a web page from within MetaStock.

Confirm deletion of objects. Check this box if you want MetaStock Pro to prompt you to select "yes" or "no" each time you delete an object (e.g., trendline, indicator, etc.) from a chart (see page 214).

Return to Select mode after drawing. Check this box if you want MetaStock Pro to return to select mode (see page 207) after drawing a line study.

Allow mixed case ticker symbols. Check this box if you want MetaStock Pro to allow upper and lower case characters when creating new securities or adding new symbols to the Symbol Database. Mixed case symbols are required by some data vendors.

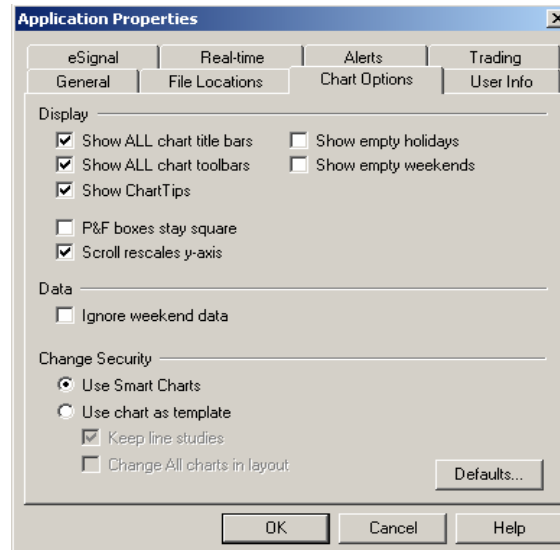
File Locations Page



The DownLoader. Type the path to The DownLoader folder. This is usually C:\Program Files\Equis\The DownLoader (see page 58 for more information on using The DownLoader).

OptionScope. Type the path to the OptionScope folder. This is usually C:\Program Files\Equis\OptionScope.

Chart Options Page



Show All chart title bars. Check this box if you want the title bars displayed for all charts. To control this option for individual charts, see page 104.

Show All chart toolbars. Check this box if you want the data toolbars displayed on all charts. To control this option for individual charts, see page 105. Note that this box has a gray square in it if you have removed a data toolbar from a single chart that is currently displayed. This is just a visual reminder that checking the box will turn on a chart's data toolbar that you have previously turned off.

Show ChartTips. Check this box if you want ChartTips to display next to the mouse pointer. ChartTips allow you to quickly display the values for a particular plot without invoking any special command. By simply positioning the mouse over a plot (e.g., price bar, indicator, moving average, etc.) and holding the mouse pointer motionless for a second or so, a ChartTip displays, giving you information about the plot.

P&F boxes stay square. Check this box if you want P&F boxes to stay square when plotting a point & figure chart (see page 497). Purists to point & figure charting prefer to have exactly square X and O boxes. However, the advantage of leaving the box *unchecked* is that the point & figure charts will utilize chart space much more efficiently.

Note that if you manually scale the y-axis, this option is ignored because it becomes impossible to keep the boxes square.

Scroll rescales y-axis. Check this box if you want the y-axis to automatically rescale when moving through the data using a chart's scroll bar. Checking this box will slow down the scrolling somewhat. However, you can leave this box unchecked and manually rescale the y-axis using the Rescale Y-Axis button on the chart toolbar (see page 86).

Ignore weekend data. Check this box if you do not want weekend data to be displayed in your charts.

Use Smart Charts. Choose this option if you want each chart to load its individual Smart Chart (see page 77) rather than retaining the previous chart's information when using the Change Security commands (see page 83). You can also select this option in the Options tab of the Choose a Security dialog (see page 84).

Use chart as template. Choose this option if you want each chart to use the same set of indicators and styles rather than using each individual Smart Chart when using the Change Security commands (see page 83). You can also select this option in the Options tab of the Choose a Security dialog (see page 84).

Keep line studies. Check this box if you want line studies to be transferred from one chart to the next when using the Change Security commands (see page 83).

For most circumstances, you will probably want to leave this box unchecked, because a line study drawn on one security is rarely useful on another security's chart (without some adjustments).

Note that this option is disabled if you choose the Use Smart Charts option.

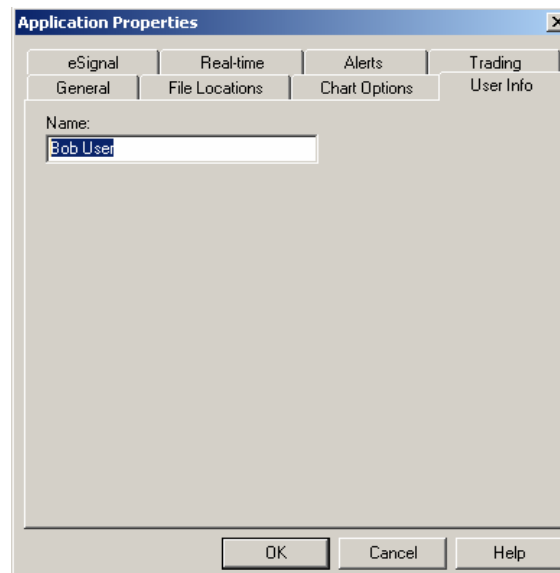
You can also select this option in the Options tab of the Choose a Security dialog (see page 84).

Change All charts in layout. Check this box if you want to use a layout as a multi-chart template when using the Change Security commands (see page 83). When selected, this option causes all charts in the layout to change to the new security when using the Next Security command (or button on the Chart Toolbar), the Previous Security command (or button on the Chart Toolbar), or the Choose a Security command (or button on the Chart Toolbar). If this option is not selected, only the active chart will be changed. You can also select this option in the Options tab of the Choose a Security dialog (see page 84).

Show empty holidays. Check this box if you want a blank space displayed in place of market holidays. On line plots (see page 151) this will cause a break to appear in the line. This option is primarily used by cycle analysts interested in maintaining equal time/space relationships on their charts.

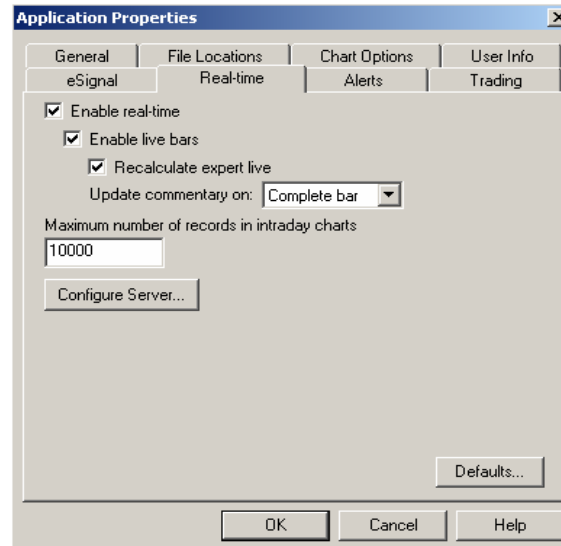
Show empty weekends. Check this box if you want a blank space displayed on the chart in place of weekends. On line plots (see page 151) this will cause a break to appear in the line. This option is primarily used by cycle analysts interested in maintaining equal time/space relationships on their charts.

User Info Page



Name. Type your name. Your name is used for multi-user network control of shared data files (see page 541). If you change your User Name, it does not take effect until the next time you run MetaStock Pro.

Real-time Page



Enable Real-time. Check this box if you want intraday data to flow into MetaStock Pro from your real-time data vendor. Note that real-time data will only flow into MetaStock Pro if your vendor's software is properly installed and running (see your Getting Started manual for real-time vendor information).

Enable Live Bars. Check this box if you want the current bar to reflect the incoming real-time tick prices. If this is left unchecked, a bar will not appear until the end of the specified intraday interval (i.e., 1-minute, 5-minute, etc).

Recalculate Expert Live. Check this box if you would like the experts that are attached to your intraday charts to recalculate and update with each new tick. If left unchecked, experts will only recalculate at the completion of each bar. A mathematically complex expert can be demanding on your system's resources, particularly with actively traded securities. If your system is struggling to keep up, you may want to leave this box unchecked.

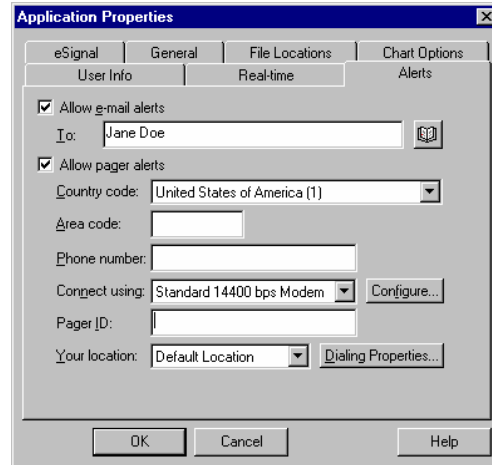
Update Commentary on. Choose when to update the expert commentary attached to a chart—with each tick, at the completion of each bar, or with the Refresh button only.

Maximum number of records in intraday charts. Enter the number of bars (or ticks) that a chart can display (between 200 and 65,500). If the number of bars exceeds this number, the oldest bars will

automatically be removed from the chart. Note however, that no data is actually lost, since MetaStock Pro stores all data to the security's files.

Configure Server. The Real-time Configuration dialog is used to configure various functions of the data, files, data vendor, and servers. For more information on this dialog see page 51.

Alerts Page



Allow e-mail alerts. Check this box to enable e-mail notifications for Expert Advisor alerts (see page 430). This feature requires a MAPI compatible e-mail program, such as Microsoft Exchange, Microsoft Outlook, Eudora, etc. If you do not have a MAPI compatible e-mail program installed on your computer, this box will be disabled.



Address Book button

To. Enter the e-mail address to notify when an Expert Advisor alert is triggered (see page 430). To notify multiple e-mail addresses, create a mailing list in your e-mail program, then enter the mailing list in this box. The address book from your MAPI compatible e-mail program will be displayed when you click the Address Book button.

Allow pager alerts. Check this box to enable pager notification when an Expert Advisor alert is triggered. You may only use a pager that can receive data transfers. If you do not have a modem installed in your computer, this box will be disabled.

Country code. If a country code is required to make a call from your computer to your pager, enter the country code in this box.

Area code. Enter the area code for your pager.

Phone number. Enter the phone number for your pager.

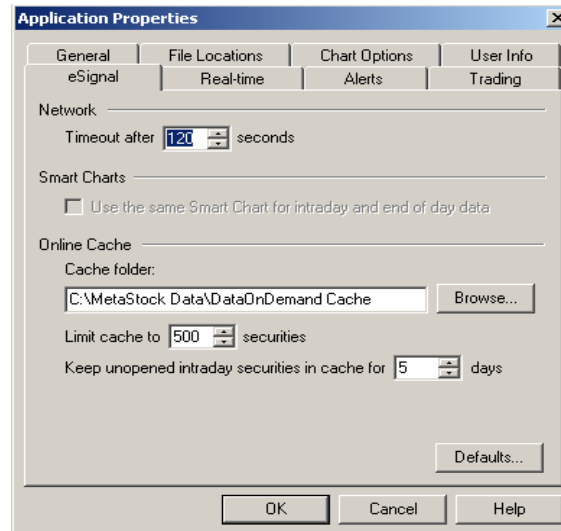
Connect using. Select a modem from the list. Click the Configure button to re-configure the selected modem.

Pager ID. Enter your pager ID in this box. Your pager ID is assigned to you by your pager service provider.

Your location. Select the current location of your computer. Click the Dialing Properties button to re-configure the selected location.

Online Data Vendor Page

The controls on the Online Data Vendor page of Application Properties are explained in detail in the vendor features chapter of your Getting Started manual. This page is available only if you chose an online vendor during installation.



Enlarging the Space Allotted for Charts

If you want more screen space allotted for your charts, you may want to try the Full Screen command in the View menu. Enabling Full Screen mode increases the space allotted for charts by about 10%. It does this by removing the application's title bar, the menu bar, and the status bar. You can even expand the screen further by removing the toolbars with the Toolbars command in the View menu.

The following illustration shows a maximized chart in Full Screen mode. Notice the Close Full Screen button in the bottom right corner of the screen.



Even though the menu bar is not visible in Full Screen mode, you can still access it with the accelerator keys (ALT+F, ALT+E, ALT+V, ALT+I, ALT+O, ALT+T, ALT+W, and ALT+H). For example, to access the Tools menu you can press ALT+T.

Restoring the Screen to Normal View

To return the screen to normal view while in Full Screen mode, click the Close Full Screen button that appears on the screen.



Or right-click on the empty workspace and uncheck the Full Screen option from the Application shortcut menu.

You can also press ALT+V and uncheck Full Screen from the View menu to return to normal view.

Using Dual Monitors with MetaStock Pro

MetaStock Pro supports dual monitor capacity. To maximize MetaStock Pro on both monitors, choose Full Desktop from the View menu.

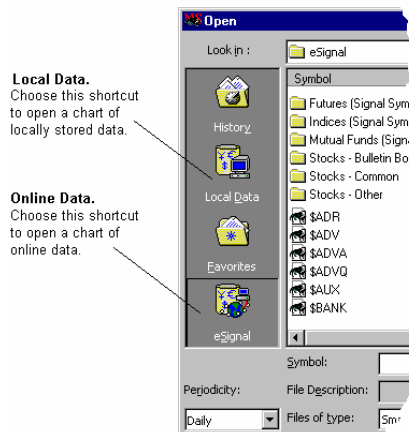
Collecting Your Data

What is Data?

Before you can look at a chart, you must have data. A chart is simply a graphical representation of price data. Price data can include Open, High, Low, Close, Volume, and Open Interest information for a specific time period. MetaStock Pro can use price data that is stored on your local hard drive, or stored remotely on a computer at your data vendor.

Data that is stored remotely at your data vendor is called *online data*. Online data is accessed through MetaStock Pro's DataOnDemand™ technology. You simply choose a symbol from the online data vendor shortcut, or if you already have a chart open, just type the symbol. The data flows instantly to your chart from your data vendor, usually through the Internet.

Data that is stored on your hard drive is called *local data*. To view local data, you must first create a security file, then collect the data through real-time collection with MetaStock Professional or end-of-day collection with The DownLoader.



Intraday data is based on trades as they occur throughout the day.

End-of-day data is based on the high, low, open, close, and volume for an entire trading day.

DataOnDemand allows you to display a chart of intraday or end-of-day data that is stored in a database on a remote computer. This information can be temporarily stored on your hard drive, but the main storage location is the remote computer at your data vendor.

Real-time data collection with MetaStock Professional allows you to view intraday data that is collected and stored locally on your hard drive as the trades occur.

End-of-day data collection with The DownLoader allows you to display a chart of end-of day data that is downloaded and stored locally on your hard drive.

The goal of each of these processes is the same — to retrieve data that can be displayed as a chart in MetaStock Pro. For more information on collecting data from your data vendor, see your Getting Started manual.

DataOnDemand™

Online data is end-of-day or intraday data that is stored on a remote computer. You access online data through MetaStock Pro's DataOnDemand technology by simply choosing the symbol from the Open dialog, or by typing the symbol if you already have a chart displayed. MetaStock Pro then requests data for that security from your data vendor. The data is temporarily held in your computer's memory while you have the chart displayed. Online data can be stored in an online cache folder, much like a web browser saves web pages, for quick retrieval. See your Getting Started manual for online cache information specific to your data vendor.

Managing Online Securities

Because your data is stored remotely on a computer at your data vendor, you will not need to create securities or perform any file or data maintenance. If you choose to store the data temporarily on your hard drive in the online cache, you may use that data with The Explorer or view the data in a datasheet in The DownLoader. If there is an error in the data, or a split occurs after you have stored the data in your online cache, you can re-collect the data from your vendor by choosing Refresh Data from the View menu while you have the chart displayed.

The DataOnDemand Collection Process

DataOnDemand occurs entirely behind the scenes. You just tell MetaStock Pro what chart you want to display. MetaStock Pro will get the data from your online vendor and display the chart on your screen. Your chart will then be updated as the trades occur.

If you have previously opened a chart for a security, MetaStock Pro will first check for data stored in your online cache folder for that security,

then retrieve any additional data to fill in to the current period from your data vendor. The data is then displayed in your chart.

Important Facts About DataOnDemand

- With DataOnDemand, you have the entire database of securities supported by the vendor available to you instantly. You simply type a symbol and the data appears.
- DataOnDemand is the quickest way to view a chart!
- DataOnDemand is only available while you are connected to your data vendor. If your connection is interrupted, or not available, you will not be able to display up-to-date charts.
- Running explorations on online data is extremely slow. If you plan to run explorations regularly, you should consider using local data instead.
- Each time you open a new online security after your cache has reached its limit, the oldest security will be removed from the cache, and the newly requested security will be added.
- Data in the online cache can be merged with local data files to create permanent securities on your hard drive. See the DownLoader User's Manual for information on the Merge function.
- Because the data is primarily stored on a remote computer at your data vendor, you do not need a large amount of hard drive space for storing data.
- If any changes are made to the data by the vendor, a split occurs for example, you can quickly update the data in your online cache by choosing Refresh from the View menu or clicking the Refresh button on the Chart Toolbar while you have the chart displayed. You will not need to edit the data in the datasheet or use any of the other file and data maintenance features in The DownLoader.



Refresh button

Collecting Local Real-time Data

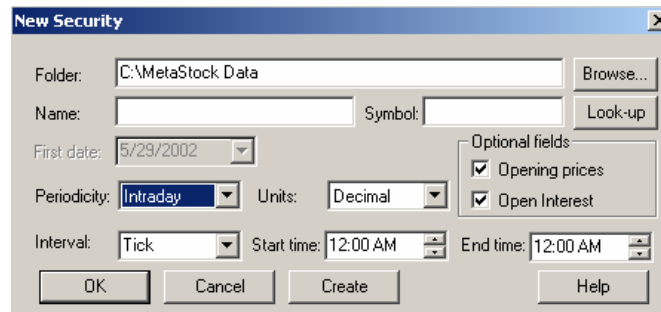
Local real-time data is intraday data that is collected and stored on your computer as the trades occur. Before you can store local data, you must create security files for the data to be stored in. You are limited to viewing the charts for the securities you have created. If you enter a symbol in the Choose a Security dialog that does not have a security file created, you will be prompted to create a security file for it. The chart will then be displayed and the data will be stored.

Creating Real-time Securities

Real-time securities are stored locally on your hard drive. Once the securities have been created, they remain on your hard drive until you delete them. You are limited only by the size of your hard drive. Each

local data folder can contain up to 6,000 securities, and you can have an unlimited number of folders. The MetaStock File Server updates the data in your real-time security files. As long as the File Server is running, your charts will be updated, even if MetaStock Pro has been shut down. See page 51 for more information on the real-time collection process.

To create securities for real-time data collection, choose New, then Security from the File menu in MetaStock Pro. You may also do this in The DownLoader.



The New Security dialog also appears if you begin typing the name or ticker symbol of a security that does not already exist. As you type, the Choose a Security dialog appears (see page 84). If the active chart contains local data, and the security or ticker symbol is not found within the Choose a Security dialog, the New Security dialog will appear, allowing you to create a new security. After specifying the parameters in the New Security dialog, click the OK button. If the periodicity is set for intraday and MetaStock Pro is in real-time mode, the chart for the new security will open and begin to collect data.

Folder. Type (or use the Browse button to select) the folder that will contain the new security file. See page 50 for information on creating new folders.

Name. Type the name of the security. If you use the Symbol Database (see page 46), the name and symbol will automatically be filled in.

Symbol. Type the ticker symbol for the security. Click the Look-up button for help with ticker symbols.

First Date. This field is disabled when you choose Intraday as the Periodicity.

Periodicity. Choose Intraday to maintain intraday price data (e.g., tick, 5-minute, hourly, etc.).

Units. Choose the unit format in which you would like the price data to be displayed. For example, if you choose "1/8," the portion of the price to the right of the decimal will be displayed in eighths. Only the numerator is shown; the denominator is dropped (e.g., 25 3/8 is displayed as 25 ^3). If you choose "decimal" (the default), the portion of the price

to the right of the decimal will be displayed in decimal format (e.g., 25.375, 45.25, etc.).

Opening Prices/Open Interest. To track the Opening Prices or Open Interest, select these boxes.

Open interest is available with most futures and options contracts.

Interval. Choose the interval from the drop-list. The interval specifies how often to update real-time charts. For example, choosing "5" causes MetaStock Professional to update the security with 5-minute bars. Once the interval has been chosen for a security, *it cannot be changed*.

A 5-minute bar labeled on a chart at 11:15 includes the first tick of 11:10:00 through the last tick of 11:14:59. Similarly, a 1-minute bar includes all ticks from 11:14:00 to 11:14:59.

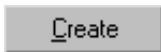
This option is only available when Intraday has been chosen as the Periodicity.

Start/End Times. Specify the time to begin and end collecting intraday data. Start and End times are required so that MetaStock Pro knows when to store data. They are normally set to correspond with the times the market opens and closes. Enter the Start and End times from your local time zone. If you want after-market ticks to be included in the last bar, see page 52 for the "Last bar lag time" option.

Browse. Click the Browse button to select the data folder where the new security will be created. The folder you select appears in the Folder edit box.

Look-up. Use the Look-up button to display the Symbol Database, which is used to quickly fill in the Name and Symbol fields with the desired security. See page 46 for more information on using the Symbol Database.

Create. Choose the Create button to repeatedly create multiple securities without leaving the dialog. When you're done creating securities, click the Cancel button.



Create Button

To create new local intraday securities

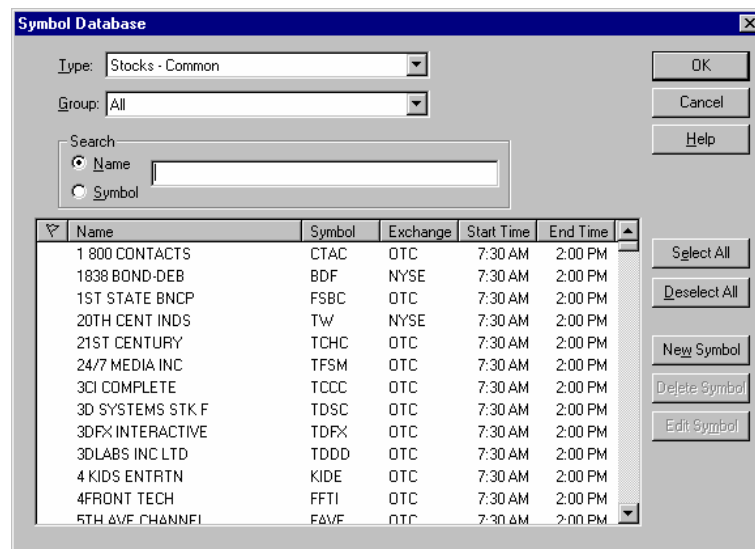
1. Choose **New** from the File menu. Choose **Security**.
2. Complete the security attribute information in the New Security dialog. If you do not know the ticker symbol, click the **Look-up** button. See page 46 for more information on using the Symbol Database.

If the security you are creating is intraday and you are running in real-time mode, the chart will immediately appear once you click the New Security dialog's OK button. The new security will be created in the specified data folder.

Using the Symbol Database to Create Securities

The Symbol Database provides you with instant access to ticker symbol information on over 15,000 stocks and about 7,200 mutual funds, for all major US exchanges. In addition, futures, indices (both U.S. and international), market indicators, and Canadian stocks that are symbol-compatible with Reuters DataLink data service are available. The Database is used to place the name and ticker symbol of the selected security in the New Security dialog.

It can also be used to quickly create multiple security files at once. The number of securities selected (i.e., highlighted) in the Symbol Database is displayed on the status bar at the bottom of the application window.



Type. Use the Type drop list to choose the type of security to list (i.e., stocks, futures, etc.).

Group. Use the Group drop-list to control which securities are listed in the dialog. The contents of the drop-list are dependent on your selection in the Type box.

If you are searching for a specific security and you're not sure which exchange grouping the security belongs to, you should select the "All" group to list all securities.

You can also choose from several specialized groups (i.e., S&P 100 stocks, NYSE stocks, etc.). The group called "optionable stocks" lists all stocks on which options are traded.

Search. Use this box to search the list for the specified name or symbol.

Select All. Click this button to quickly select all securities listed.

Deselect All. Click this button to quickly deselect all securities.

New Symbol. Click this button to add a new symbol to the database.

Delete Symbol. Click this button to delete the selected symbol from the database.

Edit Symbol. Click this button to edit the properties of the selected symbol.

Creating Multiple Securities with the Symbol Database

Instead of you having to create each security file individually, the Symbol Database dialog allows you to search for and select multiple files to create at once. The number of securities selected (i.e., highlighted) in the Symbol Database is displayed on the status bar at the bottom of the application window.

You can even create special groupings of stocks, such as the Dow 30 stocks, S&P 100 stocks, all optionable stocks, etc.

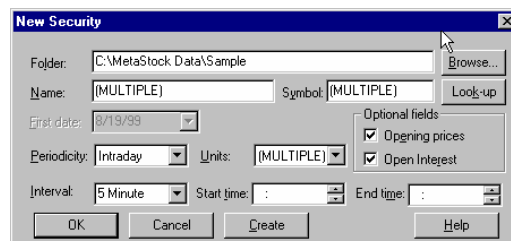
To create multiple securities using the Symbol Database

1. Choose **New** from the File menu. Choose **Security**.
2. Click the **Look-up** button. The Symbol Database dialog will appear.
3. Choose the **Type** and **Group** to specify the securities listed.

Note that you can restrict the list and select individual securities by typing specific names or symbols in the Search box. Simply separate them with a semi-colon (e.g. MSFT;IBM;AAPL;NSCP).

You can also separate the names or symbols with a comma to find everything beginning with a certain letter (e.g. A,B,C will show every security beginning with an A, a B, and a C).

4. Click the Select All button to quickly select all securities generated by the search. To select a continuous group of securities, click on the first item, then hold down the SHIFT key as you click on the last item. All items between the first and last items will be selected. To select multiple individual securities, hold down the CTRL key as you click on each one.
5. Click the OK button. The New Security dialog will appear with the text "(MULTIPLE)" in the Name, Symbol, and Units fields. The Start and End times will be blank.



6. Verify that the remaining attributes in the New Security dialog are set correctly.

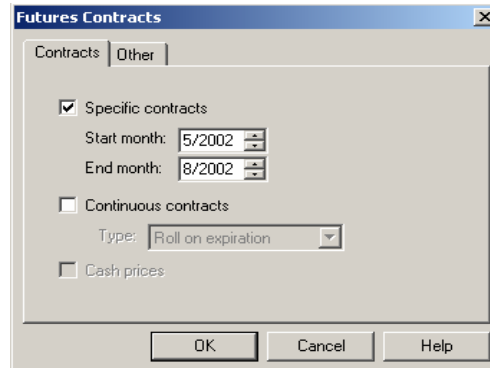
- Click the **OK** button in the New Security dialog to create the selected securities.

Creating Futures Contracts with the Symbol Database

If you use the Reuters DataLink or DBC Signal data services to collect your end-of-day data, you can use the Symbol Database dialog to create indices and futures (in addition to stocks and mutual funds).

If you select a Futures symbol from the Symbol Database dialog, the Futures Contracts dialog is displayed. You use this dialog to specify which contracts to create.

Use the Contracts page to control the type and date range for the contracts.



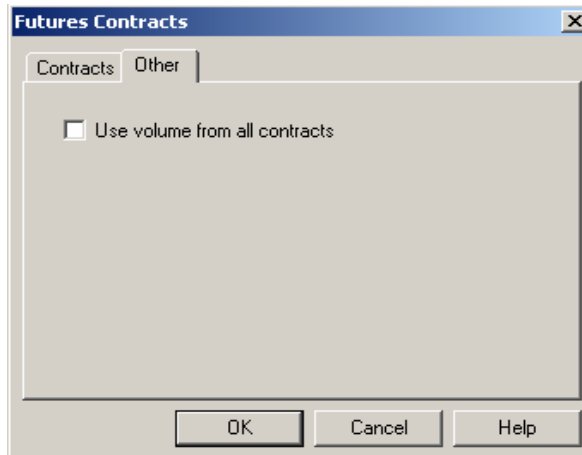
Specific contracts. Choose this box to create all contracts for the selected futures between the specified start month and end month. If you only need to create the contracts for one month, then specify the same month for the start and end months.

Continuous contracts (Reuters DataLink only). Choose this box to create a continuous contract for all the selected futures contracts. A continuous contract is a special contract that automatically rolls to the next contract when the current contract expires, thereby making it "continuous."

Type. Choose the type of continuous contract. Note that the "time-weighted average" returns an average of the nearby contract and the contract with a delivery month closest to 90 days into the future.

Cash prices (DBC only). Choose this box to create cash/spot symbols for all the selected futures.

Use the Other page to control the future contract volume option.



Use volume from all contracts (Reuters DataLink only). Choose this box if you want the volume for all contracts to be stored. Even if you choose a specific contract month, checking this box will cause the volume to reflect the total volume for all contract months.

Updating the Symbol Database

The list of symbols is updated monthly on the Equis International web site at www.equis.com in the Files section of the Customer Support area. You may update this list automatically by choosing **Update Symbol Database** from the Tools menu in either MetaStock Pro or The DownLoader.

Modifying the Symbol Database

The symbols and information included in the Symbol Database can be adjusted. To edit information for a specific symbol, select the symbol, then choose Edit Symbol from the Symbol Database dialog. To delete a symbol, select the symbol, then choose Delete Symbol from the Symbol Database dialog. To add a symbol, choose New Symbol from the Symbol Database dialog, or choose New symbol from the Tools menu in the Open dialog.

Creating Custom Symbol Lists for the Symbol Database

The Symbol Database includes nearly all U.S. and Canadian stocks and mutual funds. However, if you follow securities that do not have a universally accepted symbol format, like futures, indices, or international securities, the symbols you need may not be included in the Symbol Database. To accommodate these types of symbols, you can create your own groups of symbols for use inside the Symbol Database dialog by creating an ASCII file with a “SYM” extension. For detailed instructions on creating these groups, refer to The DownLoader User’s Manual or Help file.

Creating Data Folders for Your Security Files

MetaStock security files are stored in folders on your hard disk. You can store up to 6,000 securities in a folder, and can create an unlimited number of folders.

To create folders for your security files

1. Choose **New** from the File menu. Choose **Security**.
2. Type the name of the new folder to create in the **Folder** box (e.g., c:\MetaStockData\stocks).
3. Fill out the remaining information in the New Security dialog. Note that you must also add a security at this time so that the folder will have a reason for being created. Choose **OK**.
4. Choose **Yes** when asked if you want to create the folder.

Maintaining Local Securities

All file and data maintenance functions for local data are found in The DownLoader. The DownLoader is a separate program provided with MetaStock Pro.



The DownLoader icon

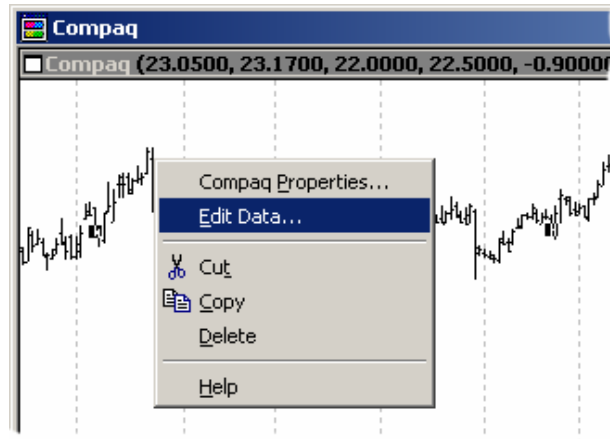
You can run The DownLoader using the Windows Start command by going to the Equis International folder and choosing The DownLoader. You also can run The DownLoader directly from within MetaStock Pro by choosing The DownLoader from the Tools menu.

There are many unique functions that The DownLoader can perform:

- You can create and edit local MetaStock security files using The DownLoader's datasheets.
- You can convert security files from one format to another.
- You can test the integrity of your security files.
- You can sort securities or the securities' data.
- You can merge securities.
- You can delete securities or a range of data within the files.
- You can copy and move your securities from one folder to another.

The folder where The DownLoader program is located is specified in the Application Properties dialog (see page 33). This specified folder must be correct in order for The DownLoader to run successfully from within MetaStock Pro.

You can quickly access the data for an open chart by right-clicking on the price plot and choosing Edit Data from the shortcut menu. The security's datasheet will open in The DownLoader where you can make the desired changes.



To edit local securities

1. Right click on the price bar that needs to be edited.
2. Choose **Edit Data** from the shortcut menu.
3. Enter the desired changes.
4. Choose **Save** from the File menu.

If a chart for a security is open, any change made in The DownLoader to that security's attributes (e.g., name, ticker, units, etc.) will not be immediately reflected in the open chart. The chart must be closed and then reopened to reflect the changes. However, changes made to the pricing data itself (i.e., date, open, high, low, close, etc.) will be immediately reflected in the open chart.

The Real-time Collection Process

Real-time data collection is handled by the MetaStock File Server and the Equis Data Server. The MetaStock File Server controls the data being stored into your local security files, while the Equis Data Server actually collects the data from your data vendor.


When a new local intraday security is created and the chart opened, a request for data is sent to the Equis Data Server. As the data is received by the Equis Data Server, it is passed to the MetaStock File Server to be stored, and to MetaStock Pro to be displayed (if the chart is open).

When a chart of an existing local security is opened, the File Server retrieves the data already stored in the security file, then the Data Server requests new data from the data vendor.

Real-time Configuration

The Real-time Configuration dialog is used to configure various functions of the data, files, data vendor, and servers. Note that many of

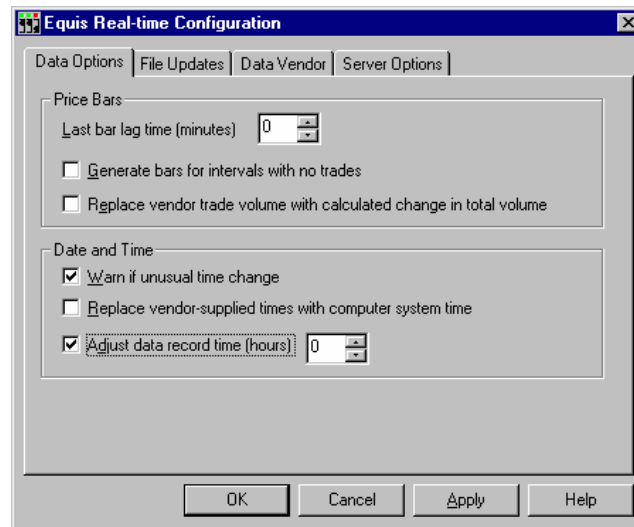
the configuration settings will not take effect until the Data Server and the File Server are restarted.

 *Equis Real-time Configuration button*

The Real-time Configuration dialog is accessed by clicking the Configure Server button on the Real-time page in the Application Properties dialog (see page 36), or by choosing the Equis Real-time Configuration application from the Equis International folder in the Windows Start menu.

Data Options

The Data Options page is used to adjust settings for data retrieved from the Equis Data Server.



Last bar lag time (minutes). This adjusts the lag time for the last bar of the day for all intraday securities. Normally, the last bar for the day terminates exactly at the specified end trade time (see page 43). If a lag time is in effect, the last bar will include any “late trades” beyond the ending trade time. For example, if a 5-minute security has an ending trade time at 16:00, the last bar will normally end at 16:00. If a 3-minute lag time is in effect, the last bar will still be time stamped with 16:00, but it will also contain any ticks that arrived through 16:03.

If the lag time goes beyond the start time for the next trading session, the last bar will be terminated at the start time of the next session.

Any change to this setting takes effect immediately and does not require restarting the Equis Data Server.

Generate bars for intervals with no trades. If this box is checked, “flat” bars will be displayed for time intervals during which there are no trades. The last closing price will be used to generate these bars.

Replace vendor trade volume with calculated change in total volume. Check this box to display volume as the change in volume since the previously reported trade. If unchecked, the volume displayed is the volume as reported by the data vendor for the current trade.

Warn if unusual time change. If this box is checked, the Data Server will display a warning message on the screen if a large time change is detected in the data stream from the data vendor.

This warning does not necessarily indicate a problem. It may appear when the system automatically adjusts the system time according to Daylight Savings Time.

If the data vendor does not supply its own time (i.e., the computer system time is used), or if the "Replace vendor supplied time with computer system time" checkbox is checked, this warning may occur if you manually change the system time while the server is running.

A time change in the data stream should not cause any significant problems with the Data Server, but the time stamps of the records produced may be unusual.

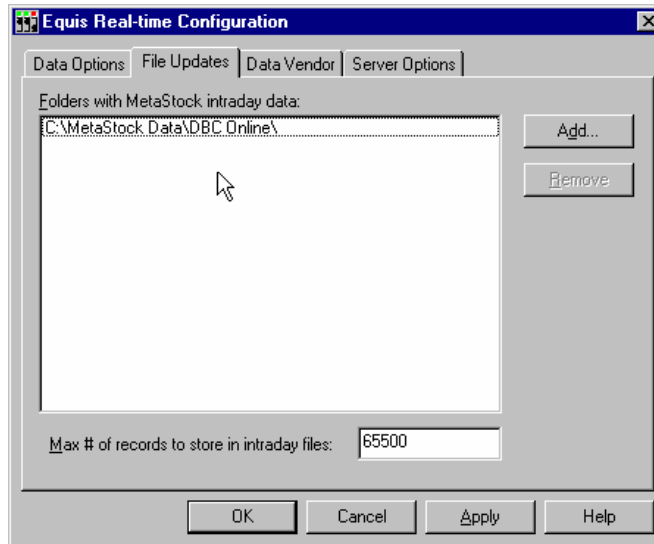
Replace vendor supplied time with computer system time. If this box is checked, the Data Server will stamp all records with the computer system time rather than using the time provided by the vendor.

Note that if the vendor does not supply time, the computer system time is automatically used and this box will have no effect.

Adjust data record time (hours). This control allows you to adjust all time stamps on all records by a specified number of hours. This adjustment is applied to all records regardless of whether the times are supplied by the data vendor or the computer system time is used. Note that this does not affect historical records stored in your data files.

File Updates

The File Updates page controls the folders where the MetaStock File Server is maintaining local real-time data.



Folders with MetaStock intraday data. This list box shows all folders that the MetaStock File Server is currently maintaining. All intraday data files in these folders will be updated with data while the File Server application is running.

The Add button allows you to add a new folder to the list. If the File Server is running, it will automatically start updating the intraday files contained in the new folder. If the File Server is not currently running, it will begin updating the files in the folder when the application is started.

The Remove button allows you to remove a folder from the list. If the File Server is running, it will automatically stop updating all intraday securities contained in the removed folder.

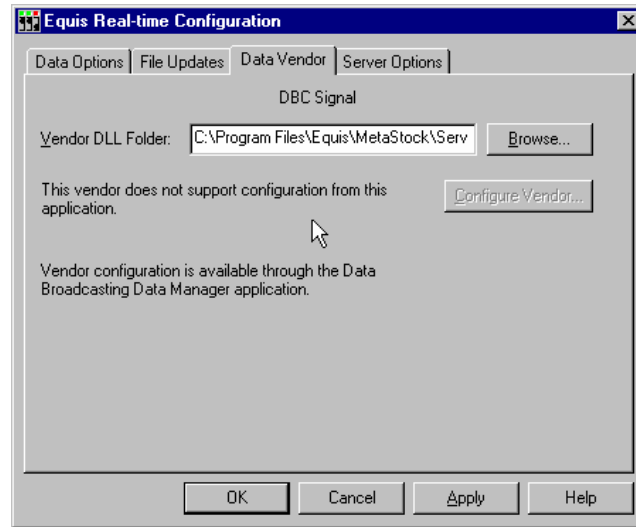
While it is possible to add and remove these folders when the File Server is running, it is not suggested that this be done on a regular basis. The CPU time required by the File Server to add and remove a folder “on the fly” is significant.

Do not attempt to access a real-time data folder that is in use by another MetaStock Pro user (i.e., a shared folder on a network). If you do, the other user will lose "write" privileges to the folder.

Max # of records to store in intraday files. The maximum number of records that MetaStock Pro can write to an intraday file is 65,500. The minimum value for this option is 5,000. If you need to conserve hard disk space or if the performance of your datasheets is poor, then you may want to lower this value. If during normal operation, this maximum value is reached, MetaStock Pro removes 10% of the oldest records to make space for the new records.

Data Vendor

This page allows you to change settings for the real-time data vendor.



The name of your data vendor appears at the top of the dialog.

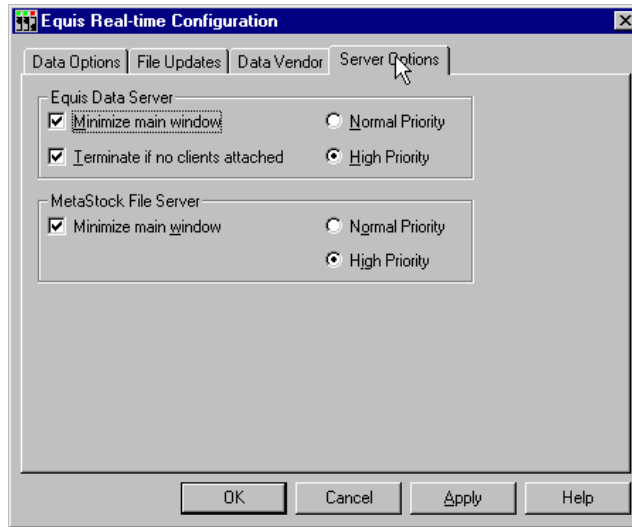
Vendor DLL Folder. All communications with a data vendor take place through the use of a special file called a DLL. Each vendor has a unique DLL to implement the data collection.

This control specifies where the vendor DLL is located. Normally, this setting is initialized during program installation and should not be changed.

Configure Vendor. If the data vendor allows access to their configuration, this button will be enabled. If you click on this button, a dialog will appear that allows you to configure specific settings within the data vendor's application itself. If the vendor does not allow access to their applications directly, this button will be disabled.

Server Options

This page allows you to change options for the Equis Data Server and MetaStock File Server applications.



The following are the Equis Data Server controls:

Minimize main window. If this box is checked, the Equis Data Server application will run in a minimized state (i.e., the main window of the application will not appear on the desktop).

Terminate if no clients attached. If this box is checked, the Equis Data Server application will automatically shut itself down when it detects that there are no client applications (i.e., MetaStock Pro, File Server, etc.) currently attached. This frees system resources for other applications.

Normal Priority / High Priority. The Equis Data Server application is a multi-threaded application that runs in the background. These radio buttons allow you to change the priority of this background operation. Normally, the Data Server should run at a high priority. This ensures that the application has as much CPU time as possible to keep up with the real-time data flow from the vendor.

This setting may be changed to "normal" if other applications seem to be unresponsive and if there is not a high volume of real-time data being processed. However, a "normal" priority setting can hinder the ability of the Data Server to keep up with the real-time data flow.

The following are the MetaStock File Server controls:

Minimize main window. If this box is checked, the MetaStock File Server application will run in a minimized state (i.e., the main window of the application will not appear on the desktop).

Normal Priority / High Priority. The MetaStock File Server application is a multi-threaded application that runs in the background. These radio buttons allow you to change the priority of this background operation. Normally, the File Server should run at a high priority. This

ensures that the application has as much CPU time as possible to keep up with the real-time data flow and to maintain the local intraday data files.

This setting may be changed to "normal" if other applications seem to be unresponsive and if there is not a high volume of real-time data being processed. A "normal" priority setting can hinder the ability of the File Server to keep up with the real-time data flow.

Things to Know about the Equis Servers

You should not be concerned with the operation of the Equis Data Server and File Server applications. In fact, you may never even need to see them. These programs do the "behind the scenes" work.



MetaStock File Server



Equis Data Server

If you prefer that the taskbar not show the buttons for the Data Server and File Server, right-click on the buttons and choose **Minimize**. Once minimized, you can click on their icons on the right side of the taskbar to switch back.

The majority of the options in the menus of the Equis Data Server and File Server are standard controls and need no explanation. However, the following provides a brief explanation of a few options in the View menu that do require additional explanation.

If you exit MetaStock Pro while the File Server is collecting data, a message box appears asking if you want to shut down the File Server. To continue to collect real-time data after shutting down MetaStock Pro, click No. Once the File Server has been closed, the Data Server will shut down also.

Performance Statistics



Performance Statistics button

The Statistics dialogs of the Data Server and File Server are accessed by choosing Performance Statistics from the View menu or clicking the Performance Statistics button on the toolbar.

The Performance pages of the File Server's and Data Server's Statistics dialog provide feedback on the efficiency of the flow of real-time data. The Efficiency area at the bottom of the Statistics page is worth noting. It shows the current and minimum amount of idle time. If these values get too low, warnings may start popping up on your screen complaining about MetaStock Pro's inability to keep up. To remedy this, you may need to reduce the number of real-time securities you follow, or upgrade your computer's resources (i.e., RAM, CPU, hard disk).

Cache

The Cache page of the File Server Statistics dialog shows the total real-time securities being processed, the current cache size (in RAM), and the amount of this cache being used.

The cache temporarily holds the real-time data as it waits to be sent to the appropriate data files. The cache size will automatically increase/decrease (up to 2 meg) as needed to accommodate the flow of real-time data.

Controlling the Message Levels

As the Data Server and File Server process the incoming real-time data, a running log of informative messages is maintained in the window. To control the amount of detail to display, choose from one of three options in the View menu: Critical Messages Only, Standard and Critical Messages (default), Diagnostic, Standard, and Critical Messages.

Important Facts About Real-time Data

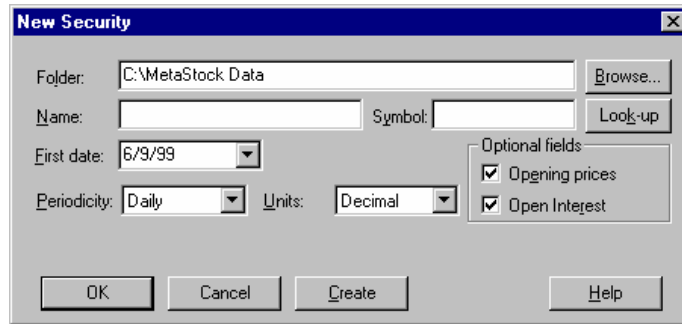
- Real-time data collection provides data as the trades occur. You do not need to wait until the end of the day to get your data. For active day-traders, this is a necessity.
- Intraday data collected through real-time data collection is stored locally on your hard drive. The data can require a significant amount of hard drive space, depending on how many securities you are following and what periodicity you prefer. You will need more room on your hard drive for data if you prefer tick data over hourly data, for example.
- Because local intraday data is stored on your computer, it can be used for your analysis anytime you need it. For example, you can collect prices all day, take your laptop with you when you leave the office, and do your analysis after market hours.
- You can also use local intraday data in other software that is OLE compatible (see page 9).
- MetaStock Pro cannot collect history for local intraday securities. Your history begins when you first create the security file. To view historical intraday data, use DataOnDemand (see page 42).

End-of-day Data Collection with The DownLoader

Downloaded data is stored locally on your hard drive. You must create security files and download data before opening a chart. Once the data has been collected, it can be used with any of MetaStock Pro's advanced analysis tools. The DownLoader is used to collect data from one of several end-of-day data vendors, and for more comprehensive data maintenance such as editing, merging, deleting, and sorting security files.

Creating Local End-of-day Securities

Security files are created using the New Security dialog. You can do this in either MetaStock Pro or The DownLoader. The New Security dialog is accessed by choosing New from the File menu, then Security.



The New Security dialog also appears if you begin typing the name or ticker symbol of a security that does not already exist. As you type, the Choose a Security dialog appears (see page 84). If the active chart contains local data, and the security or ticker symbol is not found within the Choose a Security dialog, the New Security dialog will appear, allowing you to create a new security. After specifying the parameters in the New Security dialog, click the OK button. You will then need to download the data for that security using The DownLoader.

Folder. Type (or use the Browse button to select) the folder that will contain the new security file. See page 49 for information on creating new folders.

Name. Type the name of the security. If you use the Symbol Database (see page 46), the name and symbol will automatically be filled in.

Symbol. Type the ticker symbol for the security. Click the Look-up button for help with ticker symbols.

First Date. Enter the first date for which you want to collect data. Note that you can enter the year using two or four digits (i.e., 98 or 1998).

You will specify the Last Date to collect at the time of data collection.

Units. Choose the unit format in which you would like the price data to be displayed. For example, if you choose "1/8," the portion of the price to the right of the decimal will be displayed in eighths. Only the numerator is shown; the denominator is dropped (e.g., 25 3/8 is displayed as 25 ^3). If you choose "decimal" (the default), the portion of the price to the right of the decimal will be displayed in decimal format (e.g., 25.375, 45.25, etc.).

Opening Prices/Open Interest. To track the Opening Prices or Open Interest, select these boxes.

Open interest is available with most futures and option contracts.

Browse. Click the Browse button to select the data folder where the new security will be created. The folder you select appears in the Folder edit box.

Look-up. Use the Look-up button to display the Symbol Database which is used to quickly fill in the Name and Symbol fields with the

desired security. See page 46 for more information on using the Symbol Database.

Periodicity. Choose the desired periodicity for the security. Choose Daily if you want to maintain price data for each day that the security trades. Choose Weekly if you want to maintain price data for the security on a weekly basis (Friday to Friday). Choose Monthly if you want to maintain price data for the security on a monthly basis (month-end to month-end). (See page 43 for information on adding intraday securities.)

Create. Choose the Create button to repeatedly create multiple securities without leaving the dialog. When you're finished creating securities, click the Cancel button.



To create new local end-of-day securities

1. Choose **New** from the File menu. Choose **Security**.
2. Complete the security attribute information in the New Security dialog. If you do not know the ticker symbol, click the **Look-up** button. See page 46 for more information on using the Symbol Database.
3. Collect data for this security by choosing **Download Prices** from the Tools menu in The DownLoader.

Maintaining Local Securities with The DownLoader

All file and data maintenance functions are found in The DownLoader. The DownLoader is a separate program provided with MetaStock Pro.

You can run The DownLoader using the Windows Start command by going to the Equis International folder and choosing The DownLoader. You also can run The DownLoader directly from within MetaStock Pro by choosing The DownLoader from the Tools menu.

There are many unique functions that The DownLoader can perform:

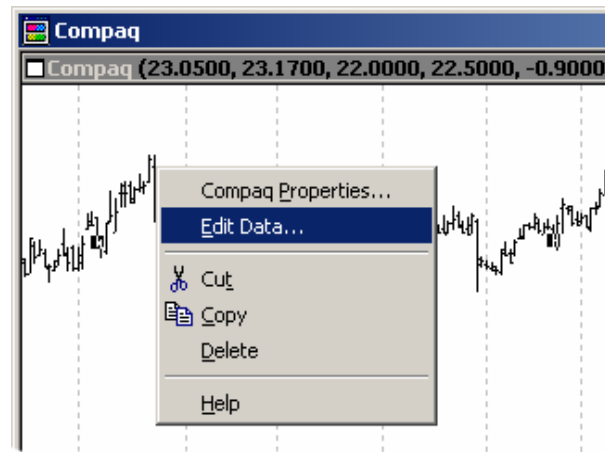
- You can create and edit MetaStock security files using The DownLoader's datasheets.
- You can update your local end-of-day security files from an end-of-day data vendor (e.g., CompuServe, Dial/Data, Reuters DataLink, Telescan, etc.).
- You can convert security files from one format to another.
- You can test the integrity of your security files.
- You can sort securities or the securities' data.
- You can merge securities.
- You can delete securities or a range of data within the files.
- You can copy and move your securities from one folder to another.

The folder where The DownLoader program is located is specified in the Application Properties dialog (see page 33). This specified folder must



be correct in order for The DownLoader to run successfully from within MetaStock Pro.

You can quickly access the data for an open chart by right-clicking on the price plot and choosing Edit Data from the shortcut menu. The security's datasheet will open in The DownLoader where you can make the desired changes.



To edit end-of-day securities

1. Right click on the price bar that needs to be edited.
2. Choose **Edit Data** from the shortcut menu.
3. Enter the desired changes.
4. Choose **Save** from the File menu.

If a chart for a security is open, any change made in The DownLoader to that security's attributes (e.g., name, ticker, units, etc.) will not be immediately reflected in the open chart. The chart must be closed and then reopened to reflect the changes. However, changes made to the pricing data itself (i.e., date, open, high, low, close, etc.) will be immediately reflected in the open chart.

The DownLoader's Collection Process

You use The DownLoader to collect data for end-of-day local securities. To connect to your end-of-day data vendor, choose Download Prices from the Tools menu in The DownLoader. See The DownLoader User's Manual or Help file for more information.

Important Facts About Downloading

- The DownLoader can collect only end-of-day data. End-of-day data includes Daily, Weekly, and Monthly prices.

- The data for the current trading day is not available until after the market closes.
- All of the data is stored on your local hard drive, which takes up a significant amount of space.
- You only have to be connected to your vendor for downloading for a short amount of time.

Chart Concepts

Managing Your Charting

MetaStock Pro provides three ways to manage your charting using charts, Smart Charts™, and layouts. All three file types are managed from one central location, the File menu.

Charts

A "chart" is a graphical representation of a security in a single window. A chart can contain price plots, indicators, line studies, text, etc. in one or multiple inner windows. You can create a chart by choosing New Chart from the File menu. To save a chart, choose Save As from the File menu, then provide a unique file name using the *.mwc extension.

For more information on charts, see page 77.

Smart Charts

A "Smart Chart" is a chart that is saved with the security name. You do not need to provide a file name. The changes are saved automatically when you close the Smart Chart. To open a Smart Chart, choose Open from the File menu. The first time you open a Smart Chart, a special template is used, called DEFAULT.MWT (see page 102), to display the price information.

Layouts

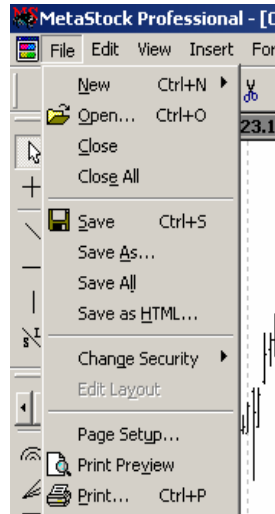
A "layout" is a graphical representation of one or multiple securities in one or multiple windows. A layout can contain price plots, line studies, text, etc.

With a layout, you can group charts of the same or different securities into one manageable unit. For example, perhaps you'd like to see charts of all of your computer stocks on the screen — not just today, but every day. You could load them all, display them as you'd like, and then save them in a layout for later use using an *.mwl extension. Or maybe you always like to display Corn and Wheat charts with a 14-day Stochastic, 9-day RSI, and 10-day moving average. Again, use a layout.

For more information on layouts, see page 89.

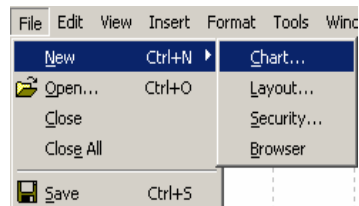
Opening, Closing and Saving (General)

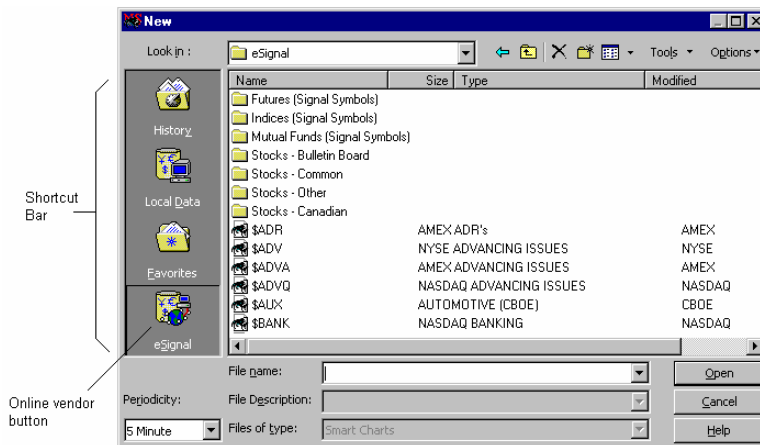
This section explains the controls in the common Windows dialogs used to open, close, and save files. These commands are found in the File menu.



New Chart

The New dialog is used to create a new chart. Choose New from the File menu, then choose Chart.





History. Choose the History shortcut from the Shortcut Bar to create a new chart for a security you have recently accessed. You can adjust the size of the history by choosing Limit History Items from the Open dialog's Tools menu.

Local Data. Choose the Local Data shortcut from the Shortcut Bar to create a new chart for a security located on a local disk drive. The local data folder from which you last viewed a security is displayed.

Favorites. Choose the Favorites shortcut from the Shortcut Bar to create a new chart for one of your pre-defined favorite securities. To add an item to Favorites, choose Add to Favorites from the Open dialog's Tools menu.

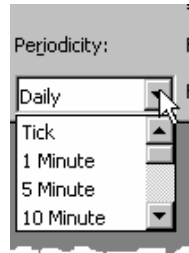
<Online Data Vendor>. If you are using an online data vendor, you may select from a list of securities available from your vendor by choosing this shortcut from the Shortcut Bar.

Look in. Use this drop-list to select the folder that contains the security for which you want to create a chart. Traverse the folders until the desired folder is listed.

Security / Symbol. The security you select from the list appears in this box. This is the security for which a new chart will be created. You can select multiple securities by holding down the SHIFT or CTRL key as you make your selections. A new chart will be created for each selected security. See page 68 for information on filtering securities in the New dialog.

Files of type. This is disabled since charts are always saved with a *.mwc extension.

Periodicity. Choose the desired periodicity from the drop list. (Only available when creating a chart for an online security.)

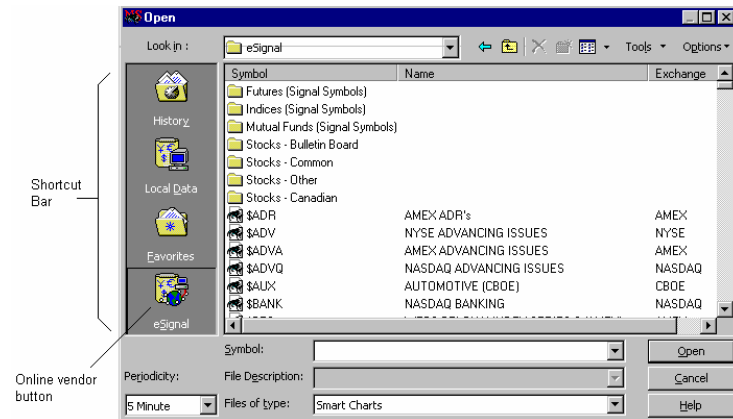


File Description. Enter a description of the new chart.

For more information on creating charts, see page 78. For more information on the Shortcut Bar and menus found in the New dialog, see page 70.

Open Dialog

The Open dialog is used to open Smart Charts, existing charts, and layouts. Choose Open from the File menu.



History. Choose the History shortcut from the Shortcut Bar to select from the list of securities you have most recently accessed. You can adjust the size of the history by choosing Limit History Items from the Tools menu.

Local Data. Choose the Local Data shortcut from the Shortcut Bar to open an existing Smart Chart located on a local disk drive. The local data folder from which you last viewed a security is displayed.

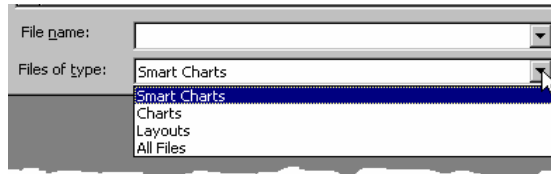
Favorites. Choose the Favorites shortcut from the Shortcut Bar to choose from your list of pre-defined favorite securities, charts, and layouts. To add an item to Favorites, choose Add to Favorites from the Tools menu.

<Online Data Vendor>. If you are using an online data vendor, you may select from a list of securities available from your vendor by choosing this shortcut from the Shortcut Bar.

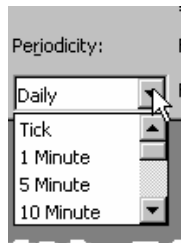
Look in. Use the drop-list to select the folder that contains the desired Smart Chart, chart, or layout. Traverse the folders until the desired folder is listed.

Security / Symbol / File Name. The chart or layout you select from the underlying list appears in this box. This is the chart or layout that will be opened. You can select multiple charts or layouts to open by holding down the SHIFT or CTRL key as you make your selections. See page 68 for information on filtering securities in the Open dialog.

Files of type. Choose the type of files (i.e., Smart Charts, charts, or layouts) you want to display in the list. The last folder you opened that type of file from will be displayed.



Periodicity. Choose the desired periodicity from the drop list. This option is available only when opening an online security.



File Description. Enter a description of the chart or layout.

For more information on displaying existing charts, see page 79. For more information on displaying existing layouts, see page 91. For more information on the Shortcut Bar and menus found in the Open dialog, see page 70.

Filtering Securities in the Open and New Dialogs

To filter online securities displayed in the Open and New dialogs, begin typing the name or symbol in the Security name / Symbol box. As you type, the list is filtered.

To filter local securities displayed in the Open and New dialogs type the security name or part of a security name in the Security box and press the ENTER key. The wildcard characters * and ? can be used as shown below.

B* Securities that *begin* with the letter "B" are displayed.

*B Securities that *end* with the letter "B" are displayed.

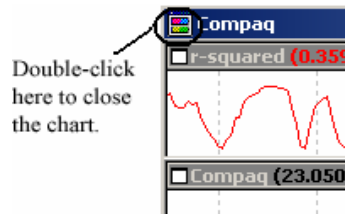
B? Securities that begin with the letter "B" and are followed by only one other character are displayed.

To reset the list to display all securities, delete all characters in the Security box and press the ENTER key.

Close and Close All Commands

Choose the Close command from the File menu to close the selected chart or layout. Choose the Close All command from the File menu to close all open charts and layouts. If any changes were made to the chart or layout, you will be asked if you want to save the changes.

You can also close a chart by double-clicking the system box at the top left corner of the chart.



For information on saving charts, see page 81. For information on saving layouts, see page 95.

Save Command

The Save command is used to save charts and layouts. When you open a chart or layout, MetaStock Pro copies it from your disk to the screen. Changes made to charts are temporarily stored in memory until you save them to the disk.

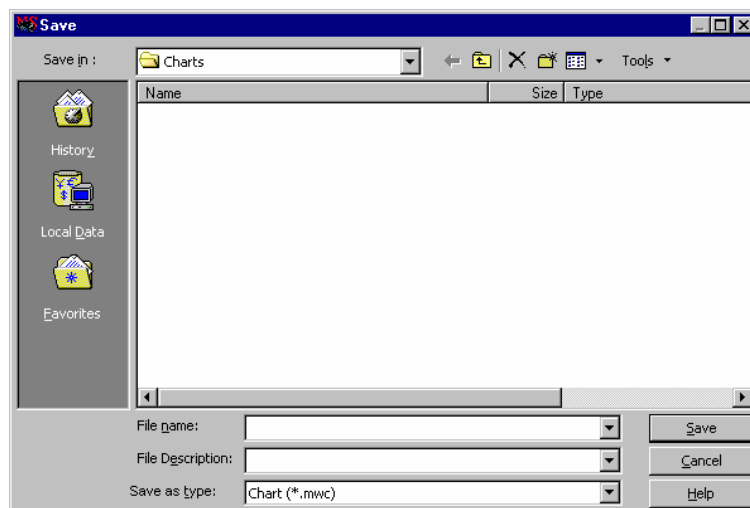
Choose Save from the File menu. If the selected chart or layout is unnamed, the Save As dialog will appear, prompting you to provide a name. We recommend that you use the Save command when you are in the middle of making extensive changes so that you avoid losing your work due to power outages or other unplanned events.

For more information on saving charts, see page 81. For more information on saving layouts, see page 95.

Save Dialog

The Save dialog is used to save a chart, layout, or template to a file name that you provide. Choose Save As from the File menu. If you attempt to close a chart or layout that you have made changes to, MetaStock Pro will automatically ask you if you want to save the chart.

For information on saving a chart as an Internet HTML file, see page 228.



Save in. Use the drop-list to select the folder where the file should be saved. If you have selected Smart Chart from the Save As Type list, the tree is disabled and the chart is automatically saved with the security data file.

File Name. Type the name you want to assign to the file. The name of the selected chart, layout, or template is displayed in the File Name box. You can save it to its existing path and name or you can specify a new one. Charts are given a *.mwc file extension, layouts *.mwl, and templates *.mwt. If you have selected Smart Chart from the Save As Type list, the File Name box is disabled since Smart Charts are automatically assigned a name.

File Description. Enter a description of the file.

Save As Type. Choose the type of file you want to save. Choose Chart if you want to save the selected chart to a file name. Choose Template if you want to save a template based on the selected chart's contents. Choose Smart Chart if you want to save the selected chart as this security's Smart Chart.

To save charts as a layout, first use the New Layout command in the File menu (see page 90). To save a chart as an Internet HTML file, see page 228.

See page 78 for information on creating a new chart. See page 101 for more information on saving templates. For more information on the Shortcut Bar and menus found in the Save dialog, see page 70.

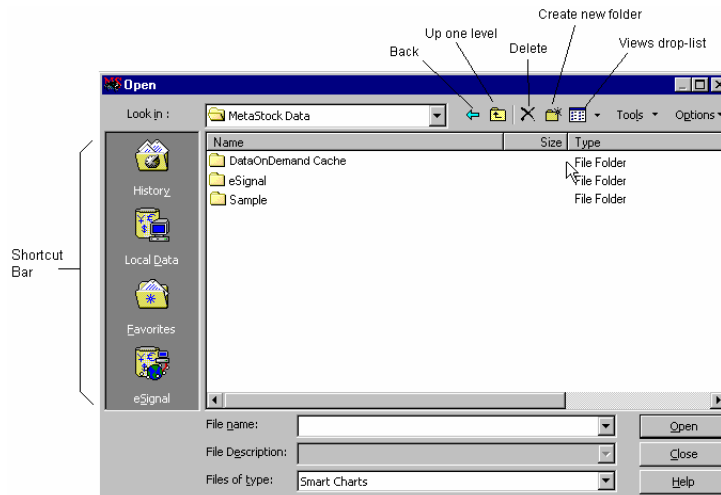
Save All Command

You use the Save All command to save all open charts and layouts to their existing file names. If a chart or layout is unnamed, the Save As dialog will appear prompting you to provide a name.

For more information on saving charts, see page 81. For more information on saving layouts, see page 95.

Special Controls in the New, Open, and Save Dialogs

The New, Open, and Save dialogs are very versatile. From these dialogs you can control the information listed with the securities, rename securities, sort the list of securities, and delete folders, charts, layouts and templates.



The items on the Shortcut Bar give you quick access to your charts. The controls in the Tools and Options menu are dependent on the item you choose from the Shortcut Bar.

Shortcut Bar

History. The History shortcut provides quick access to the items you have recently opened. You can limit the number of items in your history list by choosing Limit History Items from the Tools menu after choosing History from the Shortcut Bar. To delete all items from your History, choose Clear History Items from the Tools menu after choosing History from the Shortcut Bar.

Local Data. Choose Local Data from the Shortcut Bar to display the last folder you opened a local chart from.

Favorites. Choose Favorites from the Shortcut Bar to display your list of favorite items. To add an item to your favorites, choose Add to Favorites from the Tools menu or right-click on the item and choose Add to Favorites from the shortcut menu. To organize your favorite items into folders, choose the Create in button from the Add Favorites dialog when adding an item to favorites, or choose Create new folder from the shortcut menu when right-clicking on an item in your favorites folder.

<Online Data Vendor>. The current online data vendor is listed on the Shortcut Bar for quick access to online data. Click this shortcut, then choose from the list of folders and securities. The list of securities that is displayed when you first select the online vendor shortcut includes all securities available from that vendor. Choose a folder to filter this list. When using the Change Security commands, the folder you opened the original security from will be used to scan the securities. For example, if you open IBM from the S&P 100 folder, using the Next Security button on the Chart Toolbar will scan through the securities in the S&P 100

folder only. If you open IBM from the main list of securities, it will scan through the entire list.

Tools Menu

Select All. Choose this option to select all securities currently displayed in the dialog.

Add to Favorites. Choose this option to add the selected item(s) to your Favorites folder.

Symbol Database. Choose this option to display the Symbol Database for the current online vendor. From this dialog, you can edit or delete existing symbols, or add new symbols.

New Symbol. Choose this option to add a symbol to the Symbol Database.

New Local Security. Choose this option to display the New Security dialog from which you can create a new local security file.

Find Local Security. Choose this option to display the Find dialog. This dialog is used to search your disk for specified securities. See page 74 for more information on using the Find command.

Clear History. Choose this option to remove all items from your History. This option is available only when you choose History from the Shortcut Bar.

Limit History Items. Choose this option to change the number of items listed in your history. This option is available only when you choose History from the Shortcut Bar.

Clear Favorites. Choose this option to remove all items from your favorites. This option is available only when you choose Favorites from the Shortcut Bar.

Properties. Choose this to display detailed information about the selected item. If an online security is selected, the Edit Symbol dialog appears, allowing you to change the properties of the selected security in the Symbol Database. Some of the information in the Properties dialog can be viewed by choosing the Details view from the Views drop-list at the top of the dialog.

Options Menu

View By Symbol. Choose to view the securities by ticker symbol.

View By Name. Choose to view the securities by name.

Load Options. Choose this option to specify the amount of data to load and display when a chart is created (see page 80).

Open with template. Choose this option to select a template to apply to the security. For more information on applying templates, see page 98.

Remove Existing Charts. Choose this option if you want all open charts to be closed before displaying the new chart.

Using the Open Dialog Toolbar

Choose List from the Views drop-list to display just the securities' names or ticker symbols. Choose Details to display name, periodicity, date ranges, etc.

If the dialog is in Detail mode, you can sort the list by clicking on the column headings. Click on the column heading you want the list sorted by. Click on the heading a second time to reverse the sort order.

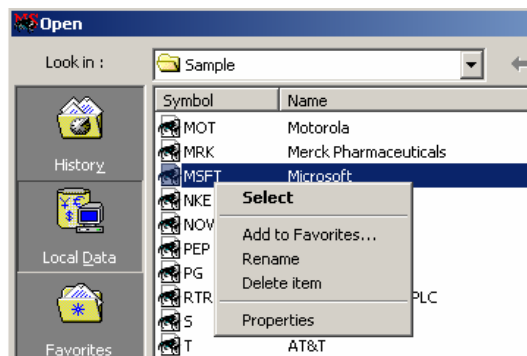
You can also resize the width of the columns by dragging the column heading separators.

The Recent button takes you back to the folder you were viewing prior to the current folder. The Up One Level button allows you to move to the folder that is up one level from the current folder. The Create New Folder button allows you to create a new folder in the current folder.

Charts, layouts, templates and folders can be deleted by selecting the item, then clicking the Delete button. You may also delete these items by right-clicking on the item and choosing Delete from the shortcut menu.

Using the Right-click Shortcut Menu

You can right-click directly on an item in the list to display commands specific to that item.



Rename. Choose the Rename command to rename the item. This command is available only for items saved on a local drive (i.e. local securities, folders, layouts, charts, templates, etc).

Delete item. Choose Delete item to delete the selected item.

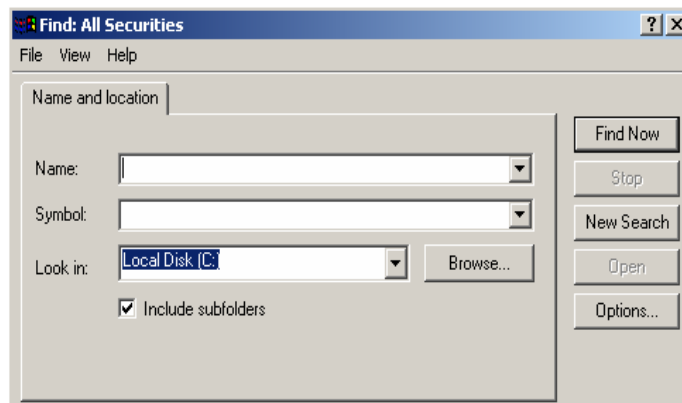
Add to Favorites. Choose this to add the selected item(s) to your Favorites.

Properties. Choose this to display detailed information about the selected item. If an online security is selected, the Edit Symbol dialog appears, allowing you to change the properties of the selected security in

the Symbol Database. The Properties dialog is also accessed by choosing Properties from the Tools menu. Some of the information in the Properties dialog can be viewed by choosing the Details view from the Views drop-list at the top of the dialog.

Searching for Securities with the Find Command

The Find command lets you search your disk for securities by name and/or symbol. The results of the search are displayed at the bottom of the dialog. This command is available from the Open and New dialogs by choosing Find Local Security from the Tools menu.



Name. Enter the name of the security to find. Use the drop-list to select from previously entered names. Use the wildcard character *, to find any character. For example, M* will find all securities beginning with the letter "M" and ME* will find all securities beginning with the letters "ME". Leave the box blank to find all securities in the specified drive and folder.

Symbol. Enter the symbol of the security to find. Use the drop-list to select from previously entered symbols. See the information about using wildcard characters in the Name section above.

Look in. Enter (or use the Browse button to select) the folder to search.

Include subfolders. Check this box if you want the search to include subfolders for the folder specified in the Look in box.

Find Now. Click this button to start the search.

Stop. Click this button to stop a search in progress. If you stop before the search is complete, no securities will be listed.

New Search. Click this button to clear the current search and specify a new one.

Open. Click this button to open a chart of the selected security.

Options. Choose this button to display the Load Options dialog, where you can control the amount of data to display in the chart (see page 80).

If the specified securities are found, the dialog will expand and list the securities. You can display a chart of a security by selecting the security and choosing the Open button, or by double-clicking on the security's name.

Note that you can right-click on the listed securities to change the way the files are displayed (i.e., by name, by symbol, small icons, large icons, detail or list). You can sort the listed securities by clicking on the column headings.

Deleting Chart and Layout Files

Each chart and layout is saved with a unique file name. Charts are saved with a *.mwc extension; layouts with *.mwl.

Charts and layouts can be deleted from the Open dialog by choosing Delete from their right-click shortcut menu, or by clicking the Delete button. Securities can only be deleted using The DownLoader (see page 60 in this manual). Templates can be deleted from the Open Template dialog (see page 100) by choosing Delete from their right-click shortcut menu, or by clicking the Delete button.

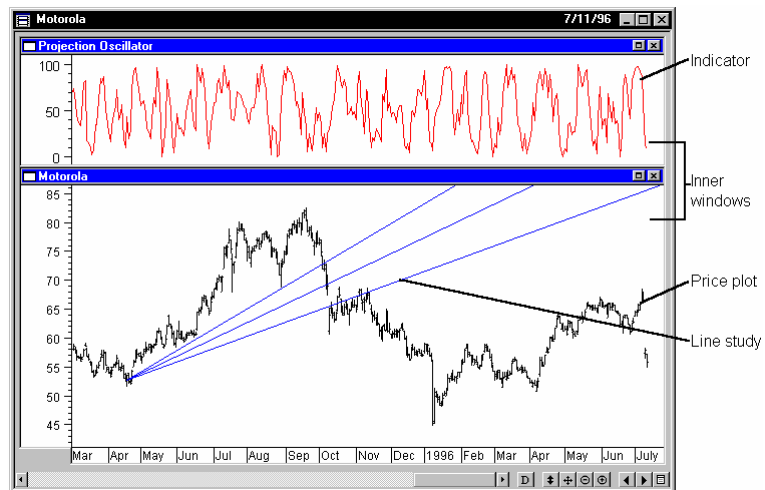
To delete charts or layouts

1. Choose **Open** from the File menu.
2. Choose **Layout** or **Charts** from the List Files of Type drop-list.
3. Right-click directly on the layout or chart to delete.
4. Choose **Delete** from the shortcut menu.

Saving Your Work with Charts

What is a Chart?

A chart is the focal point of much of what you do in MetaStock Pro. A chart is a graphical representation of security prices along with any accompanying indicators and line studies. In MetaStock Pro, a chart is contained within a single window. The window is divided into one or more *inner windows* where the prices and indicators are plotted.



A chart helps you perform a visual interpretation of a security. Indicators can be plotted on a chart to help you see what prices have done in the past, what they are currently doing, and what they may do in the future (see page 163). Line studies can be drawn on a chart to see how prices (and indicators) react at certain price levels or time intervals (see page 205).

The Convenience of Smart Charts

To help with the management of your charts, MetaStock Pro automatically creates for every security a special type of chart called a Smart Chart. A Smart Chart is simply a chart that is automatically saved under the security's name each time you are done working with it. The

next time you load a security's Smart Chart, it appears exactly as it did when you last saw it. This frees you from having to worry about saving your charts using the more involved (yet more flexible) Save As command (see page 69).

Smart Charts appear in the Open dialog. Choose Smart Charts from the Files of Type drop-list to display the Smart Charts. MetaStock Pro maintains one Smart Chart per security. If you have not yet opened the Smart Chart for a security, a special template called DEFAULT.MWT (see page 102) is used to determine how your Smart Chart will look initially. You may then make the necessary changes which will be saved automatically.

You may find that you only need to see one chart of a security. If this is the case, then Smart Charts will be a great convenience for you. However, if you'd like the flexibility of having multiple charts per security, then use the Save As command (see page 69) to assign a name to each chart.

If you want to save a Smart Chart under a unique filename, choose Save As from the File menu. Specify the file type as "Chart."

Accessing Smart Charts from Read-only Media

In order for a Smart Chart and its information (e.g., trendlines, indicators, moving averages, etc.) to be saved, you must be able to write to the disk on which the data is located. If you are accessing data from a read-only disk (e.g., CD-ROM, network drive, etc.), changes to Smart Charts cannot be saved. If you need to save the changes, you can save the chart as a Chart file using the Save As command (see page 81).

Creating a New Chart



New button

A new chart is created by using the New command in the File menu. When a new chart is created and displayed on the screen, a special default template called DEFAULT.MWT is automatically used to determine how the initial chart will appear. For more information on the default template, see page 102.

You can apply a custom template to a new chart at the time you are creating the chart by choosing the Template button in the New dialog. See page 97 for more information on Templates.

The name of a chart appears in the chart's title bar. Newly created charts are assigned a default name of "CHARTx.MWC" where "x" is a number corresponding to the number of unnamed charts opened.

If you attempt to close or save a chart that has a default "CHARTx" name, the Save As dialog will appear prompting you to provide the chart a customized name (if desired).

To create a chart

1. Choose **New** from the File menu. Choose **Chart**.

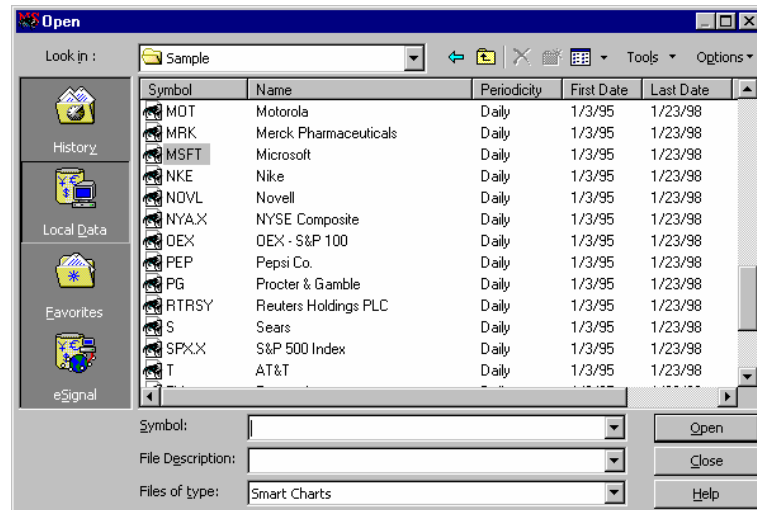
2. From the Look in box, select the folder where the security you want to chart is located.
3. Double-click the name of the security you want to chart.

Displaying Existing Charts



Open button

After a chart is saved (either manually by you or automatically as a Smart Chart), it can be redisplayed by using the Open command in the File menu.



Use the Files of Type drop-list to choose Charts or Smart Charts to display in the list. If the chart or Smart Chart you want to open is not listed, make sure the correct folder is chosen in the Look in box.

To select multiple charts, hold the SHFT or CTRL keys down as you click.

If you want to open multiple charts at once, you can select multiple charts from the list in the Open dialog and click the OK button. Each chart you select will be opened.

If you click on a chart's name, a description of the chart (if one was entered) is displayed in the Description box.

You can also filter the securities displayed in the Open dialog. See page 68 for more information.

If displaying the securities in the Open dialog is too slow, you may want to reduce the number of securities in the folder. Although a folder can hold up to 6,000 securities, anything over 1,000 may cause the Open dialog to display very slowly on some computers.

You can apply a custom template to a Smart Chart by choosing Open with Template from the Options menu. See page 97 for more information on Templates.

If you attempt to open a chart or Smart Chart that is already open, the open chart or Smart Chart is selected. If you need to make a "clone" of

an open chart, use the New Window command in the Window menu (see page 86).

To open an existing chart

1. Choose **Open** from the File menu.
2. From the Files of Type drop-list, select either **Charts** or **Smart Charts**, depending on the type of chart you want to open.
3. If you chose Smart Charts, you can also apply a template (if desired) by choosing Open with Template from the Options menu.
4. From the Look in box or Shortcut Bar, select the folder where the chart you want to display is located.
5. Double-click the name of the chart you want to display.

To quickly open multiple charts

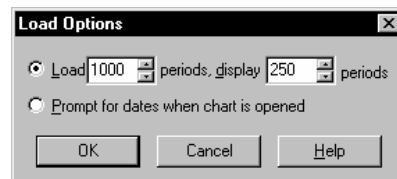
1. Choose **Open** from the File menu.
2. From the Files of Type drop-list, select either **Charts** or **Smart Charts**, depending on the type of chart you want to open.

If you chose Smart Charts, you can also apply a template to each of the charts (if desired) by choosing Open with Template from the Options menu.

3. From the Look in box or Shortcut Bar, select the folder where the charts you want to display are located.
4. Select multiple charts by holding down the CTRL key as you click the mouse.
5. Click the **Open** button.

Controlling the Number of Periods Loaded

You can control how many periods of data are loaded and displayed by choosing Load Options from the Options menu in the New or Open dialogs. Up to 65,500 periods (i.e., days, weeks, months, etc.) of data can be loaded and displayed in a chart.

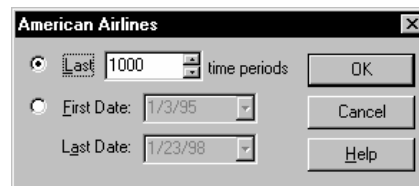


Load [] periods display [] periods. Enter the number of periods to load and display.

Prompt for dates when chart is opened. Select this button if you want to specify the amount of data loaded each time a chart is opened.

Specifying the Date Range When Loading

If you choose the "Prompt for dates when chart is opened" button in the Load Options dialog, MetaStock Pro will prompt you for the amount of data to load each time a chart is created or opened. This is useful to view different ranges of data for different charts.



The periods displayed in the "Last __ time periods" box defaults to the last number entered. Also note that the dates displayed in the First Date and Last Date boxes correspond to first and last dates available in the data file.

To specify the date range when loading

1. Choose **New** (or **Open**) from the File menu.
2. Choose **Load Options** from the Options menu.
3. Select the **Prompt for dates when chart is opened** button.
4. Click the **OK** button.
5. Select the security (or chart) you want to load. The Date Range dialog will appear prompting you for the range of data to load.

Identifying Composite Securities

A composite is a special security type that links two securities together with a mathematical operator. Composite securities are created with The DownLoader.



Composite security

Composite securities are easily identified from the Open and New dialogs by a special icon to the left of the security's name.

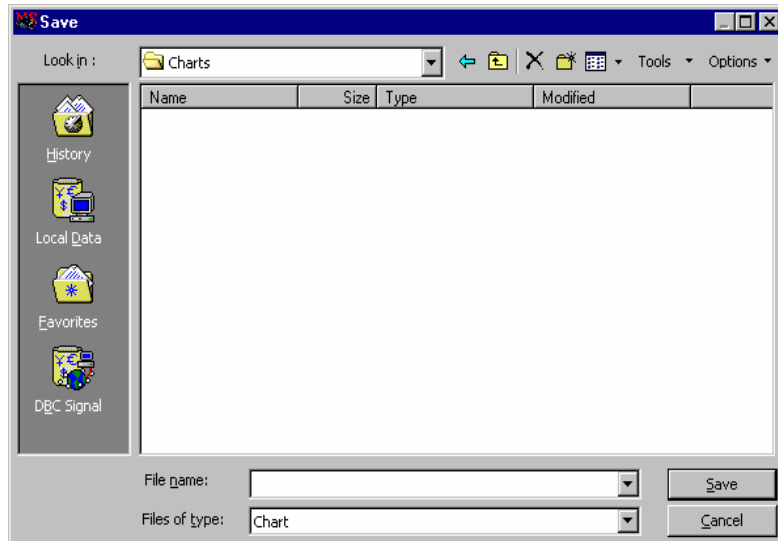
Saving Charts



Save button

When you open a chart, MetaStock Pro copies it from your disk to the screen. Changes made to charts are temporarily stored in memory until you save them to the disk.

Charts are saved with the Save and Save As commands in the File menu. MetaStock Pro also has an automatic saving feature called Smart Charts. If you open a Smart Chart, the changes you make are automatically saved when the chart is closed (see page 77).



If you use the Save command to save a chart and the selected chart is unnamed, the Save dialog will appear prompting you to provide a name. If you attempt to close a chart to which you have made changes, you will be asked if you want to save the chart.

We recommend that you save your charts often when making extensive changes so that you avoid losing your work due to power outages or other unplanned events.

Although a Smart Chart is automatically maintained for every security, there may be times when you want a specific "chart" to replace the security's automatically-created Smart Chart. Choose Smart Charts as the Save as type if you want the selected "chart" to replace the underlying security's Smart Chart.

To save a chart

1. Select the chart you want to save by clicking directly on the chart.
2. Choose **Save** from the File menu. If the chart is new and unnamed, you will be prompted to supply a name in the Save dialog (see page 69).

Closing Charts

After you finish working on a chart, you should close it to free memory. If you attempt to close a chart to which you have made changes, MetaStock Pro will ask you if you want to save the chart first. If you attempt to close a chart that has never been saved before (e.g., a newly created chart), MetaStock Pro displays the Save dialog which prompts you to provide the chart a name.

To close a chart

1. Select the chart you want to close and do one of the following:
 - Choose Close from the File menu.
 - Click the Close button in the upper-right corner of the chart.
 - Double-click the chart's system box in the upper-left corner of the chart.
2. If the chart has been changed, you are asked if you want to save it. If the chart is unnamed, you are prompted to provide a name.

To close all open charts

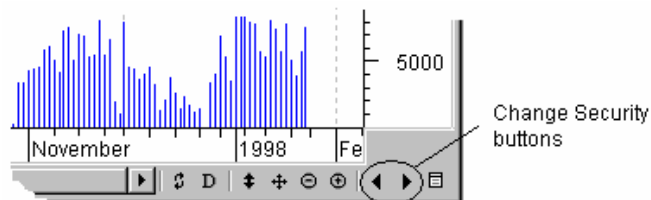
1. Choose **Close All** from the File menu.
2. If any chart has been changed, you are asked if you want to save it. If any chart is unnamed, you are prompted to provide a name.

Scanning Charts with the Change Security Commands

A quick way to scan all the securities in a folder is with the Change Security commands. The Change Security commands replace the base security of the selected chart or layout with the next (or previous) security in the folder. All indicators are recalculated (using the same parameters) on the new base security. Everything else about the chart or layout remains intact.

There are four ways to access the Change Security commands.

- You can choose them with the Change Security command in the File menu.
- You can use the Microsoft IntelliMouse™ pointing device. While holding the ALT key down, rotate the wheel forward to move to the next security or rotate back to move to the previous security. See page 87 for more information on the IntelliMouse pointing device.
- You can type ALT+RIGHT ARROW to move to the next security or ALT+LEFT ARROW to move to the previous security.
- You can click the Next Security or Previous Security buttons on the Chart toolbar (see page 24).



This feature can be a great time saver, particularly for those who like to look at all their securities with the same set of indicators.

If you are in the middle of scanning through securities, any changes made to a chart are reflected in all charts that you subsequently scan to.

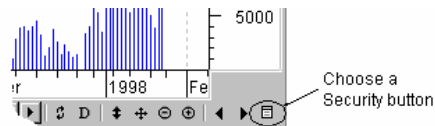
Smart Charts are unaffected unless you make changes to a chart. If changes are made to the displayed security, the security's Smart Chart will be overwritten.

To scan through charts

1. Display a chart that you'd like to use as the base chart when scanning.
2. Do one of the following:
 - Choose **Change Security** from the File menu. Choose **Next**.
 - Type ALT+RIGHT ARROW.
 - Click the **Next Security** or **Previous Security** button on the Chart toolbar.

Choose a Security

If you like the idea of scanning charts, but don't want to sequentially advance through every security in the folder, you can use the Choose a Security dialog. This dialog allows you to select a security from a list. The simplest way to access this dialog is to simply type the name or ticker symbol while a chart is displayed. If you type the name, make sure the "By Name" radio button is selected (or the "By Symbol" button if typing a ticker symbol). As you type, the Choose a Security dialog automatically appears and advances to the security's name or ticker symbol. Press the ENTER key or click the OK button to display the chart.



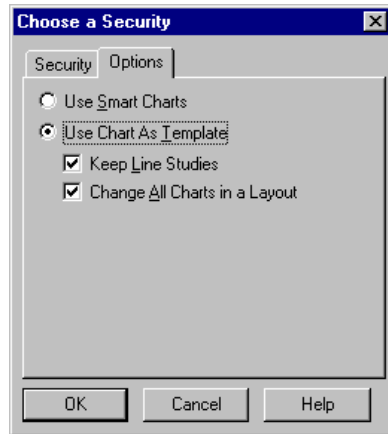
If you type a name or symbol that does not exist in your security files, the Choose a Security dialog will appear with no match. Press the ENTER key or click the OK button and the New Security dialog automatically appears and allows you to create a new security. See page 60 for more information on adding new securities.

There are three ways to access the Choose a Security dialog.

- Choose the Change Security command in the File menu.
- Click the Choose Security button on the Chart toolbar (see page 24).
- With a chart displayed, begin typing a security's name. As you type, the Choose a Security dialog will automatically appear.

Options for Scanning Charts

The Change Security options can be accessed by choosing the Options tab in the Choose Security dialog.



Use Smart Charts. Choose this option to display a security's own Smart Chart when scanning (see page 34).

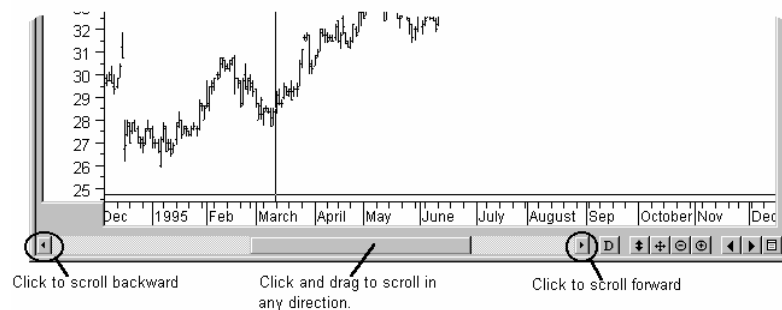
Use Chart as Template. Choose this option to scan charts with the same information (i.e., indicators, periodicity, etc.).

Keep Line Studies. Check this box to transfer line studies from one chart to the next when scanning (see page 34).

Change All Charts in a Layout. Check this box to scan your charts using a multi-chart template or layout (see page 33).

Scrolling Charts

A horizontal scroll bar is located at the bottom of every chart. This scroll bar lets you move forward and backward through the loaded data. Click the left scroll button to scroll backward through the data, and click the right scroll button to scroll forward through the data. You can also click and drag the scroller to move in either direction.



To scroll your data, you must have more data loaded than displayed. You can use the Load Options dialog (see page 80), the X-Axis properties dialog (see page 118), or the Zoom-In command (see page 128) to reduce the amount of data displayed versus the amount loaded.

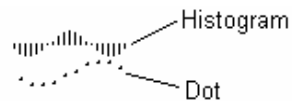
You can also scroll through the data in a chart using the Microsoft IntelliMouse pointing device. Simply rotate the wheel forward to scroll forward and rotate back to scroll backward. See page 87 for more information on the IntelliMouse pointing device.

Learn as You Plot

You can scroll a chart by only a single time period (i.e., day, week, or month) by holding down the SHIFT key when clicking on a chart's horizontal scroll buttons.

This can be useful if you want to do what we call "learn as you plot." By analyzing a chart and then scrolling a chart forward one period at a time, thereby simulating the passing of time, you can quickly improve your technical analysis skills.

It is helpful to use the histogram or dot as your indicator style when using learn as you plot. If you use a standard line style, you will be able to see the direction the indicator is moving before you scroll to the next period.



To automatically scroll through a chart, you can also use the Microsoft IntelliMouse pointing device. See page 87 for more information on the autoscroll feature of the IntelliMouse pointing device.

Rescale Y-Axis

The Rescale Y-Axis button is used to manually force the y-axis to rescale. This tool is primarily used when you are using the chart's scroll bar to scroll through the data. Choose this command from the View menu or from the Chart toolbar.

When scrolling forward or backward through a chart, the y-axis scale remains fixed (unless the Scroll Rescales Y-Axis checkbox in the Application Properties dialog is checked, see page 34). However, the data being scrolled may oscillate up and down. Very often, the data moves outside the fixed range of the y-axis scale. When this occurs, use the Rescale Y-axis command to rescale the chart so that the data comes into complete view.



Rescale Y-axis button

Cloning Charts

The New Window command in the Window menu is used to create a copy (i.e., clone) of the selected chart. For example, if you have a chart named "IBM" selected, and you choose the New Window command, another chart will open containing the same data and plots. The new chart will be unnamed with the title "Chart1-IBM."

This command is useful for quickly designing a layout or template that requires multiple charts of the same security.

To clone a chart

1. Select the desired chart by clicking anywhere on it.
2. Choose **New Window** from the Window menu.

Using the Microsoft IntelliMouse Pointing Device

The Microsoft IntelliMouse™ pointing device is similar to a typical mouse in much of its functionality with one unique difference. It contains a wheel that gives you quick and convenient access to several commonly used features in MetaStock Pro.



| IntelliMouse™ Action | Result |
|-----------------------------|---------------------|
| Rotate wheel | Scrolls chart |
| ALT + rotate wheel | Scan through charts |
| CTRL + rotate wheel | Zoom-in/out |
| SHIFT + rotate wheel | Change periodicity |
| Press wheel button and move | Autoscroll chart |

Scrolling Charts. When you have more data loaded than displayed, you are able to scroll through the data. To scroll forward using the IntelliMouse pointing device, simply rotate the wheel forward (i.e., toward the monitor). To scroll back using the IntelliMouse pointing device, simply rotate the wheel back (i.e., away from the monitor). See page 85 for more information on scrolling through charts.

Scanning Charts. To scan from one chart to the next in your folder, hold the ALT key down and rotate the wheel forward (i.e., toward the monitor) to advance to the next security or rotate back to move to the previous security. See page 83 for more information on scanning charts.

Zoom Scaling Charts. To zoom-in/out on a chart, hold the CTRL key down and rotate the wheel forward (i.e., toward the monitor) to zoom-in or back (i.e., away from the monitor) to zoom-out. See page 128 for more information on zoom scaling.

Change Periodicity of a Chart. To change the periodicity in a chart, hold the SHIFT key down and rotate the wheel forward (i.e., toward the

monitor) to move to a shorter periodicity (e.g., weekly to daily) or back (i.e., away from the monitor) to move to a longer periodicity (e.g., weekly to monthly). See page 120 for more information on periodicity.

Autoscrolling Charts. To scroll through a chart automatically, press the wheel button on the IntelliMouse pointing device. The pointer will change to a double arrow. Move the arrow left or right depending on which direction you wish to autoscroll. The further you move the arrow away from its origin the faster the autoscroll.



Mouse

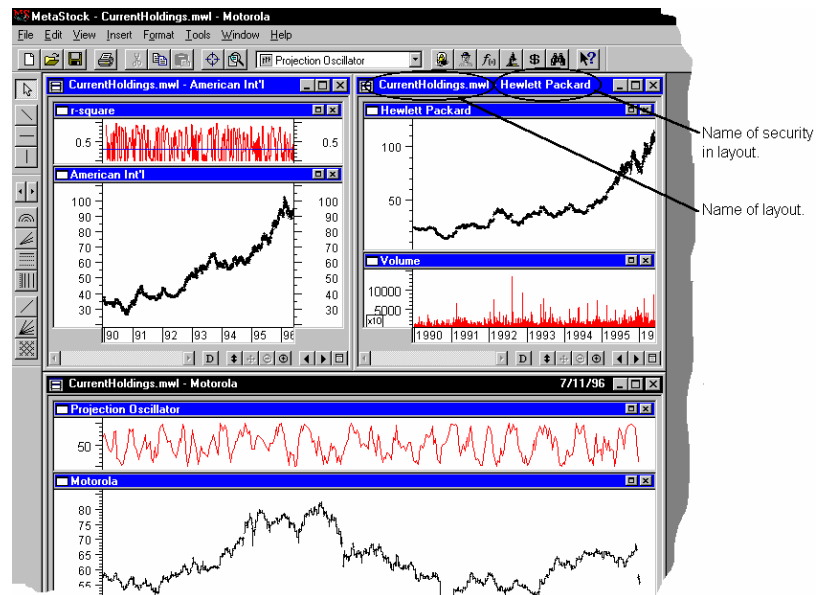
Note that you must have the wheel button assignment set to "Default" in the Windows Mouse Properties dialog in Control Panel. Otherwise, the autoscroll feature will not operate. See page 85 for more information on scrolling through charts.

Combining Multiple Charts with Layouts

What is a Layout?

Layouts provide a convenient way to manage groups of charts. Maybe you'd like to combine your favorite computer stocks into one easily managed group. Or maybe you'd like to see IBM along with the Dow and four of your favorite indicators. The best way to manage such groups of charts is with a layout.

A layout itself is a single file that, when opened, brings up all the charts that were saved in the layout. When displayed on your screen, each member chart can be identified by the layout's name, which appears in each chart's heading. A layout can even include minimized charts.



When a layout is opened, each member chart is opened and positioned on the screen exactly as it appeared when the layout was saved, including the

scaling. Even charts that were not visible (or were minimized) when the layout was saved will be opened.

Creating a New Layout

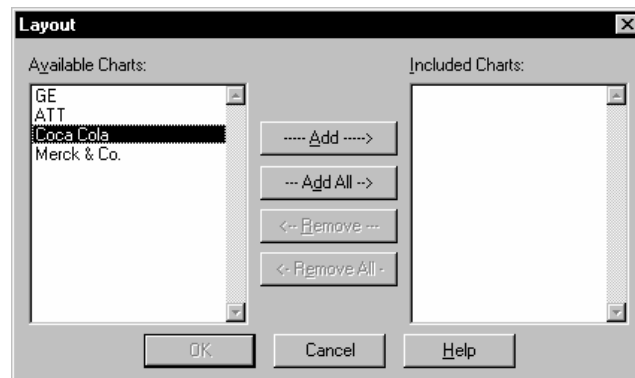


New button

Layouts can be created after you have opened and arranged the desired charts. You'll notice that the Layout command (choose File|New) is disabled until a chart (or charts) is opened.

Once you have opened and arranged the desired charts to your liking, use the New command in the File menu to create the layout. The Layout dialog is used to choose which charts to include in the layout.

Until you save a newly created layout, a default name of "Layoutx" (where "x" is a number) is automatically assigned. This name appears in the title bar of each chart included in the layout (along with the security name). See page 95 for information on saving the layout with a new name.



To select multiple charts, hold the SHFT or CTRL key down as you click the mouse.

Add. This button moves the selected chart(s) from the Available Charts list to the Included Charts list. You can also double-click a chart to add it to the Included list.

Add All. This button moves all charts in the Available Charts list to the Included Charts list.

Remove. This button moves the selected chart(s) from the Included Charts list to the Available Charts list. This removes the selected chart(s) from the layout. You can also double-click a chart to remove it from the Included list.

Remove All. This button moves all charts from the Included list to the Available list. This removes all charts from the layout.

To create a layout

1. Display the charts to include in the layout by using the Open (or New) command in the File menu (see page 78).
2. Modify the charts as desired (e.g., add indicators, add moving averages, resize, etc.).

3. Choose **New** from the File menu. Choose **Layout**.
4. Click the **Add All** button to add all the open charts to the Included list. These are the charts that will appear in the layout.
5. To save the layout, choose **Save As** from the File menu, and give the layout a unique file name.

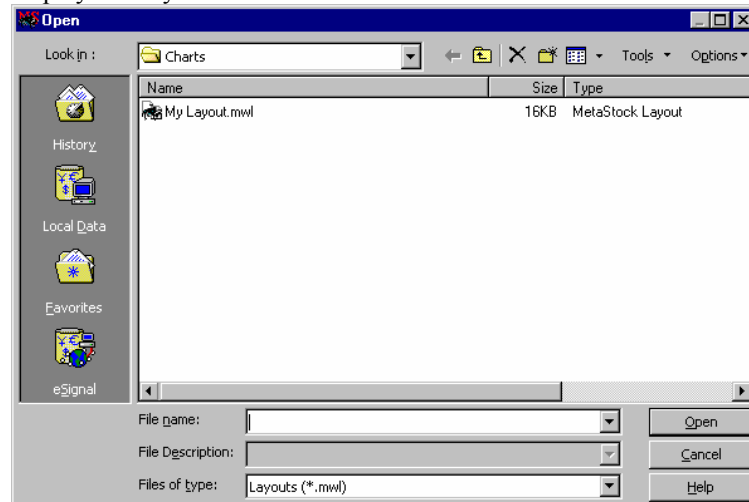
Each chart will now have the name "Layoutx" (where "x" is a number) in the title bar to show that the chart is a member of the layout. For more information on saving layouts, see page 95.

Displaying an Existing Layout



Open button

After a layout has been saved, it can be re-opened using the Open command in the File menu. If Layouts is selected in the Files of Type drop-list in the Open dialog, all layouts in the selected folder are displayed. Layouts have a *.mwl file extension.



To select multiple layouts, hold the SHFT or CTRL keys down as you click.

If you want to open multiple layouts at once, you can select multiple layouts from the list in the Open dialog and click the OK button. Each layout you select will be opened.

If you click on a layout's name in the Open dialog, a description of the layout (if one was entered) is displayed in the Description box.

The Options button (see page 80) in the Open dialog is disabled if the File Type is "Layouts." This button is disabled because layouts always load the amount of data that was saved with the layout.

When a layout is loaded, each chart included in the layout will have the layout name in its title bar.

To display an existing layout

1. Choose **Open** from the File menu.

2. From the Files of Type drop-list, select **Layouts**.
3. From the Look in box, select the folder where the layout you want to display is located.
4. Double-click the name of the layout you want to display.

Scanning Charts in a Layout

You can use the Change Security commands to scan the securities in a folder using a layout as the template. This can be useful if you'd like to see more than one periodicity at a time, more than one Expert Advisor at a time, or like to see several different indicators plotted separately but still plotted with the price plot.

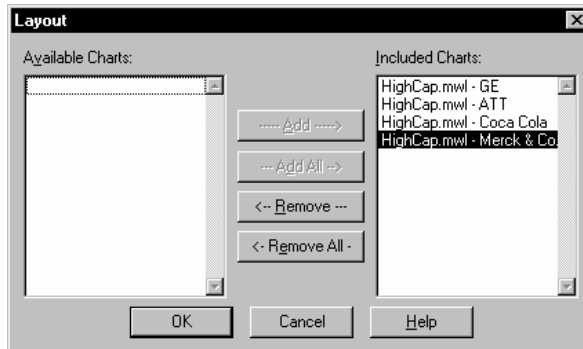
To scan your securities using a multi-chart template or layout, choose the Change All Charts in a Layout option in the Change Security options (see page 33). Once this option is selected, simply click the Next or Previous Security button on the Chart Toolbar to scan your securities in a layout. If this option is not selected, only the active chart will change to the new security.

To scan charts in a layout

1. Open a layout.
2. Click the **Choose a Security** button on the chart toolbar.
3. Click the **Options** tab.
4. Select **Use Chart As Template** and **Change All Charts in a Layout**. Click **OK**.
5. Click the **Next**, **Previous**, or **Choose a Security** buttons from the Chart Toolbar to scan the securities in the folder containing the active chart's security.

Making Changes to a Layout

After a layout has been created, you can easily add and delete charts from the layout using the Edit Layout command in the File menu. A layout must be open before the Edit Layout command is available. If you choose the Edit Layout command when there is more than one layout open, the Select Layout dialog appears (see page 94).



For information on the controls in the Edit Layout dialog, see page 90.

Whenever you make changes to individual charts within a layout, be sure to save the layout (see page 95) if you want the changes permanently reflected in the layout.

The scaling of individual charts within a layout are set at the time the layout is saved. Therefore, if you need to change the scaling of a chart within a layout, you must remove the chart from the layout, change the scaling, then re-add the chart to the layout.

Special windowing commands implemented exclusively for layouts allow you to cascade, stack, and tile only those charts included in a layout. By holding the SHIFT key down as you choose the cascade, tile, or stack options in the Window menu, you can arrange only those charts in the layout. This feature is handy to view charts in a specific layout on your screen when you have multiple charts and layouts open simultaneously. See page 15 for more information on these windowing commands.

If you want to save a chart that is already in a layout as a separate chart file, you should use the New Window command in the Window menu to create a duplicate of the chart (see page 86) and then use the Save As command in the File menu (see page 69).

If you remove a chart from a layout using the Edit Layout dialog, the chart remains on your screen and becomes an unnamed chart (e.g., Chart1, Chart2, etc.).

To edit charts within a layout

1. Choose **Open** from the File menu. Select **Layout** from the Files of Type drop-list.
2. Select the desired layout and click **Open**.
3. Make the desired changes to the chart(s) within the layout.
4. Choose **Save** from the File menu.

To add charts to a layout

1. Choose **Open** from the File menu. Choose **Layout** from the Files of Type drop-list.

2. Select the desired layout and click **Open**.
3. Choose **Open** from the File menu. Select **Smart Charts** from the Files of Type drop-list.
4. Select the charts you want to add to the layout and click **Open**.
5. Choose **Edit Layout** from the File menu.
6. Select the charts you want to add to the layout from the Available Charts list and click the **Add** button to add them to Included Charts list. You can also double-click a chart to add it to the Included Charts list.
7. Click the **OK** button.

To delete charts from a layout

1. Choose **Open** from the File menu. Select **Layout** from the Files of Type drop-list.
2. Select the desired layout and click **Open**.
3. Choose **Edit Layout** from the File menu.
4. Select the charts you want to delete from the Included Charts list and click the **Remove** button. You can also double-click a chart to remove it from the Included Charts list.
5. Click the **OK** button.

The charts will remain on your screen until you have saved, closed, and re-opened the layout.

You can also remove a chart from a layout by double-clicking the chart's system box in the upper left corner of the chart. The Close Layout dialog will appear. Select "Close the chart and remove it from the layout."

To tile/stack/cascade charts in a layout

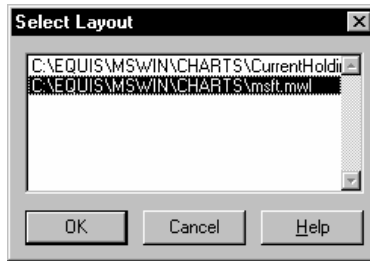
1. Select a chart in the layout you want to arrange by clicking anywhere on the chart.
2. Hold the SHIFT key down to arrange only the charts in the layout, then click the tile, stack, or cascade button on the toolbar.

Select Layout Dialog

If you choose the Edit Layout command when you have more than one layout open, you are prompted to select the layout to edit from the Select Layout dialog.



System box



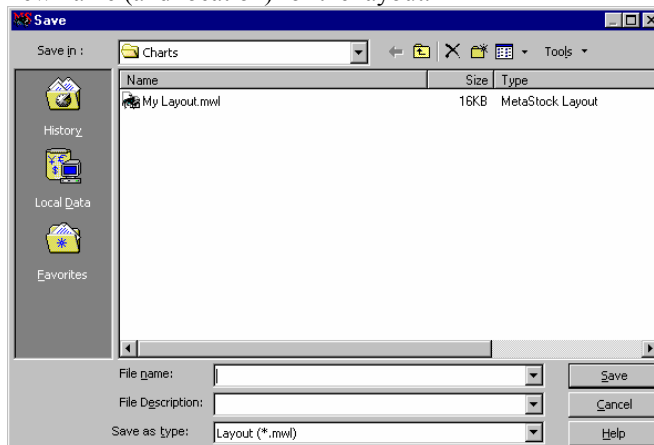
To select the layout to edit, you can either double-click the layout or click the layout and choose the OK button.

Saving a Layout



Save button

When you make changes to a layout, you should save the layout using the Save or Save As commands in the File menu. The Save command saves the layout to its existing name. The Save As command lets you specify a new name (and location) for the layout.



If you use the Save command to save a layout and the layout is unnamed (i.e., a newly created layout), the Save dialog will appear prompting you to provide a name. If you attempt to close a layout to which you have made changes, you will be asked if you want to save the layout first.

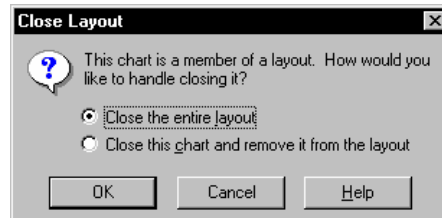
We recommend that you save your layouts often when making extensive changes so that you avoid losing your work due to power outages or other unplanned events.

To save a layout

1. Select the layout you want to save by clicking directly on any chart in the layout.
2. Choose **Save** from the File menu. If the layout is new and unnamed, you will be prompted to supply a name in the Save dialog (see page 69).

Closing a Layout

Since a layout is a set of charts, whenever you attempt to close a chart within a layout, the Close Layout dialog appears prompting you to close just the chart or to close the entire layout.



If you attempt to close a layout to which you have made changes, MetaStock Pro will ask you if you want to save the layout. If you attempt to close a layout that has never been saved before (e.g., a newly created layout), MetaStock Pro displays the Save As dialog in which you can provide the layout a name.

To close a layout

1. Select a chart in the layout you want to close and do one of the following:
 - Choose **Close** from the File menu.
 - Click the Close box in the upper-right corner of any chart in the layout.
 - Choose **Close Layout** from the chart's control menu. The control menu is displayed by clicking on the system box in the upper left corner of the chart.
 - Double-click the chart's system box in the upper-left corner of the chart.
2. The Close Layout dialog appears. Choose **Close the entire layout**.



System box

Recycling Your Work with Templates

What is a Template?

A template contains all the information in a chart or layout excluding the base security. A template is applied to a security (either to an existing open chart or when loading a chart) at which time a new chart or layout is created based on the template's information. Each template is saved as a file with a *.mwt extension.

If the information from a template came from a single chart, then a chart is created when the template is applied. If the information came from a layout, then a multi-chart layout is created.

For example, suppose you like to analyze your securities with an RSI, MACD, and a 50-day moving average. You could save this information in a template and apply it to any security in one quick step.

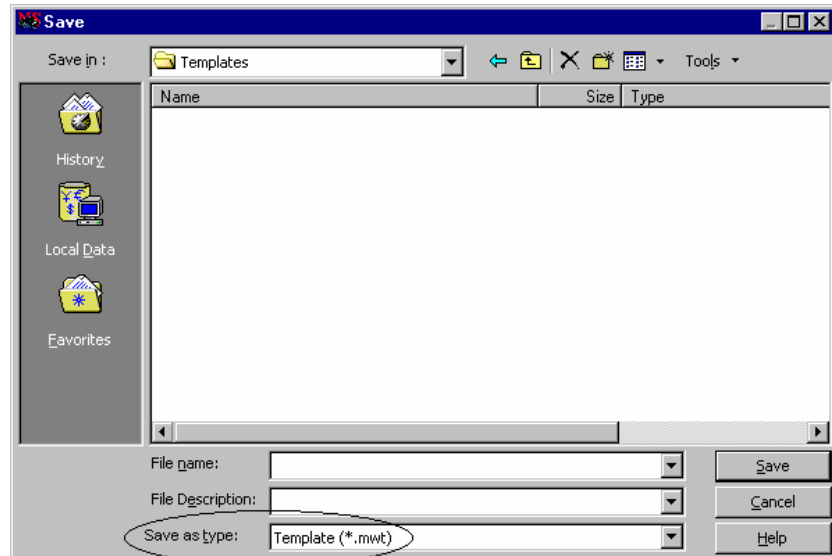
You can also create a default template that is always used when a new chart is created (see page 102).

Once a template is created, it can be used over and over.

Creating a New Template

A template is created from the information in either a chart or a layout. Once the chart or layout appears as you'd like, use the Save As command in the File menu to save the template.

If you create a template when a multi-chart layout is selected, a multi-chart template is created. If you create a template when a single chart is selected, a single-chart template is created.



Choose "Template" here to save the chart or layout as a template.

To create a template

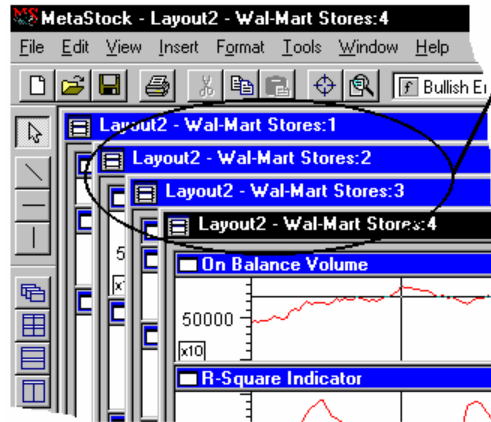
1. Choose **Open** from the File menu.
2. Choose **Smart Chart**, **Chart** or **Layout** from the File of Type drop-list. Choose **Smart Chart** or **Chart** to create a single chart template. Choose **Layout** to create a multi-chart template.
3. Select the desired chart or layout and click the **Open** button.
4. Make the desired changes to the chart (i.e., add indicators or moving averages, change the scaling, etc.).
5. Choose **Save As** from the File menu.
6. Choose **Template** from the Save as type drop-list.
7. Type a name in the File Name box.
8. Click the **Save** button.

Applying an Existing Template

Templates can be applied to a chart on the screen, when you open a Smart Chart from the Open dialog, or when you create a new chart. When a template is applied to a chart, the template uses the chart's base security for all charts in the template.

If the template was created from a single chart, then a chart is created when it is applied. The name in the affected chart's title bar will appear as "Chartx-Security Name" (where "x" is a number).

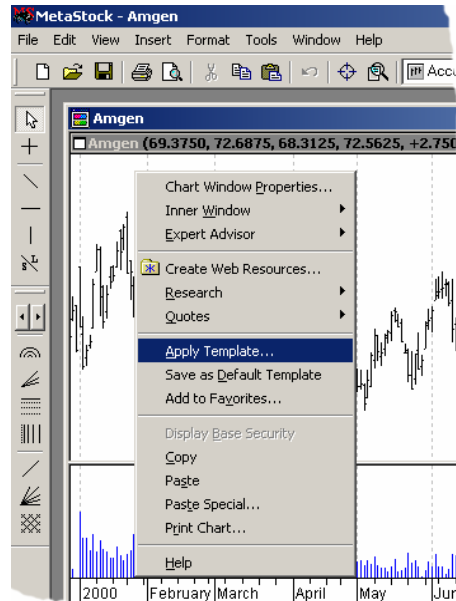
If the template was created from a multi-chart layout, then a layout is created when the template is applied. The name in each of the chart's title bars will appear as "Layoutx-Security Name:x" (where "x" in Layout refers to the layout number and "x" next to the Security Name is the chart's differentiating number).



This four chart layout was created after a four chart template was applied to a chart of Wal-Mart.

As previously mentioned, when a template is applied to a chart, a new chart is created. However, the chart to which the template was applied remains on the screen. If you do not want the original chart to remain on the screen, check the Close all open charts box in the Apply Templates dialog.

A template can be applied to an open chart by right-clicking on the chart and selecting Apply Template from the shortcut menu.



You can also apply a template when creating a new chart or when opening Smart Charts by choosing Open with Template from the Options menu in the New or Open dialogs. Note that this option is disabled in the Open dialog if you don't have Smart Charts selected in the Files of Type drop-list.

If you find templates useful for your analysis, you may also want to try the Change Security commands (see page 83).

To apply a template to an open chart

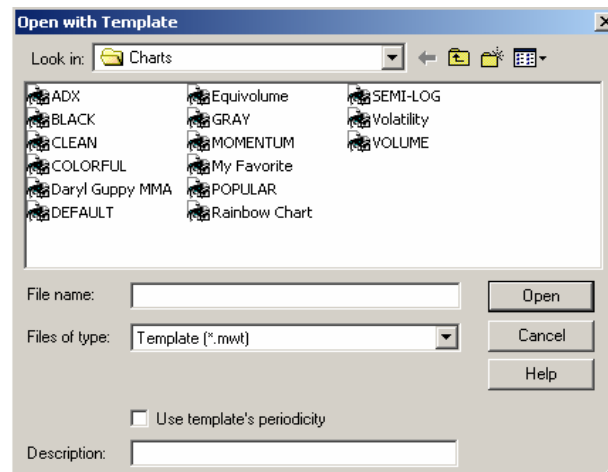
1. Right-click on the chart.
2. Choose **Apply Template** from the shortcut menu.
3. Choose the desired template from the Apply Template dialog.

To apply a template when loading a security

1. Choose **Open** or **New** from the File menu.
2. If you are opening an existing security with the Open dialog, select **Smart Charts** from the Files of Type drop-list.
3. Choose **Open with Template** from the Options menu.
4. Choose the desired template from the Open Template dialog. Click **Open**.
5. Choose the desired security. Click **Open**.

Open Template Dialog

You can apply a template to a security when loading by choosing Open with Template from the Options menu in the New or Open dialog. If you are in the Open dialog, this option is disabled if you don't have Smart Charts selected in the Files of Type drop-list.



Look in. Use the drop-list to select the drive for the folder of files you want to display in the list. Traverse the folders until the folder containing the templates is listed.

File Name. The template you select from the list appears in this box. This is the template that will be opened and applied to the selected security.

For information on creating templates, see page 97. For information on creating layouts, see page 90.

Making Changes to a Template

Changes are made to a template by opening (applying) the desired template, making the changes, and resaving the template to the same file name.

To make changes to an existing template

1. Apply the template you want to change to a security or chart (see page 98).
2. Make the desired changes.
3. Choose **Save As** from the File menu.
4. Choose **Template** from the Save as Type drop-list.
5. Double-click the name of the template file you are currently editing.
6. Choose **Yes** when asked if you want to "replace the existing file."

Saving a Template

Templates are saved using the Save As command in the File menu. If you want the changes you have made to a template to be retained, you must save the template using the Save As command.

You can also save a template as the *default template*. The default template is automatically applied to all newly created charts. See page 102 for more information on the default template.

To save a template

1. Choose **Save As** from the File menu.
2. Choose **Template** from the Save as Type drop-list.
3. If you are editing a template and want to save the changes to the same template name, double-click the name of the template file.
4. If you are saving a new template, type a name in the File Name box and click **Save**.

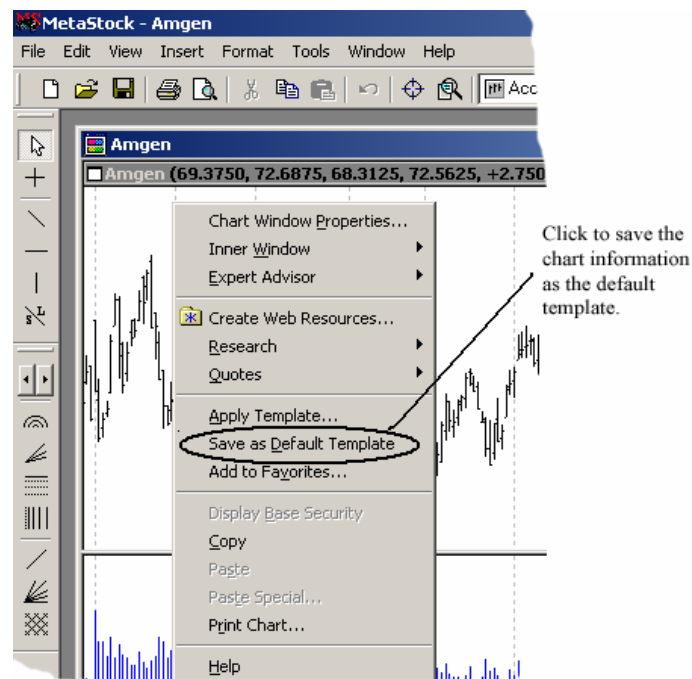
The Default Template

You can control how a newly created chart appears using the *default template*. The default template is a special template that is exactly like a regular template except that MetaStock Pro automatically applies it to *newly* created charts. The default template that is shipped with MetaStock Pro is just a single chart with high-low-close price bars and volume.

The default template is named DEFAULT.MWT and it is stored beneath the MetaStock Pro program folder (i.e., c:\Program Files\equis\metastock\charts) along with your other templates. This means that the default template can be applied at any time just like a regular template.

For example, you could change the default template so that candlesticks and a moving average are always plotted when a new chart is created.

To quickly make the information in the currently selected chart the default template, right-click on the chart and choose Save as Default Template.



To edit the default template

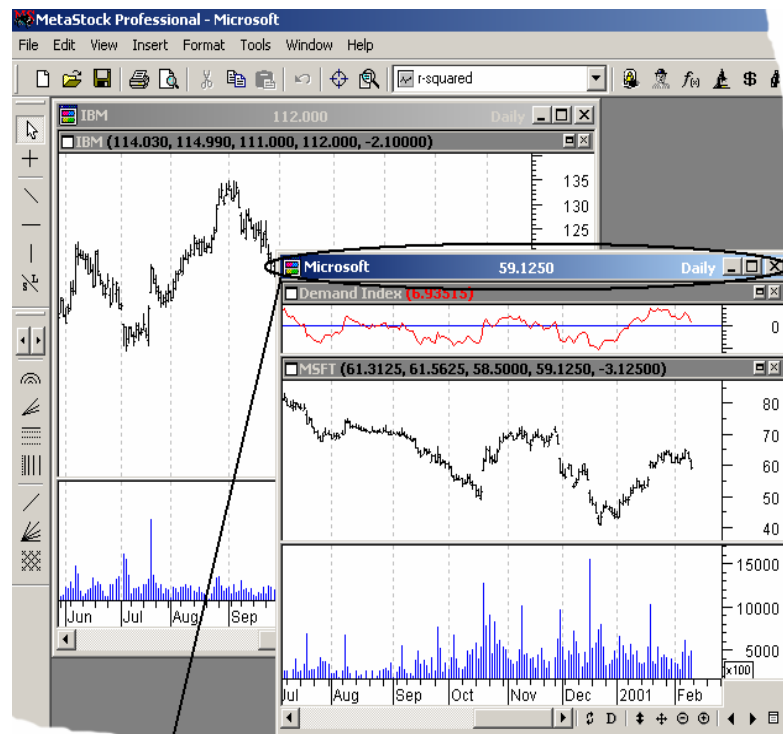
1. Choose **New** from the File menu. Choose **Chart**.
2. Double-click any security or chart listed in the dialog.
3. Make the desired changes to the chart.
4. Right-click on the chart and choose **Save as Default Template** from the shortcut menu.

Customizing a Chart's Appearance

Chart Window

Selecting a Chart

Before any changes can be made to a chart, the chart must be selected. You can select a chart from the Window menu (a checkmark designates the selected chart), or by clicking anywhere on the chart. The selected chart is distinguished by its unique title bar color. The name of the selected chart is also shown in the Application's title bar.



The selected chart has a unique title bar color

The chart of Intel above has a different title bar color than the others. This lets you know that it is the selected chart.

To select a chart

Do one of the following:

- Click the mouse anywhere on the desired chart.
- Choose the desired chart at the bottom of the Window menu.

Modifying a Chart

The properties of a chart are modified with the Chart Window Properties dialog. This dialog is accessed by right clicking on a chart and selecting Chart Window Properties from the shortcut menu. You can also choose Chart Window from the Format menu.

Modifications made to a chart's window are retained automatically by MetaStock Pro's Smart Chart feature if you are working with a Smart Chart. If you are working with a chart or layout, you should save the chart or layout to retain the changes.

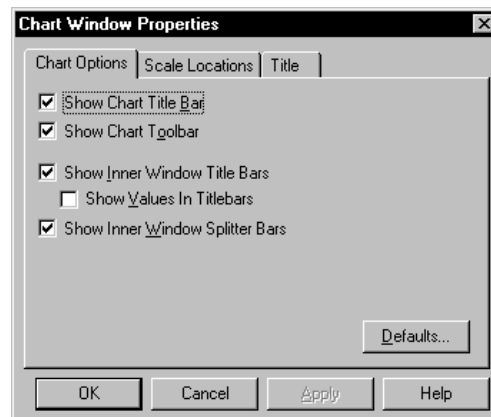
To modify a chart

1. Right-click on the desired chart.
2. Choose **Chart Window Properties** from the shortcut menu.
3. Make the desired changes in the Chart Window Properties dialog.
4. Click the **OK** button.

For information on modifying an inner window's properties, see page 111.

Chart Options

The Chart Options page is located in the Chart Window Properties dialog. Choose Chart Window from the Format menu, or right-click on a chart and choose Chart Window Properties from the shortcut menu.



Show Chart Title Bar. Check this box if you want the title bar of the selected chart displayed. The chart title bar displays the name of the chart (or layout) and the information specified in the "Title" page of this dialog (see page 107).

To control the display of the chart title bar for all charts, use the Application Properties dialog (see page 33).



Show Chart Toolbar. Check this box if you want the toolbar of the selected chart displayed (see page 24 for more information on the chart toolbar).

To control the display of the chart toolbar for all charts, use the Application Property dialog (see page 34).

Show Inner Window Title Bars. Check this box if you want the inner window title bars in the selected chart displayed. The inner window title bars display the names of the plots (e.g., security name, indicator name, etc.) in the inner window. If you choose the accompanying "Show Values in Title Bars" box, the last period's value for the plot in each inner window will display.

If this checkbox is grayed, it means that the display of at least one of the inner window title bars is being controlled by the inner window's properties page (see page 112).

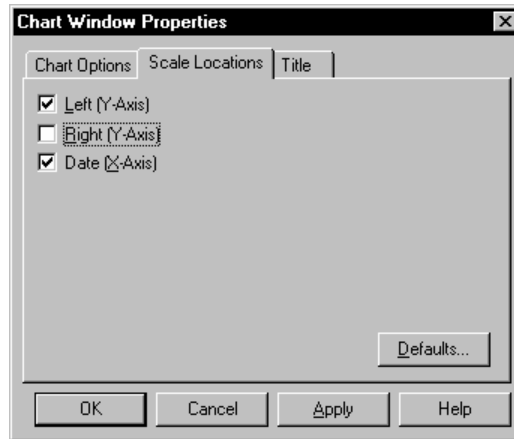


Show Inner Window Splitter Bars. Check this box if you want splitter bars between the inner windows. The splitter bar allows you to resize inner windows with the mouse (see page 113).



Scale Locations

The Scale Locations page is located in the Chart Window Properties dialog. Choose Chart Window from the Format menu (or right-click on a chart and choose Chart Window Properties from the shortcut menu).



Left (Y-Axis). Check this box if you want a y-axis scale displayed on the left side of all inner windows in the chart. Use the Y-Axis Properties dialog to control properties of the scale itself (see page 123).

Right (Y-Axis). Check this box if you want a y-axis scale displayed on the right side of all inner windows in the chart. Some people like to have just the right y-axis displayed since it is closest to the most recent data. Use the Y-Axis Properties dialog to control properties of the scale itself (see page 123).

Date (X-Axis). Check this box if you want an x-axis scale displayed at the bottom of the chart window. The same x-axis scale is used for all inner windows displayed in a chart. Use the X-Axis Properties dialog to control properties of the scale itself (see page 118).

Title

The Title page is located in the Chart Window Properties dialog. Choose Chart Window from the Format menu, or right-click on a chart and choose Chart Window Properties from the shortcut menu.

While you can control what is displayed in the center and right side of the title bar, the name of the chart is *always* displayed on the left side.

If you display the "Last Price" in an intraday chart, the change in price from the previous day's close is also included in parenthesis.



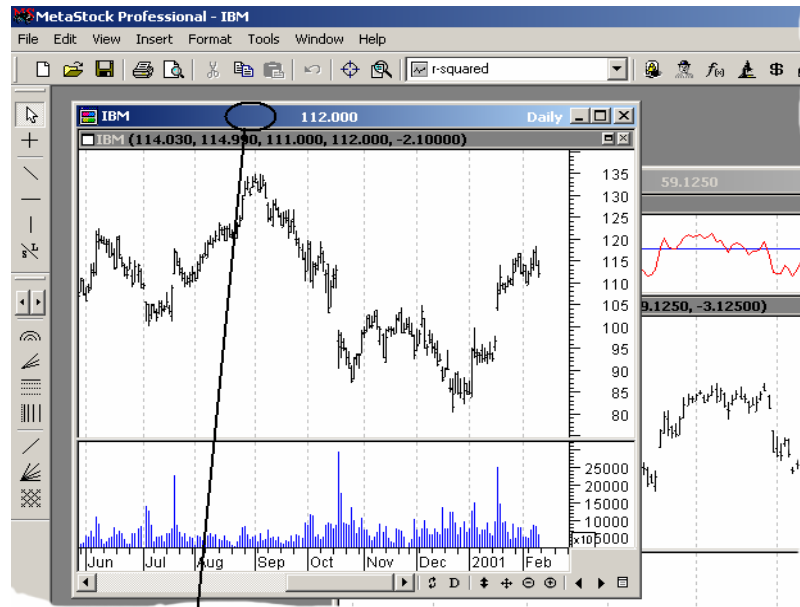
Center. Choose the information to display in the center of the title bar.

Right. Choose the information to display on the right side of the title bar.

Description. These boxes are used to enter or edit a description about the selected chart and/or layout. This description appears in the Open dialog (see page 68). Charts that are members of a layout share the same layout description.

Repositioning Charts

Since a chart is contained within a window, repositioning a chart is just a matter of using basic click and drag techniques common to all Windows programs.



Click and hold the left mouse button on the chart's title bar.

If the title bar of a chart is not displayed, you can still move a chart by typing ALT+ "-" to access the chart's system box, choosing Move, and then using the arrow keys.

To reposition a chart

1. Position the mouse pointer over the chart's title bar.
2. Click and drag the mouse until the chart is in the desired location.

You can quickly arrange the charts on your screen by using the windowing commands (tile, cascade, etc.) in the Window menu (see page 15).

Resizing Charts

Since a chart is contained within a window, resizing a chart is just a matter of using basic click and drag techniques common to all Windows programs.

For information on resizing inner windows within a chart, see page 113.

To resize a chart

1. Position the mouse pointer over the chart's border until a double-sided resizing arrow appears.
2. Click and drag the mouse until the chart is the desired size.

You can quickly enlarge a chart to full-screen with the maximize button, or you can minimize a chart with the minimize button. The minimize/maximize buttons are found in the upper-right corner of a chart. You can restore a minimized chart to its original size by double-clicking directly on the minimized chart's title bar.

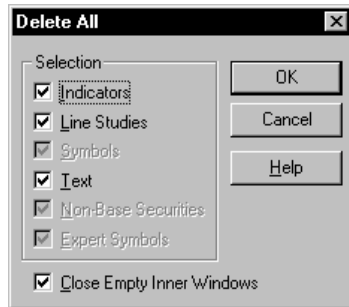
The application itself (i.e., the MetaStock Pro program) is also contained within a window. It can be resized using the same methods described above.



***Minimize/Maximize
buttons***

Clearing a Chart

The Delete All command in the Edit menu provides a quick and convenient way to remove indicators, line studies, symbols, text, and non-base securities from your chart. Simply click on the items you want removed from the selected chart and click the OK button. The chart will redisplay with the selected items removed.



Click the "Close Empty Inner Windows" box if you want MetaStock Pro to close any leftover inner windows.

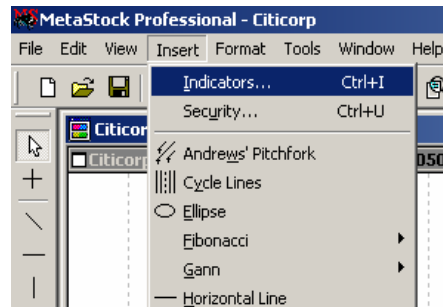
Inner Windows

Opening Inner Windows

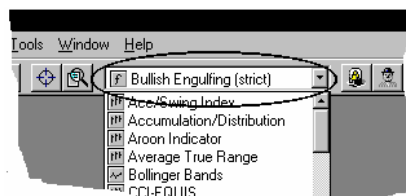
An inner window is a window within a chart window that can be controlled within the confines of the chart window. A chart can contain up to 10 inner windows. The most common reason for opening an inner window is to plot an indicator. However, price plots are also contained within an inner window.

There are four ways to open an inner window.

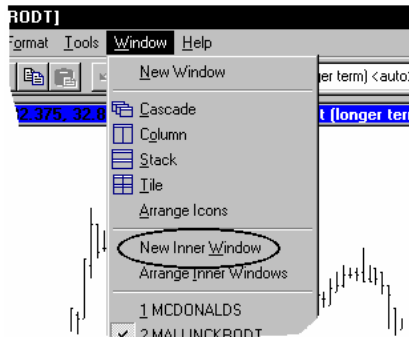
1. You can use the Indicators command (see page 164) from the Insert menu to plot an indicator in a new inner window.



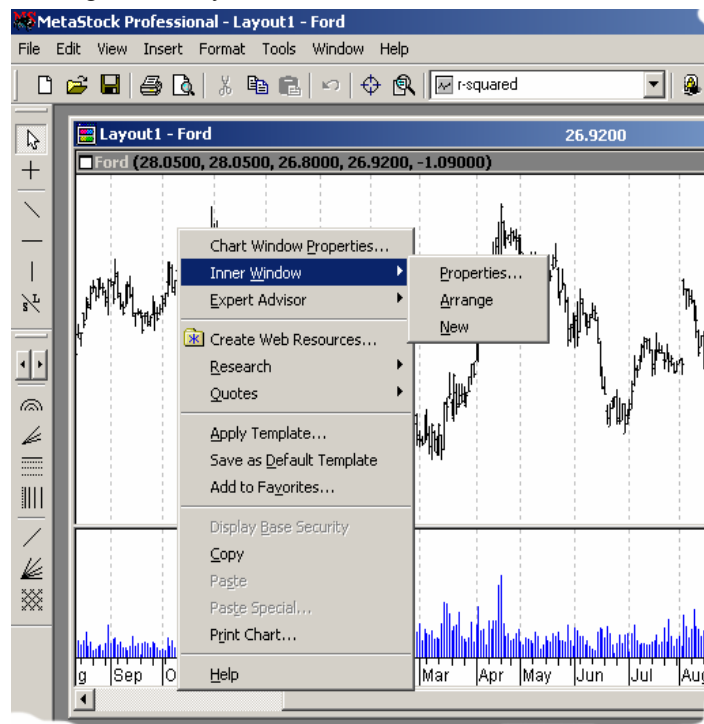
2. You can drag and drop an indicator from the Indicator QuickList (see page 165).



3. You can choose New Inner Window from the Window menu.



4. You can choose Inner Window, New from the chart shortcut menu. Right-click anywhere on a chart to access the chart shortcut menu.



If you don't want to plot an indicator in an inner window (i.e., maybe you'd like to copy another security's prices into it), you should use methods three or four to create an empty inner window.

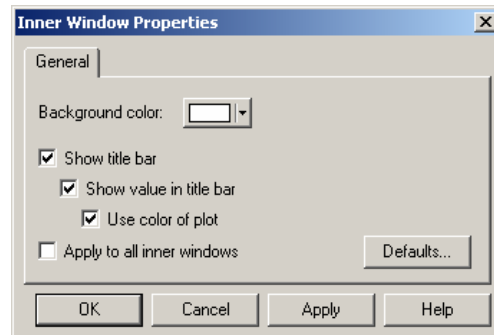
Modifying Inner Windows

The properties of an inner window are modified with the Inner Window Properties dialog. This dialog is accessed - by right-clicking on an inner

window and selecting Inner Window, then Properties from the shortcut menu.

You can also choose Inner Window from the Format menu. This command acts on the inner window most recently modified or clicked in.

If you are working with a Smart Chart, modifications made to an inner window are retained automatically. If you are working with a chart or layout, you should save the chart or layout to retain the changes.



Background Color. Choose the desired background color for the inner window. You should choose a color that is different from any other items plotted in the window (e.g., a blue indicator on a blue background will disappear).

Show Title Bar. Check this box if you want to display the inner window's title bar. The title bar displays the contents of the inner window (e.g., indicator, security name, etc.) and provides a system box and maximize/restore buttons.

Show Value In Title Bar. Check this box if you want the inner window to display the value of the last period's plot(s).

Use Color of Plot. Check this box if you want the plot values in the inner window title bar to match the color of the plot(s).

Apply to All Inner Windows. Check this box if you want the settings in this dialog to apply to all inner windows within the chart. Leave it unchecked if you only want the settings to apply to the selected inner window.

If an indicator is calculated on a security other than the chart's base security, the name of the security is shown in parenthesis after the indicator's name in the inner window's title bar.

To modify an inner window

1. Right-click within the desired inner window.
2. Choose **Inner Window** from the shortcut menu. Then choose **Properties**.
3. Make the desired changes to the Inner Window Properties dialog.
4. Click the **OK** button.

For information on modifying a chart's properties, see page 104.

Resizing Inner Windows

The height of an inner window can be adjusted several ways including using the splitter bar, maximize/restore buttons, and the Arrange Inner Window command.

Adjusting the height of an inner window is useful if you want to provide more space for a certain price plot or indicator. Maybe you'd like to temporarily see the indicator enlarged to fit the entire chart window. Or maybe you always like to have the base security plot occupy three-fourths of the chart.

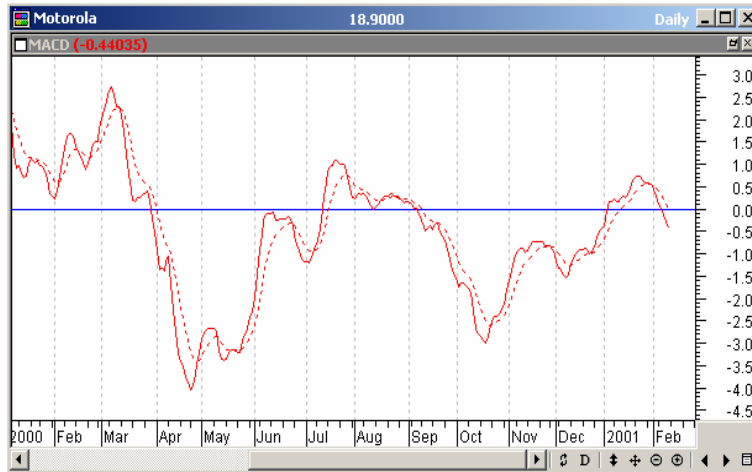
The Arrange Inner Windows command is available from the Chart shortcut menu by right-clicking on an inner window. You can also choose Arrange Inner Windows from the Window menu. The Arrange Inner Windows command resizes the inner windows within a chart so they are equally sized.

Click on an inner window's maximize button to enlarge the inner window to occupy the entire chart. To restore the chart to its pre-maximized state, click the restore button.

Before maximizing the MACD's inner window...



After maximizing the MACD's inner window...



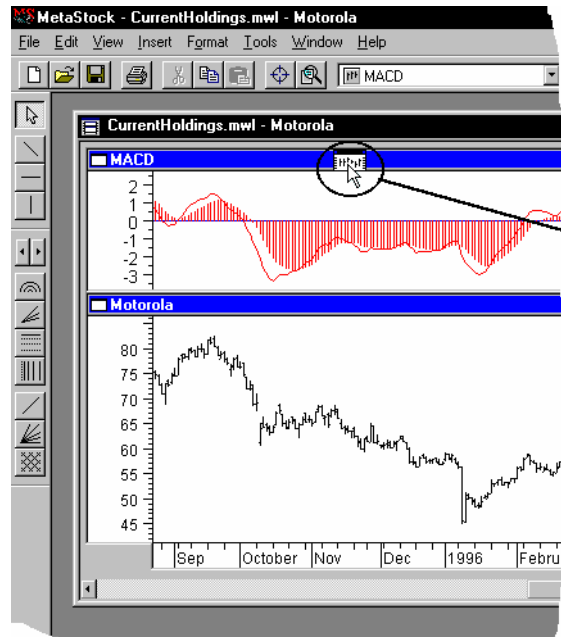
For information on resizing charts, see page 109.

Resizing With The Splitter Bar

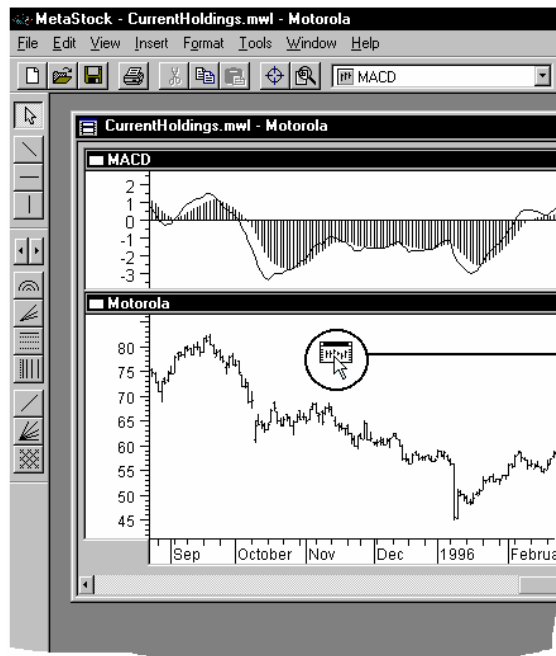
An inner window can be resized with the splitter bar by positioning the mouse pointer over the border above an inner window, clicking the mouse, and dragging the border up/down until the inner window reaches the desired size.

Moving Inner Windows

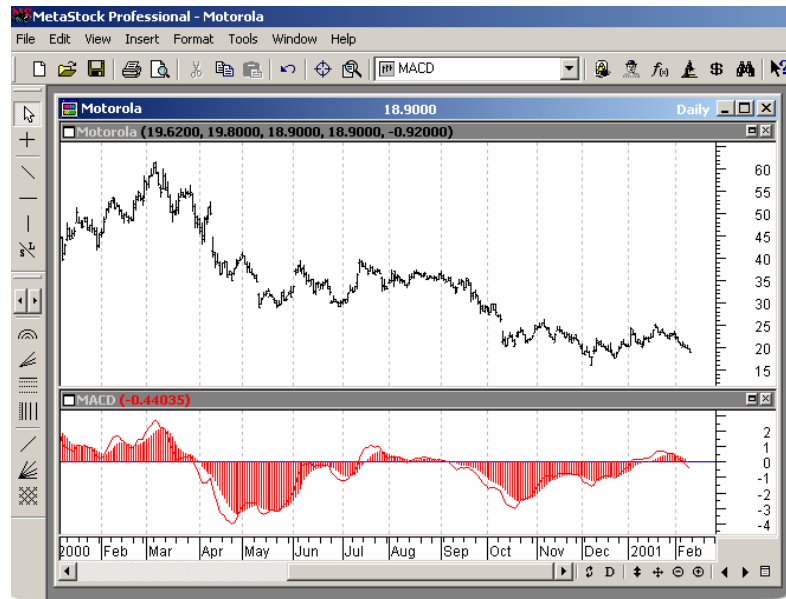
One of the great advantages of having charts divided into inner windows is that the inner windows can be easily resized and even moved. For example, if you have a chart with the indicator displayed above the price, you can simply drag and drop the inner window so that it appears where you'd like. You can even drag an inner window from one chart to another.



Position the mouse pointer on the inner window's title bar and click and hold the left mouse button.

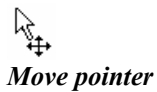


Drag and drop anywhere within the price plot's inner window.



For information on moving charts, see page 108.

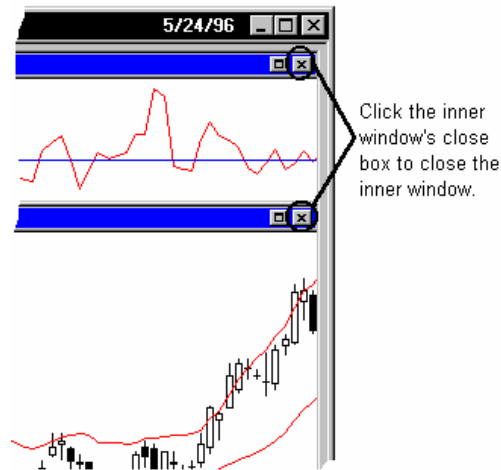
To move an inner window



1. Position the mouse on the inner window's title bar. Notice that the mouse displays a special move pointer. This tells you that the inner window can be moved.
2. Click ***and hold*** the left mouse button on the inner window's title bar and drag the inner window until it is located where you'd like. Note that you can even drag an inner window to another chart.
3. Release the mouse button to drop the inner window.

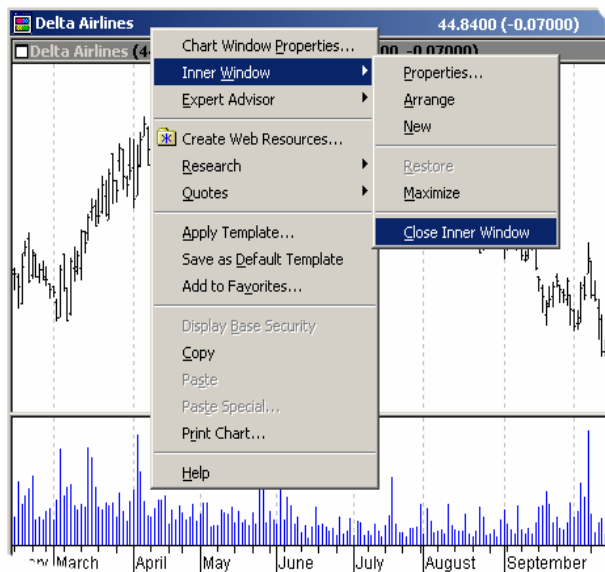
Closing Inner Windows

Inner windows are closed much like a normal window. You can click the inner window's close box in the top-right corner or you can double-click the system box in the top-left corner.



Note that you cannot close the last inner window. A chart must contain at least one inner window.

If an inner window does not have a title bar displayed (which means there is no close box or system box to click), you can still close the inner window. Right-click on the inner window and choose Inner Window then Close Inner Window from the chart shortcut menu.



To close an inner window

Do one of the following:

- Double-click the inner window's system box.

- Click the inner window's system box and choose Close Inner Window.
- Click the Close button on the right side of the inner window title bar.
- If the inner window's title bar is not displayed, right-click on the inner window and choose Inner Window, then Close Inner Window.

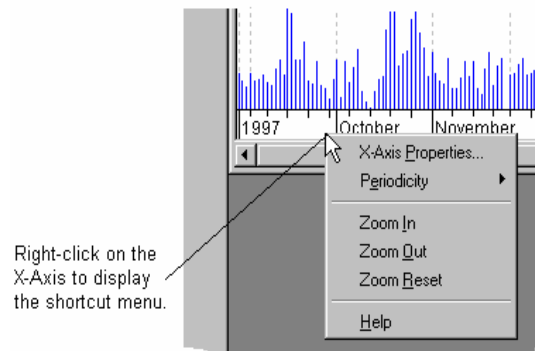
Scales

MetaStock Pro handles the scaling of charts automatically based on the data plotted. However, you can override the automatic scaling by changing the properties of the scales or by using the Zoom Scaling tools (see page 128).

X-Axis Properties

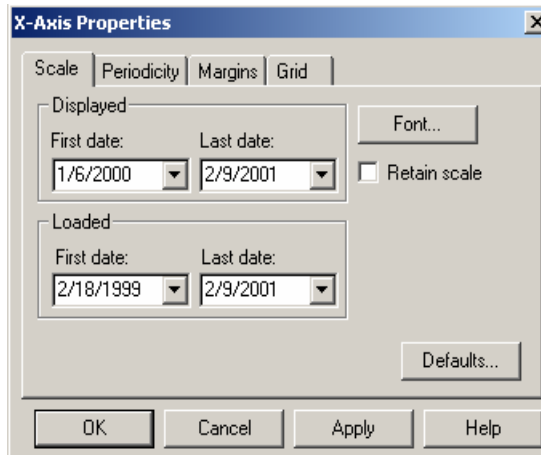
The x-axis (or date scale) is located along the bottom of a chart. One x-axis is shared by all inner windows in the chart.

You can change the properties of the x-axis by right-clicking directly on the chart's x-axis or by choosing X-Axis from the Format menu.



Scale

The Scale page is located in the X-Axis Properties dialog. Choose X-Axis from the Format menu (or right-click on a chart's x-axis and choose X-Axis Properties from the shortcut menu).



Displayed. The First Date and Last Date boxes control the range of data displayed on the chart. This range cannot be outside of the range of data loaded. Click the "D" button to enter dates. Click the "T" button to enter times.

Loaded. The First Date and Last Date boxes control the range of data loaded from the data file. Click the "D" button to enter dates. Click the "T" button to enter times.

Retain Scale. Check this box if you want the x- and y-axis to be scaled as currently specified when the chart is opened using the Open command in the File menu. Checking this box instructs MetaStock Pro to override the settings in the Load Options dialog (see page 80). Note that if the active chart is part of a layout, the Retain Scale option is disabled since layouts remember the exact scaling for each individual chart in the layout at the time the layout was saved.

Font. Choose this button to display the standard Windows Font dialog. Use this dialog to specify the font for the x-axis labels. See page 171 for more information on fonts.

To load more data into the chart using the Scale page

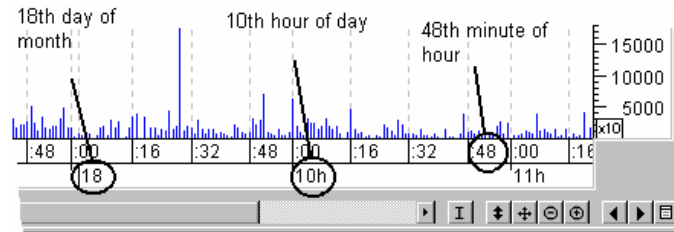
1. Right-click on the chart's x-axis.
2. Choose **X-Axis Properties**.
3. From the Scale page, type an earlier date into the Loaded First Date box. Note this assumes that you have earlier data in the file to load.
4. Click the **OK** button.

To display a specific range of data using the Scale page

1. Right-click on the chart's x-axis.
2. Choose **X-Axis Properties**.
3. From the Scale page, type the range of dates to display in the Displayed First Date and Last Date boxes.

4. Click the **OK** button.

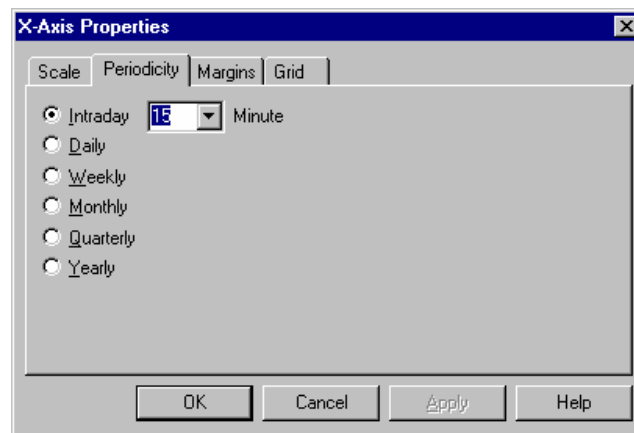
The x-axis of a real-time chart displays three time frames: days of month, hours, and minutes. For example, "18" means the 18th day of the month; "10h" means the 10th hour of the day; and ":48" means the 48th minute of the hour.



A 5-minute bar labeled on the x-axis of a chart at 11:15 includes the first tick of 11:10:00 through the last tick of 11:14:xxx. Similarly, a 1-minute bar includes all ticks from 11:14:00 to 11:14:xxx.

Periodicity

The Periodicity page is located in the X-Axis Properties dialog. Choose X-Axis from the Format menu, or right-click on a chart's x-axis and choose X-Axis Properties from the shortcut menu.



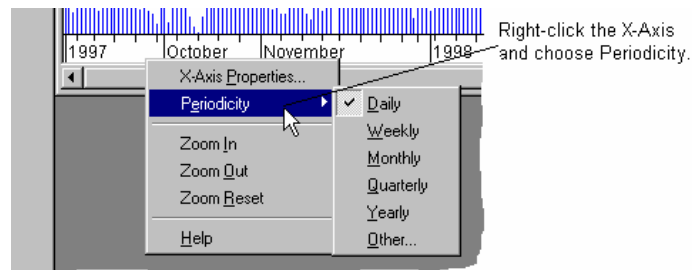
Use the periodicity page to specify the periodicity of the data. For example, if your chart contains daily data, you could change the data into weekly bars. Or if your chart contains tick data, you could change it to hourly bars. Even though the periodicity has been changed, the same date range is maintained. So if a daily chart ranging from 06/01/96 to 12/31/96 is changed to weekly, the chart will display weekly bars for the same date range, 06/01/96 to 12/31/96.

Volume and open interest are summed over the new period. For example, monthly periodicity displays the sum of the entire month's volume.

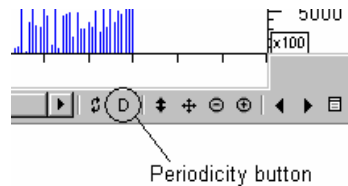
If the last day loaded is not the end of the selected periodicity, MetaStock Pro displays a bar of the shortened period. For example, if today is Wednesday and daily data is loaded, the last price bar of a weekly chart represents the shortened week of Monday through Wednesday.

The Other periodicity option allows you to control the number of periods over which to compress the data. This allows you to view the data using non-standard periods. For example, a periodicity of eight periods with daily data loaded would display a price bar every eight trading days.

You can also change the periodicity by right-clicking on the x-axis and choosing Periodicity from the shortcut menu.



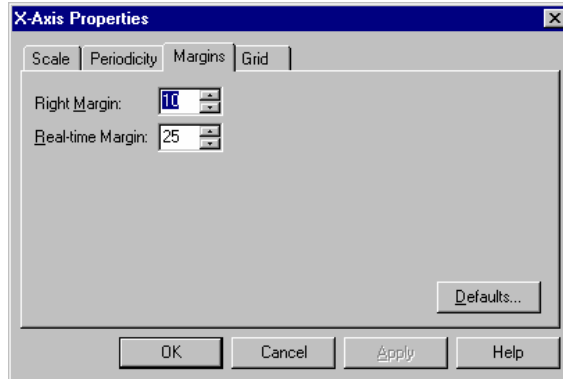
You can also click the Periodicity button on the chart toolbar to change the periodicity.



You can also change the periodicity with your Microsoft IntelliMouse pointing device. Hold the SHIFT key down and rotate the wheel forward to lengthen the periodicity or back to shorten the periodicity. See page 87 for more information on the Microsoft IntelliMouse pointing device.

Margins

The Margins page is located in the X-Axis Properties dialog. Choose X-Axis from the Format menu, or right-click on a chart's x-axis and choose X-Axis Properties from the shortcut menu.



Right Margin. This box specifies how much blank space (by number of time periods) there is between the last data point and the right border of the chart. This is useful to project trendlines or other line studies into the future.

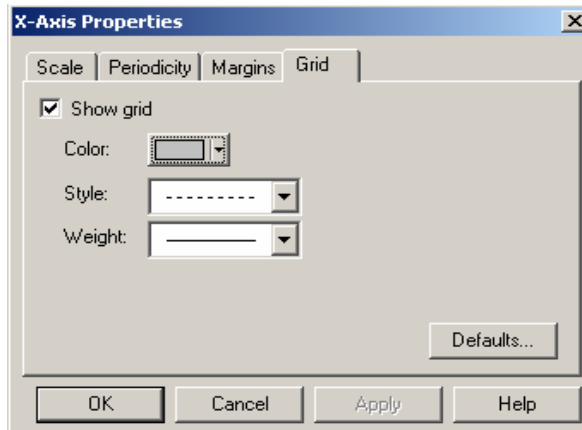
Real-time Margin. This box specifies how much blank space (by number of time periods) to display between the last data point and the right margin. This is the area of the chart where real-time bars are drawn. When the bars reach the right margin, the chart is redrawn. The larger the number, the less redrawing required. A small value like five will cause the chart to redraw every fifth bar.

The following chart illustrates the location of the real-time margin and the right margin.



Grid (X-axis)

The Grid page is located in the X-Axis Properties dialog. Choose X-Axis from the Format menu (or right-click on a chart's x-axis and choose X-Axis Properties from the shortcut menu).



Show Grid. Check this box if you want vertical grid lines to be displayed in every inner window at each of the x-axis labels.

Color. Choose the color of the grid lines from the drop-list.

Style. Choose the line style (dotted, dashed, etc.) of the grid lines from the drop-list.

Weight. Choose the weight (thick, thin, etc.) of the grid lines from the drop-list. If you select a heavier weight, the Style will always appear as a solid line.

Y-Axis Properties

The y-axis of a chart is located along the side of an inner window.

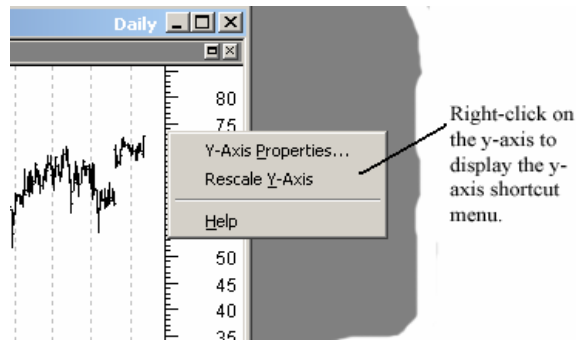
If you want to quickly reset the y-axis to accommodate new data that you have scrolled to with the chart's scroll bar, use the Rescale Y-Axis button on the chart toolbar (see page 86). The Scroll Rescales Y-axis option in the Application options dialog also lets you control the effect of scrolling on the y-axis (see page 33).

You can also change the scaling of the y-axis by using drag and drop techniques directly on the y-axis scale of the chart. See page 126 for more information.

You can change the properties of the y-axis by right-clicking directly on the chart's y-axis or by choosing Left Y-Axis or Right Y-Axis from the Format menu.

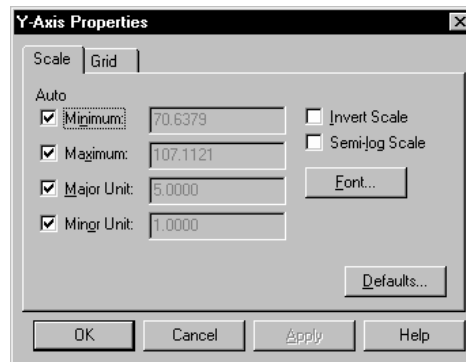


Rescale Y-Axis button



Scale

The Scale page is located in the Y-Axis Properties dialog. Choose Left Y-Axis or Right Y-Axis from the Format menu (or right-click on an inner window's y-axis and choose Y-Axis Properties from the shortcut menu).



Check the box under the Auto heading if you want the corresponding scaling control to be automatically determined by MetaStock Pro. If the Auto box is unchecked, you can manually enter a value.

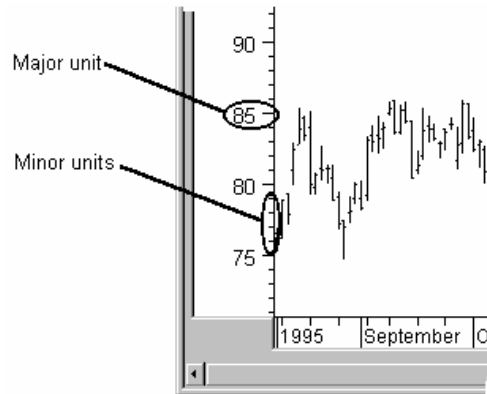
Minimum. Type the minimum value to display on the y-axis.

Maximum. Type the maximum value to display on the y-axis.

Major Unit. Type the major unit to increment the y-axis labels. For example, if you want y-axis labels to display every five units, then type "5". Grid lines (if enabled) are displayed at the major units.

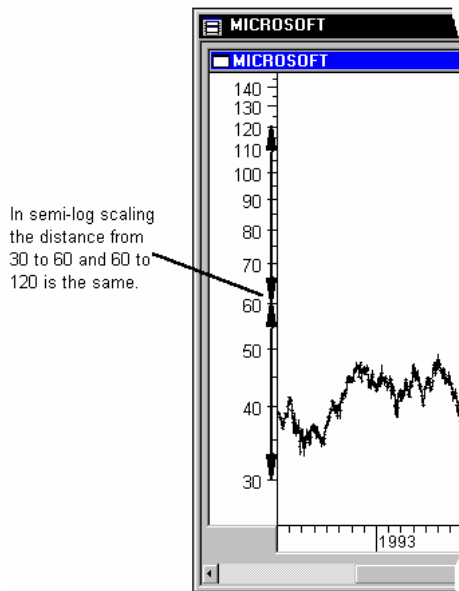
The y-axis is displayed in decimal or fractions (e.g., eighths, 32nds, etc.) depending on the "Units" setting in the security's data file. Use The DownLoader to change the Units setting (see page 58 in this manual).

Minor Unit. Type the minor unit to increment the y-axis labels. Hash marks are displayed at each minor unit along the y-axis scale. For example, if you want scaling hash marks displayed every 2.5 units, then enter "2.5". If you want y-axis labels to increment by five units, then type "5". Note that labels are not displayed on the minor units hash marks.



Invert Scale. Check this box if you want the y-axis scale inverted. Inverting the scale of indicators that are negatively correlated with the price (e.g., Williams' %R or interest rates) is a popular use of this feature.

Semi-log Scale. Check this box if you want the y-axis scaled in semi-log. In a semi-log scaled chart, the distance between each point is exponential. For example, the distance between 30 and 60 (a 30 point, 100% increase) is the same as the distance between 60 and 120 (a 60 point, but still 100% increase). Semi-log scaling is used to compare relative price changes rather than physical point changes.



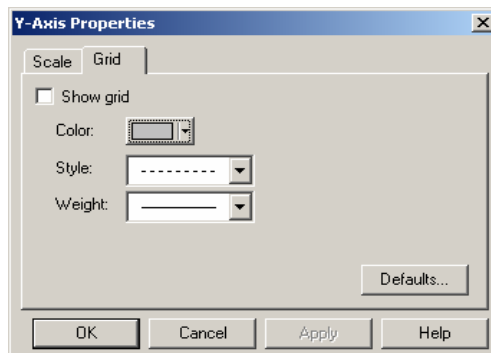
Font. Choose this button to display the standard Windows Font dialog. Use this dialog to specify the font for the y-axis labels. If you choose a font that is too large to display without overlapping, MetaStock Pro will not place a label at every major unit. See page 171 for more information on fonts.

To change the y-axis scale

1. Right-click on the chart's y-axis scale.
2. Choose **Y-Axis Properties**.
3. From the Scale page, uncheck the **Auto** box for the Minimum and Maximum controls and type the desired values for the range of the y-axis.
4. If you want to manually specify the step size of the y-axis, uncheck the **Auto** box for the Major and Minor units and enter the desired values. If you want semi-log or inverted scaling, check the boxes.
5. Click the **OK** button.

Grid (Y-axis)

The Grid page is located in the Y-Axis Properties dialog. Choose Y-Axis from the Format menu, or right-click on an inner window's y-axis and choose Y-Axis Properties from the shortcut menu.



Show Grid. Check this box if you want grid lines to be displayed in the selected inner window at each of the y-axis major unit labels.

Color. Choose the color of the grid lines from the drop-list.

Style. Choose the line style (dotted, dashed, etc.) of the grid lines from the drop-list.

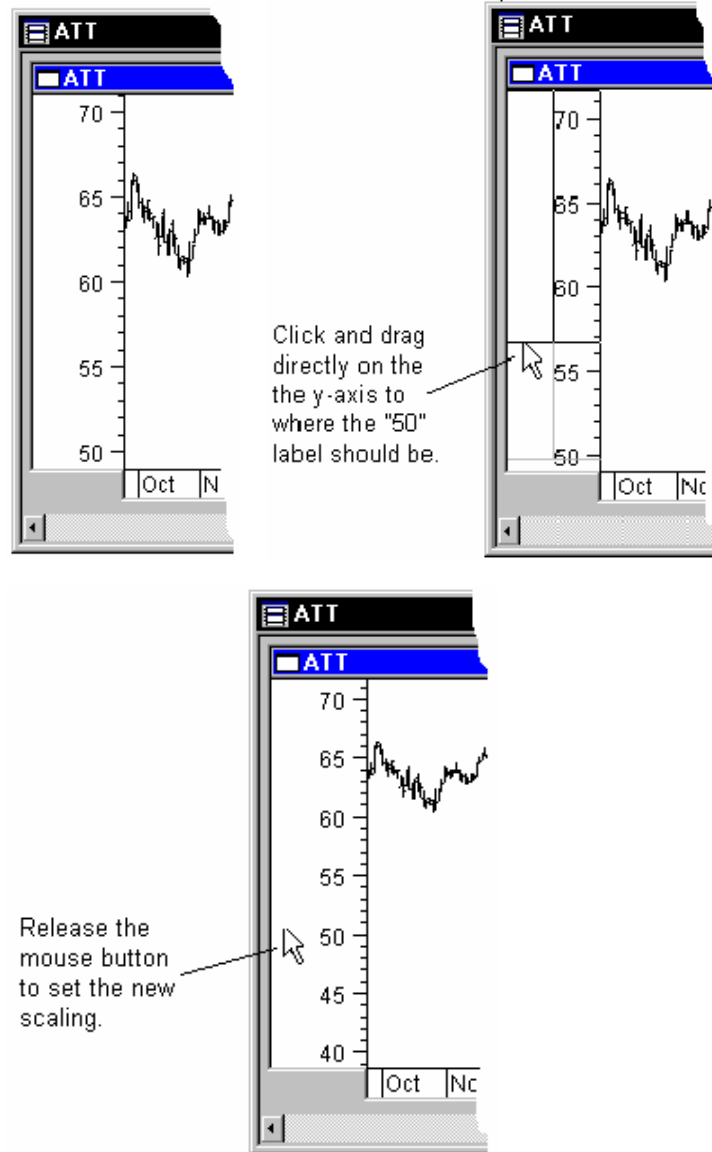
Weight. Choose the weight (thick, thin, etc.) of the grid lines from the drop-list. If you select a heavier weight, the Style will always appear as a solid line.

Using Drag and Drop to Change the Scaling

Both the x- and y-axis can be adjusted using your mouse and basic drag and drop techniques. By clicking directly on a chart's x- or y-axis and dragging either up/down (for y-axis) or left/right (for x-axis), the range of the scale will be adjusted.

For example, if a chart's y-axis scale ranges between 50 and 70, you can adjust the scale to go from 40 to 70 by clicking directly on the y-axis at

the "50" label, and dragging the mouse upwards. The same type of adjustment can be done with the x-axis using the same technique.



Scale Locations

Some people like to display the y-axis scale on the right side of the chart since it is closer to the more recent data.

To display/remove the x- or y-axis

1. Right-click on the chart's inner window.

2. Choose **Chart Window Properties** from the shortcut menu.
3. Click on the **Scale Locations** tab.
4. Check the Left, Right, or Date boxes to display the corresponding scales. Uncheck the boxes to remove the scales.
5. Click the **OK** button.

Zoom Scaling

The Zoom-In, Zoom-Out, and Zoom Reset commands are selected from the View menu or from the Chart toolbar. The Zoom Box command is selected from the View menu or from the standard toolbar.



Zoom In button

The Zoom In command progressively zooms in on the most recent data displayed in the chart. Each time the command is used, the more detailed the view of the most recent data.



Zoom Out button

The Zoom Out command changes the scaling to the previously zoomed state. For example, if you have used the Zoom In command to zoom in on the chart four times, the Zoom Out command will take you back to the third zoomed view. Using it again will take you back to the second zoomed view, etc.



Zoom Box button

The Zoom Box command allows you to define a section of the chart to enlarge.



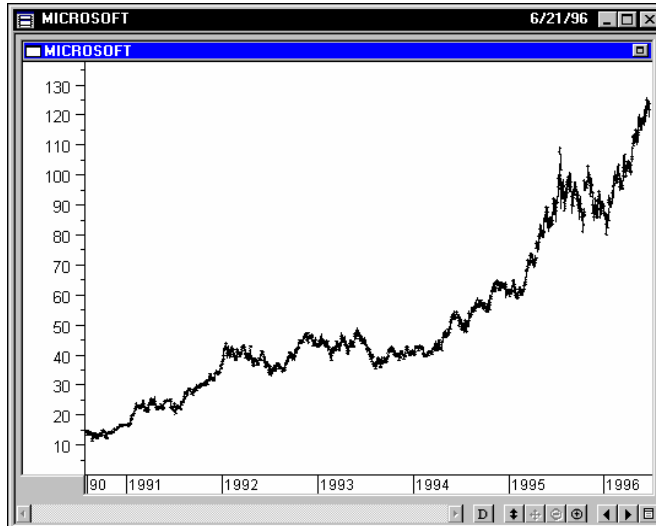
Zoom Reset button

The Zoom Reset command undoes the scaling effects of any zooming by resetting the chart's scales so that all the loaded data is displayed. The zooming can be the result of using the Zoom In and Zoom Box commands or the automatic zooming that occurs as a result of the settings in the Load Options dialog (see page 80).

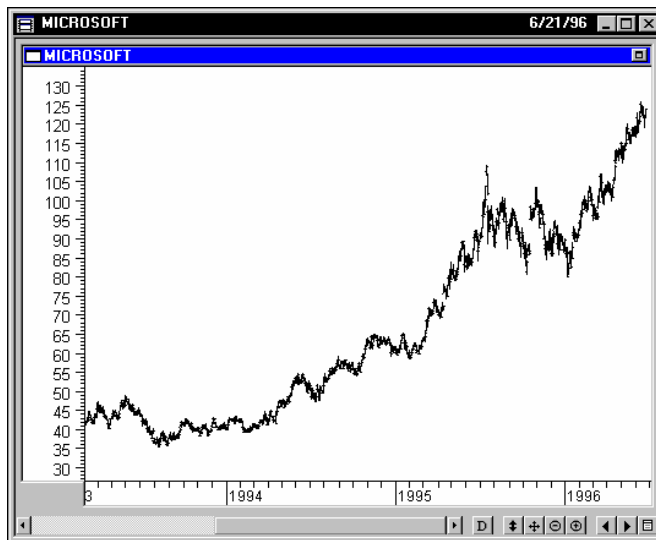
You can also use the Microsoft IntelliMouse pointing device to zoom-in/out on your chart. Hold the CTRL key down and rotate the wheel forward to zoom-in or rotate back to zoom-out. See page 87 for more information on the Microsoft IntelliMouse pointing device.

The following illustrations show a chart before and after using the Zoom In command:

Before using the Zoom In command...

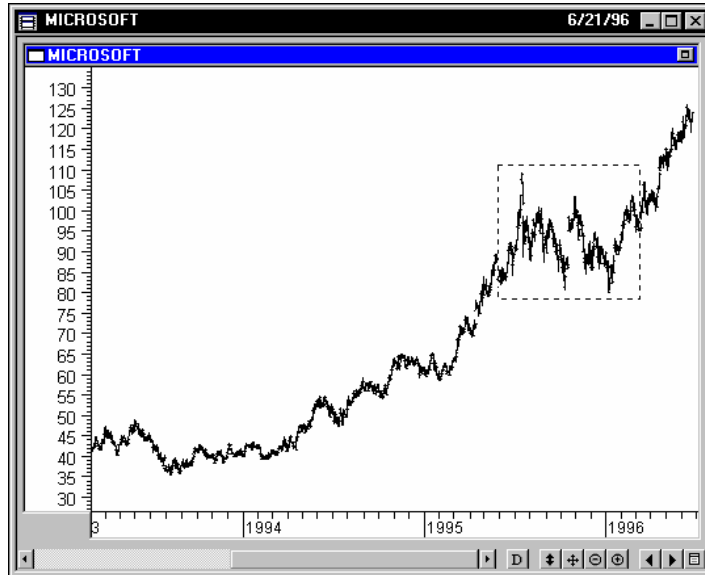


After clicking twice on the Zoom In button...

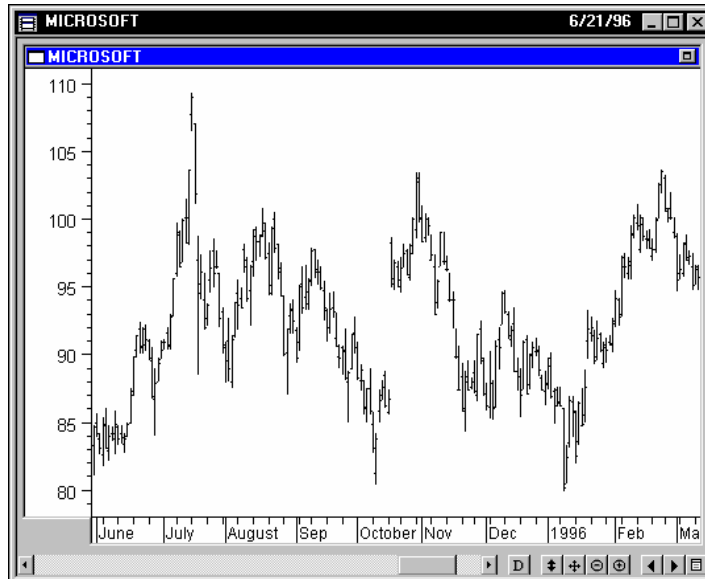


The following illustrations show a chart before and after zooming using the Zoom box command.

Before using the Zoom Box...



After using the Zoom Box...

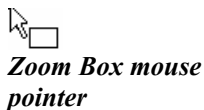




To zoom in on the most recent data

Do one of the following:

- Choose **Zoom** then **Zoom In** from the View menu repeatedly until the view you want is displayed.
- Click the Zoom In button on the Chart toolbar repeatedly until the view you want is displayed.
- Press CTRL+ "+" repeatedly until the view you want is displayed. CTRL+ "-" zooms out.
- Using the Microsoft IntelliMouse pointing device, hold the CTRL key down and rotate the wheel forward to zoom-in or rotate back to zoom-out.



To zoom in on a specified area

1. Choose **Zoom** then **Zoom Box** from the View menu or toolbar. A small box appears next to the mouse pointer indicating that you should select an area to zoom.
2. Position the mouse pointer at one corner of the desired zoom area.
3. Click and drag the mouse pointer to the opposite corner of the desired zoom area and release your mouse button.

To reset a zoomed chart

Do one of the following:



- Choose **Zoom** then **Zoom Reset** from the View menu.
- Click the Zoom Reset button on the Chart toolbar.

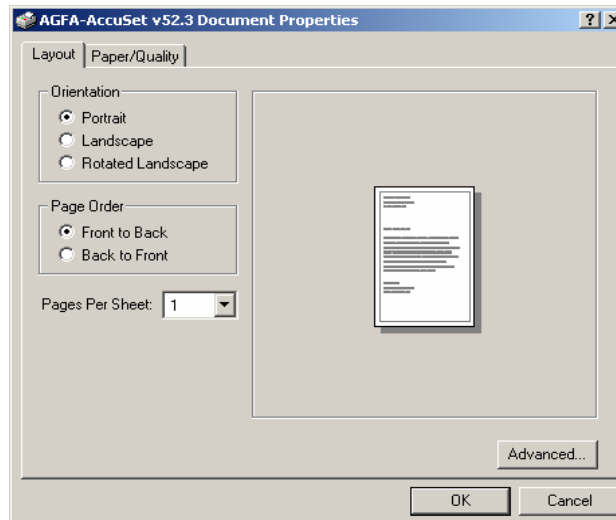
Printing Charts and Data

Introduction

MetaStock Pro's Print command lets you print charts and the pricing data in charts. Before you can print, you must first select and configure your printer using the Print Setup dialog.

Selecting and Configuring Your Printer

MetaStock Pro uses the default Windows printer selected from the Windows Printers folder. Direct access to your printer's properties dialog is available from within MetaStock Pro via the Print menu. To display the Properties dialog, open a chart, select Print from the File menu, and click the Properties button.



See your Windows manual for additional information on the controls in the Print Setup dialog.

To select and configure your printer

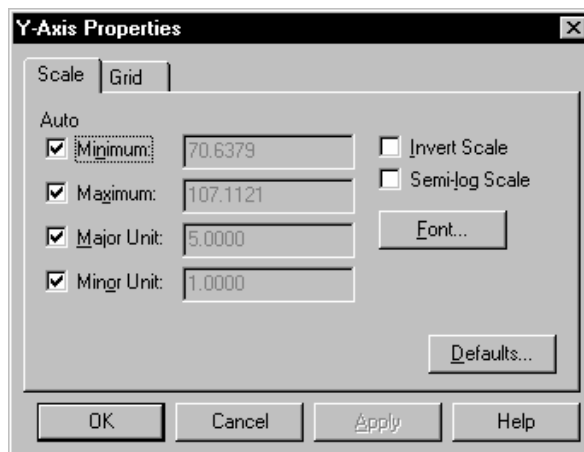
1. Choose **Print** from the File menu.
2. Choose the desired printer from the **Name** drop-list.
3. Click the **Properties** button if you need to change the printer's configuration settings.
4. Click the **OK** button.

Customizing the Printout with Page Setup

To control such things as paper size, margins, headers/footers, orientation, etc., use the Page Setup command in the File menu. Maybe you'd like your company name to appear at the top of every page and the date and time at the bottom. Or maybe you'd like a larger margin. All this and more can be controlled within the Page Setup dialog.

Layout

The Layout page is located in the Page Setup dialog. Choose Page Setup from the File menu or from the Print dialog.



Print Layout. Choose the Charts per Page button to specify the number of charts you want to appear on a page. For example, if you have eight charts open and you want the charts printed on two pages then type "4" in the Charts per Page box.

Choose Print to Fit to print all open charts on one page.

Choose Print Where Displayed to print the charts in the same size and location as they appear on the screen.

Page Border. Choose the type of border to surround the page. The Page Border is printed at the specified margin settings.

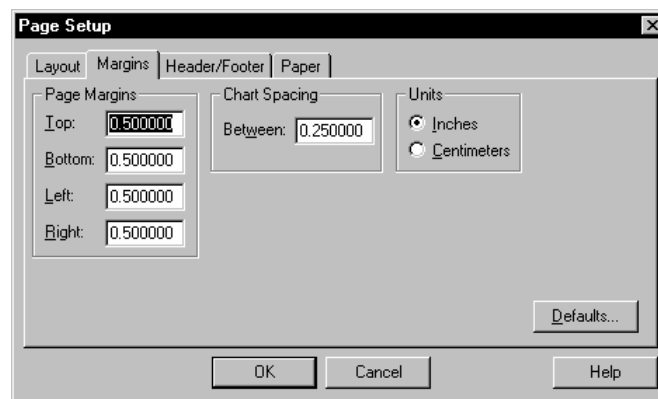
Chart Border. Choose the type of border to surround each chart.

Chart Title. Check this box if you want the information appearing in the chart title bar (see page 107) to print. Click the Font button to choose the desired font for the chart title.

Automatically Reduce Fonts. Choose this box if you want the x- and y-axis fonts to be reduced in relation to the size of the chart. The smaller the chart, the smaller the font used. Leave the box unchecked if you want the fonts to remain at the specified sizes.

Margins

The Margins page is located in the Page Setup dialog. Choose Page Setup from the File menu or from the Print dialog.



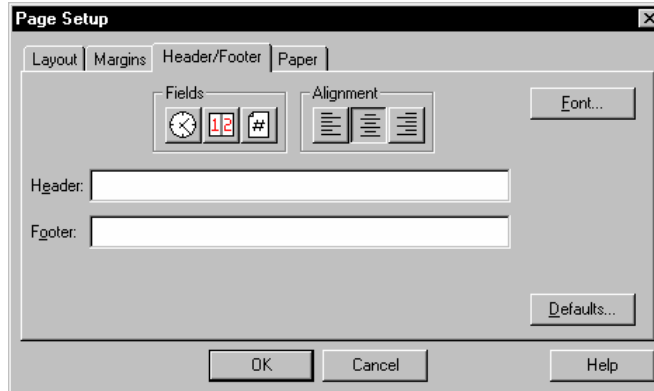
Page Margins. Specify the distance the chart should be printed from the top, bottom, left, and right sides of the page. Note that the Page Border is printed directly against the margins.

Chart Spacing. Specify the distance between charts on the printout.

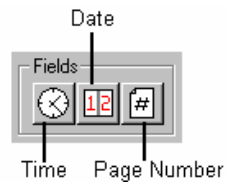
Units. Choose inches or centimeters to use for the margin and chart spacing measurements.

Header/Footer

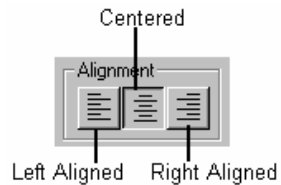
The Header/Footer page is located in the Page Setup dialog. Choose Page Setup from the File menu or from the Print dialog.



Fields. Click on the time, date, or page number buttons to automatically insert the corresponding field into your header or footer.



Alignment. Click on the button that corresponds with the way you want both your header and footer aligned.



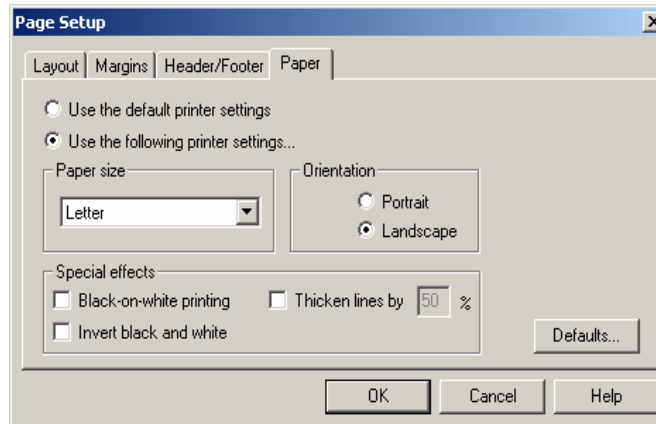
Header. Type the desired header to be printed at the top of the page.

Footer. Type the desired footer to be printed at the bottom of the page.

Fonts. Click this button to select the font for the header and footer. The Font dialog is used to select the font and the font's style, size, effect, and color. See page 171 for more information on fonts.

Paper

The Paper page is located in the Page Setup dialog. Choose Page Setup from the File menu or from the Print dialog.



Use the Default Printer Settings. Use the default settings already specified in the Windows Printer Properties for the selected printer.

Use the Following Printer Settings. Use the settings specified in this dialog.

Paper Size. Choose the size of paper (i.e., letter or legal) loaded in the printer's paper tray.

Orientation. Choose the orientation for your printout. Landscape prints horizontally on the page; portrait prints vertically on the page.

Black-on-White Printing. Check this box to print charts with a white background and black foreground. All background colors are printed as white; all foreground colors are printed as black.

Invert Black and White. Check this box if you want all black colors to print white and all white colors to print black.

Thicken Lines by. Check this box if you want all lines within a chart to print thicker by the specified percentage. This includes price plots, indicators, and line studies (excluding text). This setting also affects charts shared with other programs using the Copy and Paste commands (see page 8).

Previewing Charts Before Printing



Print Preview button

To see how a chart will appear when printed, use the Print Preview command in the File menu or click the Print Preview button on the toolbar. Print Preview will show you an exact replica of the printed chart on your computer screen. The Print Preview command is also available directly from the Print dialog.



The buttons along the top of the Print Preview screen allow you to print and change the view of the chart.

To preview a chart before printing

1. Select the chart you want to preview by clicking anywhere on the chart.
2. Make any desired changes at the Page Setup dialog.
3. Choose **Print Preview** from the Print dialog or the File menu.

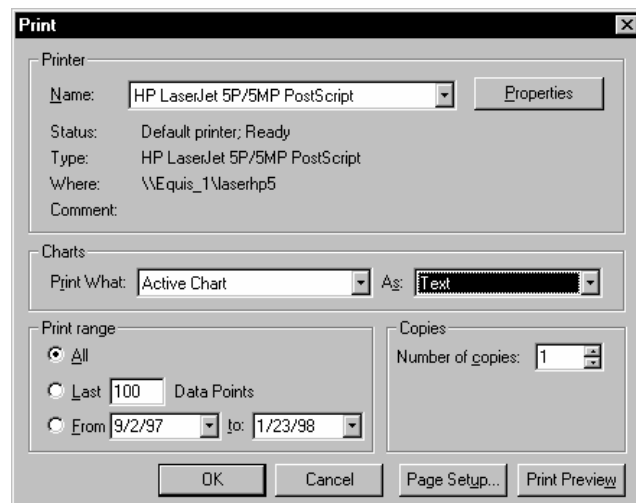
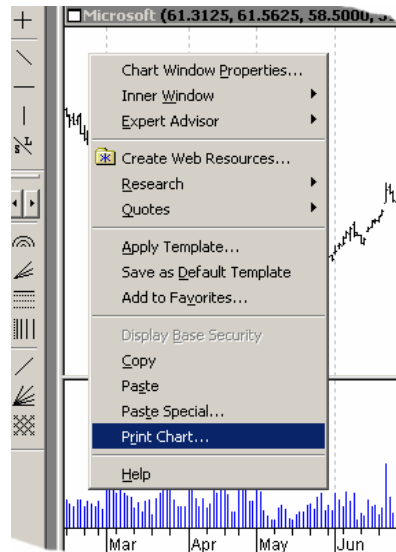
Printing Charts and Data

Before you can print, be sure that you have selected the correct printer (see page 133).



Print button

You print charts or data by using the Print command located in the File menu, by clicking the Print button on the toolbar, or by right-clicking on a chart and choosing Print Chart from the shortcut menu.



All open charts are listed at the bottom of the Window menu.

Name. Choose the desired printer from the drop-list. Only those printers that you have installed from within Windows will appear.

Print What. Choose what you want to print from this drop-list. Choose Active Chart to print the currently selected chart. Choose All Open Charts to print all charts currently open.

From the As box, choose whether you'd like the chart(s) printed in graphics or text. If you choose text, the Print Range options are made available.

Copies. Type the number of copies to print.

Print Range. If you have chosen to print Text, you can choose to print all or a specific range (by data points or dates). The values default to the amount of data loaded.

Page Setup. Choose this button to access the Page Setup dialog where you can specify the layout, margins, header/footer, and paper size. See page 134 for more information.

Print Preview. Choose this button to access the Print Preview screen. This lets you see exactly how the printout will appear on your screen. See page 137 for more information.

Properties. Choose this button to access the printer's Properties dialog where you can configure your printer. See page 133 for more information.

To print a chart

1. Select the chart you want to print by clicking anywhere on the chart.
2. Do one of the following:
 - Choose **Print** from the File menu.
 - Right-click on the chart and choose **Print Chart** from the Chart shortcut menu.
 - Click the Print button on the toolbar.
3. Click the **Print What** drop-list and select **Active Chart**. Click the **As** box and select **Graphics**.
4. Click the **OK** button.

To print a chart's pricing data

1. Select the chart whose data you want to print by clicking on the chart.
2. Do one of the following:
 - Choose **Print** from the File menu.
 - Right-click on the chart and choose **Print Chart** from the Chart shortcut menu.
 - Click the Print button on the toolbar.
3. Click the **Print What** drop-list and select **Active Chart**. Click the **As** drop-list and select **Text**.
4. Choose the desired **Print Range**.
5. Click the **OK** button.

To print multiple charts

1. Open the charts you want to print.
2. Do one of the following:
 - Choose **Print** from the File menu.
 - Right-click on the chart and choose **Print Chart** from the Chart shortcut menu.
 - Click the Print button on the toolbar.

3. Click the **Print What** drop-list and select **All Open Charts**. Click the **As** drop-list and select **Graphics**.
4. Click the **OK** button.

Working with Price Plots

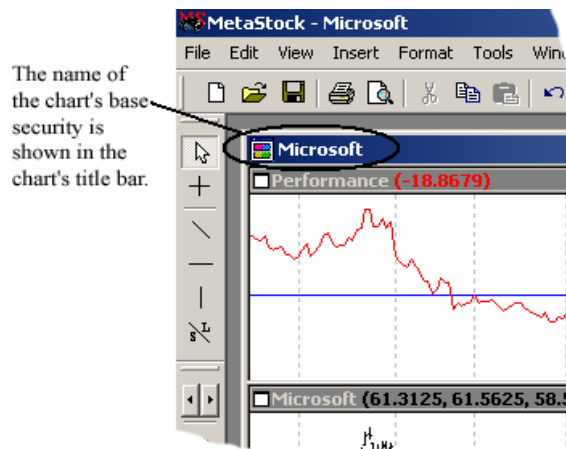
Introduction

The primary focus of a chart is its price plot. Every chart consists of a base security. A base security is simply a security's pricing data.

There are nine different styles of displaying pricing data. Each of these styles uses one or more of the four basic pieces of pricing data--open, high, low, or close. Each of the nine styles has unique differences that can be interpreted in various ways.

Base Security Concept

Every chart has a base security. The base security is the security that was selected when the chart was originally created. All indicators plotted in a new inner window calculate on the chart's base security. The base security's name is displayed in the chart's title bar.



The base security of a chart can be changed by using the Change Security command in the File menu (see page 83).

You can close the base security's inner window, but closing the inner window does not break the link to the base security.

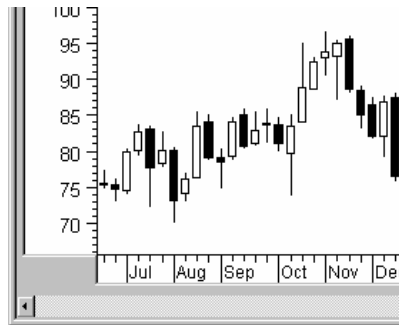
If you close the inner window of the base security or delete the base security and want to redisplay it, right-click on the chart and choose Display Base Security from the Chart shortcut menu. A new inner window will be created in which the base security will be plotted.

Although a chart has only one base security, pricing data for other securities can be displayed in inner windows within the same chart (see page 154).

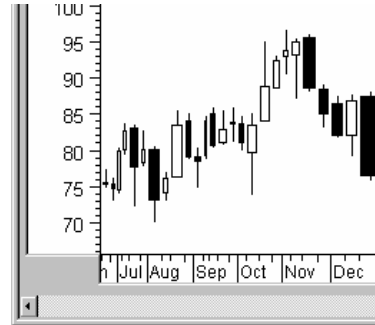
Types of Price Plots

MetaStock Pro provides nine ways to view the pricing information: candlesticks, candlevolume, equivolume, kagi, high/low/close bars, line, point & figure, renko, and three line break. The most common style of price plot is the high/low/close bar.

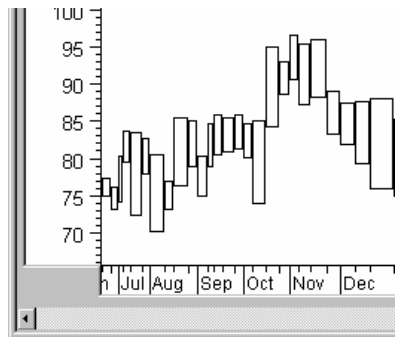
The following illustration shows the same security's data plotted in each of the nine styles.



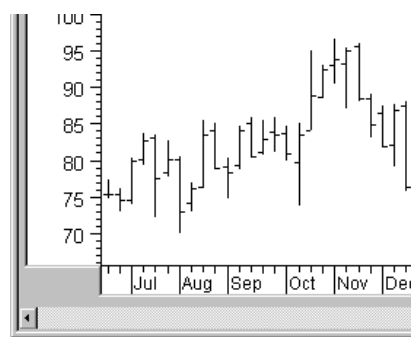
Candlestick Chart



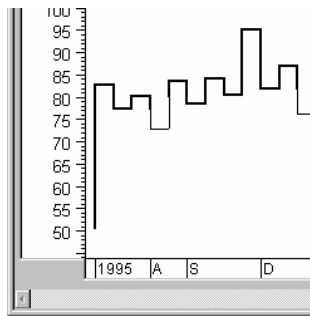
Candlevolume Chart



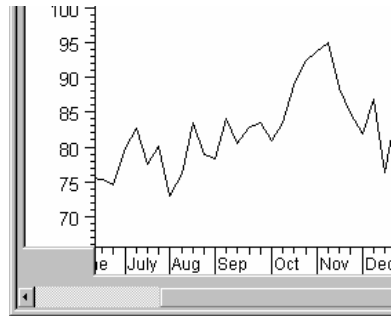
Equivolume Chart



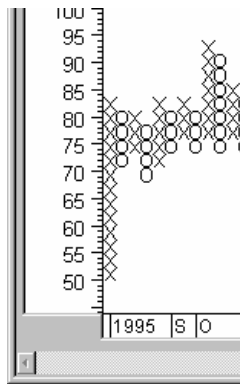
High/Low/Close Bar Chart



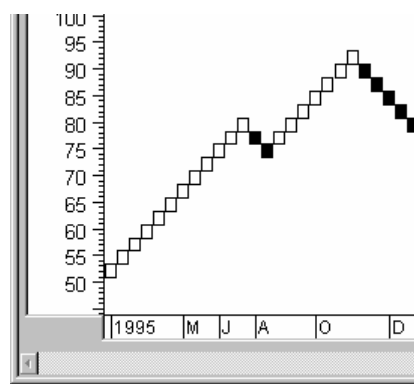
Kagi Chart



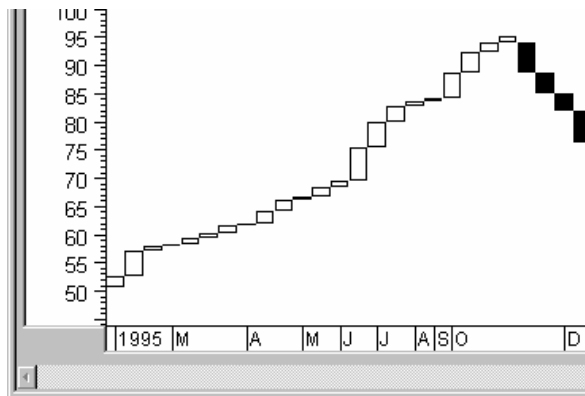
Line Chart



Point & Figure Chart



Renko Chart



Three Line Break Chart

Line charts require only closing prices to plot, whereas Candlesticks require all four pieces of pricing information--open, high, low, and close. And as their names imply, Equivolume and Candlevolume incorporate volume into the price plot.

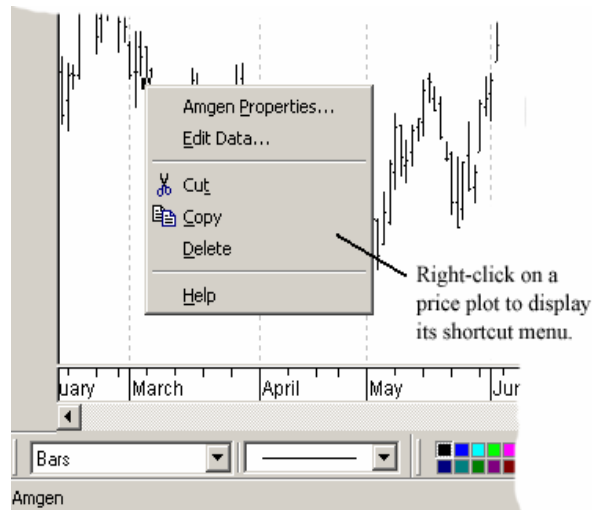
Certain line studies (i.e., cycle lines, Gann grids, and Fibonacci Time Zones) plot unevenly on equivolume and candlevolume charts. This is

because the distance between time periods on these charts varies. The same line studies, when plotted on kagi, point & figure, renko, and three line break charts, also produce results inconsistent with normal interpretation.

Indicators calculated on kagi, point & figure, renko, and three line break charts use all the data in each column and then display the average value of the indicator for that column.

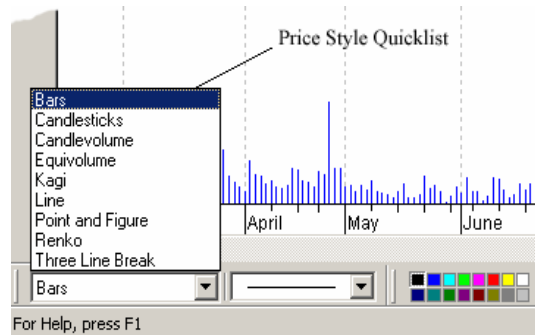
Modifying a Price Plot

Price plots have several properties including style and color. The properties of a price plot are changed from the Price Plot's Properties dialog.



Right-click directly on the price plot and choose the Properties command to display the Properties dialog. You can also double-click on the price plot to bypass the shortcut menu and go directly to the Properties dialog. The Properties dialog can also be displayed by choosing Prices from the Format menu.

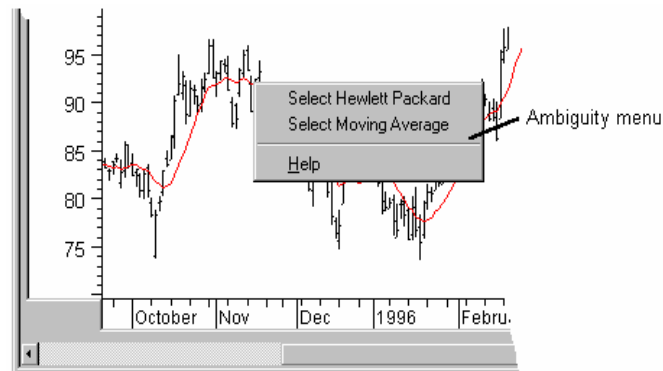
If you just want to change the line style of the price plot, the fastest way is to click directly on the plot to select it, and then choose the desired style from the Price Style QuickList on the Style toolbar.



Ambiguity Menu

You can also use the TAB key to cycle through selectable objects on your chart.

When you click on a plot (i.e., price, indicator, or line study), an "ambiguity" menu may appear if the plot you are clicking on is close to other plots. When plots are very close together, it is impossible for MetaStock Pro to know which plot was clicked on. The illustration below shows the ambiguity menu that appeared because MetaStock Pro didn't know whether the price plot or moving average was clicked.



When the ambiguity menu appears, simply choose the desired plot from the menu.

Parameters Page

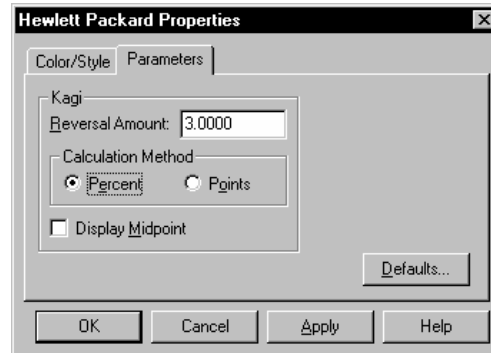
The following sections explain the parameters for each of the price styles that require parameters (i.e., kagi, point & figure, renko, and three line break).

To change a price plot's parameters

1. Do one of the following:
 - Right-click on the price plot and choose **Properties**.
 - Double-click on the price plot.
2. From the Parameters page of the Properties dialog, make the desired changes to the parameters.

3. Click the **OK** button.

Kagi



Reversal Amount. Enter the Reversal Amount to control when the direction of the kagi chart changes. For example, if you enter a reversal amount of 2.00 points, the kagi chart will change from up to down if there is a two point downward change in the closing prices. Likewise, it will change from down to up if there is a two point upward change in the closing prices. The length of time required to make the reversal does not matter.

Calculation Method. Choose one of the two calculation methods. Choose Percent if you want the reversal amount determined on a percentage basis (e.g., a Reversal Amount of 2.00 requires a two percent change in the close to cause a reversal). Choose Points if you want the reversal amount determined on a points basis (e.g., a Reversal Amount of 3.00 requires a three point change in the close to cause a reversal).

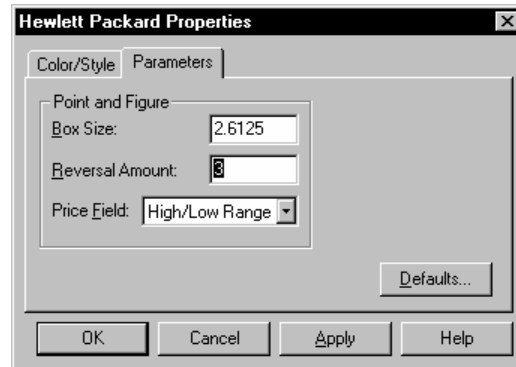
Display Midpoint. Choose Display Midpoint if you want a "tick" mark displayed at the midpoint of each of the up and down lines.

Indicators calculated on kagi charts use all the data in each column and then display the average value of the indicator for that column.

Also note that certain line studies, (i.e., Gann, Fibonacci time zones, cycle lines, etc.) when plotted on kagi charts, produce results inconsistent with normal interpretation.

See page 472 for interpretation information on kagi charts.

Point & Figure



Box Size. Enter the Box Size (the size may contain a decimal portion, e.g., 1.33). The default box size is determined automatically depending on the price of the security being charted. Note that the smaller the box is, the more boxes will be displayed.

Reversal Amount. Enter the Reversal Amount. The Reversal Amount controls how many boxes the price must change to cause a reversal and move to the next column. For example, specifying 3 boxes per reversal when the box size is set to 2 will require that prices change 6 points (3 boxes times a box size of 2) before changing columns. Because the reversal is in boxes, the number may not contain a decimal portion. Larger reversal amounts cause fewer, taller columns.

Price Field. Choose the price field to use when plotting the point & figure chart. The default "High/Low Range" is recommended. When calculated on the High/Low Range, MetaStock Pro takes into account the intraday extreme moves when drawing the boxes.

A checkbox in the Chart Options page of the Application Options dialog (see page 34) lets you specify if you want point & figure boxes to stay square when plotting a point & figure chart. Purists to point & figure charting prefer to have exactly square X and O. However, the advantage of leaving the box *unchecked* is that the point & figure charts will utilize chart space much more efficiently.

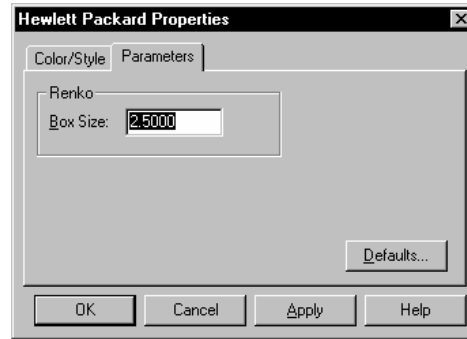
The inner window title bar of a point & figure chart displays information about the chart. The first number is the Box Size and the second number is the Box Size *multiplied* by the Reversal Amount. The Price Field that a point & figure chart is based on is also identified in the title bar of the chart.

Indicators calculated on point & figure charts use all the data in each column and then display the average value of the indicator in that column.

Also note that certain line studies, (i.e., Gann, Fibonacci time zones, cycle lines, etc.) when plotted on point & figure charts, produce results inconsistent with normal interpretation.

See page 498 for interpretation information on point & figure charts.

Renko



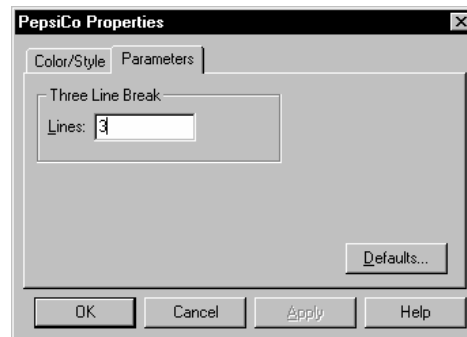
Box Size. Enter the Box Size (the size may contain a decimal portion, e.g., 1.33). The default box size is determined automatically depending on the price of the security being charted. Note that the smaller the box, the more boxes displayed.

Indicators calculated on renko charts use all the data in each column and then display the average value of the indicator in that column.

Also note that certain line studies, (i.e., gann, Fibonacci time zones, cycle lines, etc.) when plotted on renko charts, produce results inconsistent with normal interpretation.

See page 515 for interpretation information on renko charts.

Three Line Break



Lines. Enter the lines per break. The default is three. Note that the smaller the lines per break, the more blocks displayed.

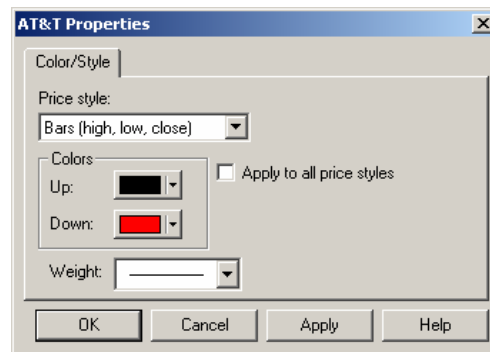
Indicators calculated on three line break charts use all the data in each column and then display the average value of the indicator in that column.

Also note that certain line studies, (i.e., Gann, Fibonacci time zones, cycle lines, etc.) when plotted on three line break charts, produce results inconsistent with normal interpretation.

See page 526 for interpretation information on three line break charts.

Color/Style Page

The color/style page allows you to change the color, line style, and weight of the selected price plot. You can also make these changes by using the color and line style toolbars (see page 25).



Price Styles. Click on the Price Style drop-list to display the nine price styles: Bars, Candlesticks, Candlevolume, Equivolume, Line, Kagi, Point & Figure, Renko, and Three Line Break.

Up. Use this drop-list to select the color when the closing price moves upward (as compared to the previous period's price). Note that this color only affects the currently selected Price Style. If an expert containing a Highlight is attached to the chart (and its condition is true), the Highlight's color will override this setting.

Down. Use this drop-list to select the color when the closing price moves downward (as compared to the previous period's price). Note that this color only affects the currently selected Price Style. If an expert containing a Highlight is attached to the chart (and its condition is true), the Highlight's color will override this setting.

Weight. Use this drop-list to select the weight (i.e., thickness) of the price plot.

Apply To All Price Styles. Check this box if you want the Up and Down colors selected for the current price style to apply to all Price Styles (rather than just the currently selected Price Style).

To change the style of the price plot

1. Double-click on the price plot in the chart.
2. From the Color/Style page, click the **Price Styles** drop-list.

3. Choose the desired price style and click the **OK** button.

Or

1. Select the price plot in the chart.
2. Choose the desired price style from the Price Style QuickList located on the style toolbar.

To change the color of a price plot

1. Double-click on the price plot in the chart.
2. From the Color/Style page, click the **Up** drop-list.
3. Choose the desired color for upward price changes.
4. Click the **Down** drop-list.
5. Choose the desired color for downward price changes.
6. Click the **OK** button.

Or

1. Select the price plot in the chart.
2. Choose the desired color from the color palette located on the style toolbar.

Updating and Editing a Price Plot's Data

The method you use to update and edit data depends on the type of data you are using – online data, real-time local data, or end-of-day local data (see page 41).

To update online data, choose Refresh from the View menu. The data will be re-collected from your online vendor, including any splits or adjustments that have occurred since you opened the chart. **Note that weekly and monthly charts do not update in real time.**

Real-time data is updated automatically as the trades occur. All you need to do is start MetaStock Pro, which will then start the File and Data Servers. If your charts stop updating, there may be a problem with one of the servers (see page 51).

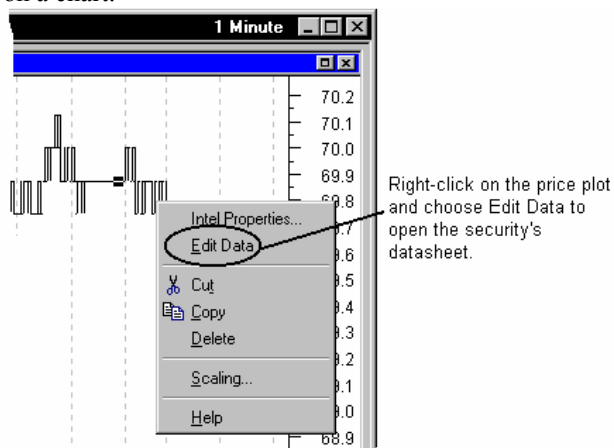
To update your end-of-day downloaded data, use the Download Prices command in The DownLoader. The DownLoader is a separate program provided with MetaStock Pro. However, MetaStock Pro provides seamless integration with The DownLoader, making data changes quick and easy.



The DownLoader icon

You can run The DownLoader using the Windows Start command by going to the Equis International folder and choosing The DownLoader. Or you can run The DownLoader directly from within MetaStock Pro by choosing The DownLoader from the Tools menu.

You can quickly access the data for an open chart by right-clicking on the price plot and choosing Edit Data from the shortcut menu. The security's datasheet will open in The DownLoader where you can make the desired changes. This makes it easy for you to quickly edit an erroneous price on a chart.



If a chart for a security is open, changes made in The DownLoader to that security's attributes (i.e., name, ticker, units, etc.) will not be immediately reflected in the open chart. The chart must be closed and then reopened to reflect the changes. However, changes made to the pricing data itself (i.e., date, open, high, low, close, etc.) will be immediately reflected in the open chart.

Copying, Deleting, and Moving Price Plots

Copying, moving, and overlaying price plots involves basic drag and drop techniques. Perhaps you want to see three computer stocks in the same chart. Or maybe you want to overlay several stocks in the same inner window.

"Moving" a price plot means to actually remove the selected price plot from its original location and move it to a new location. "Copying" means to make a copy of the selected price plot and place the copy in another location. "Deleting" a price plot means to remove the selected price plot from the chart, but this does not delete the data permanently from the security file.

Copying and Moving a Price Plot

You can copy any price plot from one inner window to another by selecting and dragging the price plot with the CTRL key depressed, and then dropping it in a new location.

A price plot is moved from one inner window to another using the same procedure described in the previous paragraph, except that you don't need to hold the CTRL key down. The only exception to this is if you attempt to move a base security price plot (see page 143) from one chart to another. In this case the base security price plot is always copied. This prevents the accidental removal of a base security from its chart.

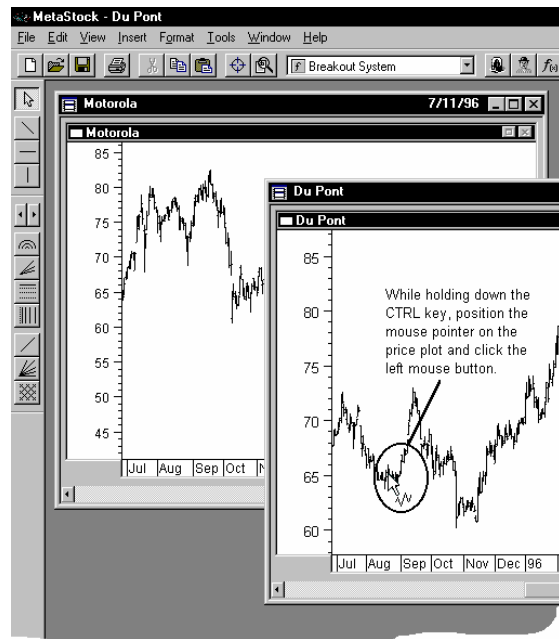
When you click on a price plot, an "ambiguity" menu may appear if the plot you are clicking on is close to other plots (e.g., moving averages, trendlines, etc.). See page 147 for more information.

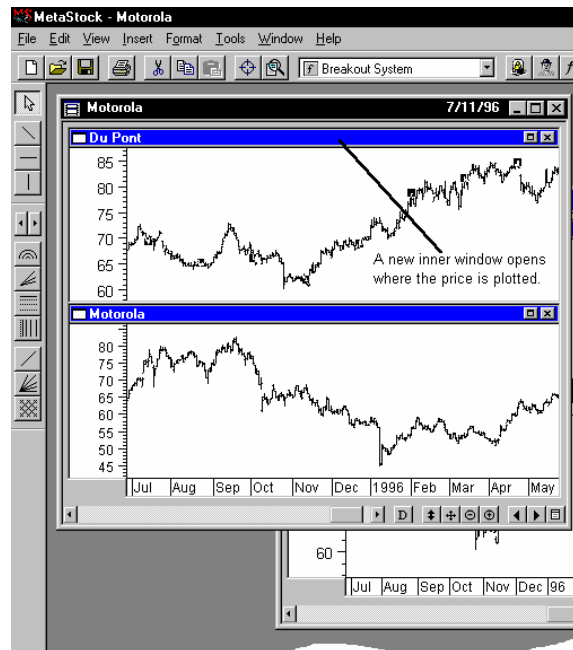
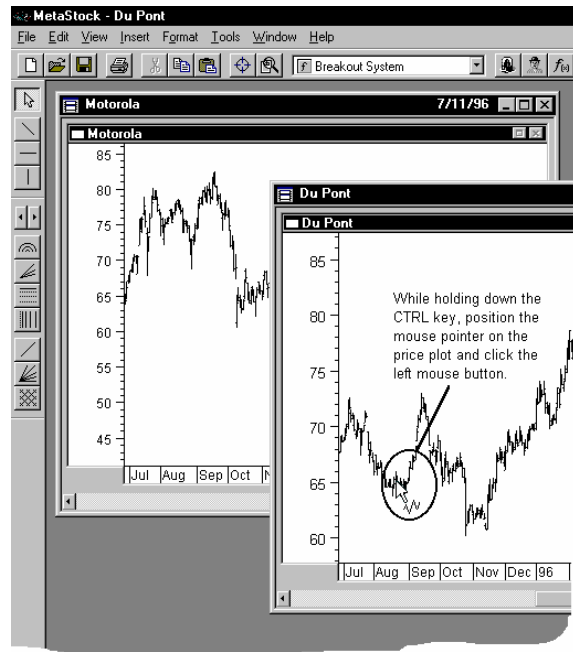
A "not" sign appears next to the mouse pointer when dragging a price plot over an area where it cannot be dropped.



"Not" sign

The following illustrations show how to copy a price plot from one chart to another. If the price plot is not the base security (see page 143), you can move the price plot by following the same procedure, except don't hold the CTRL key.





To copy or move a price plot to a new inner window in the same or different chart

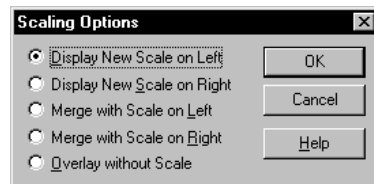
1. Open two charts.
2. Position the mouse over the price plot you want to copy or move.
3. Hold the CTRL key down. Then click ***and hold*** the left mouse button and drag the price plot to the destination chart's title bar.
4. With the mouse still positioned over the destination chart's title bar, release the mouse button.

To overlay a price plot on an existing plot

1. Position the mouse over the price plot you want to copy or move.
2. Hold the CTRL key down (for copying only). Then click ***and hold*** the left mouse button and drag the price plot to the inner window containing the price plot or indicator you want to overlay on. The inner window can be in the same chart or a different chart.
3. Release the mouse button.
4. Choose the desired option from the Scaling Options dialog (see page 156) and click **OK**.

Scaling Options Dialog

When you copy or move a plot (i.e., price plot or indicator) to another inner window, it is likely that the other inner window's y-axis scale will not be compatible. If this is the case, MetaStock Pro displays the Scaling Options dialog so that you can choose how to handle the scaling when the plot is overlaid.



Display New Scale on Left. Use a new scale on the left side of the chart that is compatible with the new plot. The existing plot will continue to display, but the left y-axis scale represents the new plot.

Display New Scale on Right. Use a new scale on the right side of the chart that is compatible with the new plot. The existing plot will continue to display, but the right y-axis scale represents the new plot.

Merge with Scale on Left. Adjust the existing left y-axis scale so that the new price plot can be represented.

Merge with Scale on Right. Adjust the existing right y-axis scale so that the new price plot can be represented.

Overlay without Scale. Overlay the plot without displaying a scale. You may want to do this if you are only concerned about comparing relative movements between the plots.

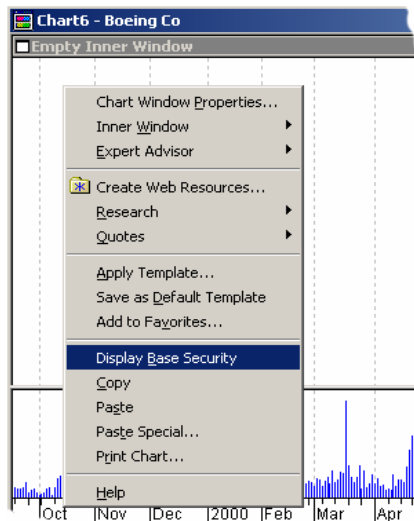
Deleting a Price Plot

Deleting a price plot from an inner window will remove the price plot and leave the inner window intact. See page 116 for information on closing inner windows.

You can delete the selected price plot by pressing the DEL key or by right-clicking on the price plot and choosing Delete from the shortcut menu. You are asked to confirm the deletion. An option in the Application Properties dialog controls whether the Confirm Deletions dialog appears (see page 32).

You can also delete price plots by using the Cut command from the Edit menu or the price plot's shortcut menu. However, the Cut command also copies the price plot to the Windows clipboard. See page 8 for more information.

If the price plot you delete is the chart's base security (see page 143), you can redisplay the base security by right-clicking on any inner window and choosing Display Base Security from the chart's shortcut menu. A new inner window will be opened at the top of the chart where the base security will be replotted.



To delete a price plot

1. Do one of the following:
 - Right-click on the price plot and choose **Delete**.
 - Click the left mouse button on the price plot and press the DEL key.

- Select the price plot and choose **Delete** from the Edit menu.
2. Choose **Yes** when asked to confirm the deletion.

Confirm Deletions

When you delete price plots, indicators, or line studies from a chart, the Confirm Deletions dialog will appear (if you haven't disabled it).



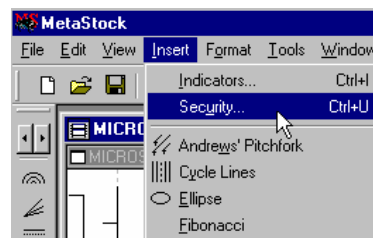
Choose Yes if you want the selected object deleted. Choose No to cancel the deletion.

You can prevent this message from appearing by checking the "Don't display this message anymore" box in this dialog or by unchecking the "Confirm Deletion of Objects" box in the Application Properties dialog (see page 32).

Inserting Price Plots

Any security can be added to the current chart using the Insert Security command. This method is quicker than opening the chart and using drag and drop to copy the price plot.

To insert the price plot of a security that is not open, choose Security from the Insert menu.



If the periodicities are not the same, the data will be displayed in the best way possible.

Viewing Values on the Chart

There are two ways to view a plot's value in a chart. For a detailed, color-coded view of the data, use the Data Window. For a quick inspection of the data for a particular bar, use ChartTips.

The Data Window displays the values at the location of the mouse pointer. You can display the base security's date, time, open, high, low,



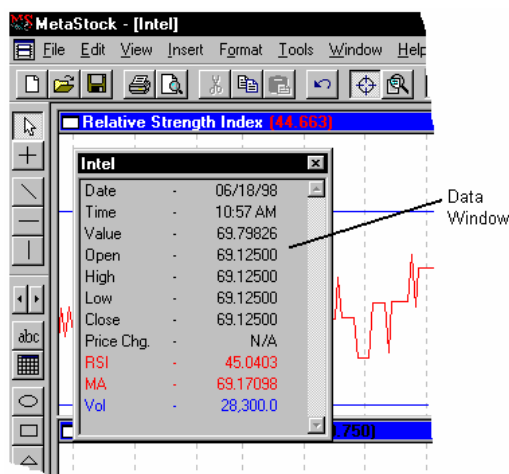
Data Window button

close, volume, open interest, price change from previous period, and indicator values. The Data Window displays the values for the chart that the mouse pointer is in. If the Data Window is docked, it will also display the ticker symbol.

The Data Window is displayed by choosing Data Window from the View menu, or by clicking the Data Window button on the toolbar.

The format of the price values displayed in the Data Window are either in decimal or fractions depending on the "Units" setting for the security. A security's Units setting is controlled with The DownLoader (see page 60 in this manual).

The color of the values displayed in the Data Window correspond to the color of the price plots represented. You can turn this "coloring" of text off from the Data Window Properties dialog (see page 161).



If you have multiple charts displayed on your screen, you can simply move the mouse from chart to chart and the Data Window will display the appropriate data.

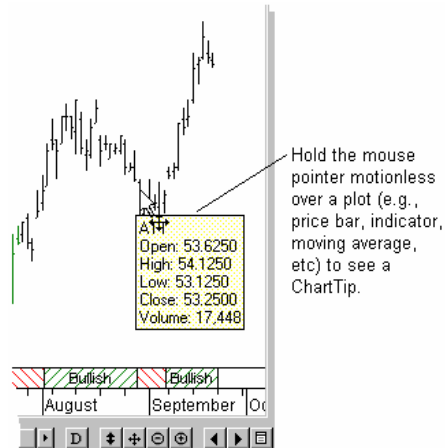
When attempting to display the data for a specific bar, you may want to use your mouse to quickly move to the general area of the chart, and then switch to the keyboard's arrow keys to zero in on the specific bar.

The Data Window can be moved just like any window by clicking on the title bar and dragging. You can also resize the Data Window vertically by clicking on the bottom border and dragging.

The active chart's ticker symbol appears in a docked Data Window.

You can dock the Data Window on the left or right side of the screen by clicking and dragging the Data Window to the desired side of the screen. Double-clicking anywhere on the Data Window will also dock it. After it is docked, double-clicking returns it to a floating window, or you can click and drag it to the desired location. Note that when the Data Window is docked, the ticker symbol of the security in the active chart is displayed.

ChartTips allow you to quickly display the values for a particular bar without invoking any special command. By simply positioning the mouse over a plot (e.g., price bar, indicator, moving average, etc.) and holding the mouse pointer motionless for a second or so, a ChartTip displays, giving you information about the plot. The first line of a ChartTip provides the name of the plot plus any parameters associated with that plot. The remaining lines provide other useful information about the plot.



To display the Data Window

Do one of the following:

- Choose **Data Window** from the View menu.
- Click the Data Window button on the toolbar.

To remove the Data Window

Do one of the following:

- Choose Data Window from the View menu.
- Click the Data Window button on the toolbar.
- Double-click the control menu box on the Data Window.
- Right-click on the Data Window and choose **Remove Data Window**.

To dock the Data Window

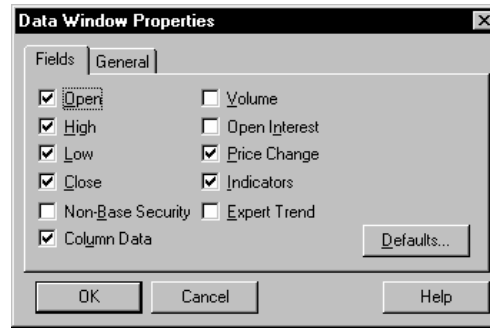
1. Display the Data Window.
2. Double-click anywhere on the Data Window. Or you can drag the Data Window until the mouse appears near the left or right edge of the screen. Release the mouse button to dock it.

To undock the Data Window

Double-click anywhere on the Data Window. It will return to a floating window.

Changing the Properties of the Data Window

To specify the properties of the Data Window, use the Data Window Properties dialog. This dialog is accessed by right-clicking on the Data Window or by choosing Data Window from the Format menu.



Check the box next to the values you want displayed in the Data Window.

Click on the General tab to access the "Update Only On Drag" and the "Display Data Window Text In Color" options. Check "Update Only On Drag" box if you would like the Data Window to update only when you are dragging the mouse (i.e., clicking and holding the left mouse button down). Check the "Display Data Window Text In Color" box if you would like the color of the values in the Data Window to correspond to the color of the represented plot.

To specify the contents of the Data Window

1. Choose **Data Window** from the Format menu.
2. Check the desired values to display in the Data Window Properties dialog.
3. Click the **OK** button.

Visual Inspection Using the Crosshairs



Crosshairs button

The crosshairs are helpful when inspecting the relative moves of indicator and price plots. They are also good for spotting support/resistance levels (see page 523). The crosshairs are turned on by choosing Crosshairs from the View menu or clicking the Crosshairs button on the trendline toolbar. You can turn off Crosshairs by pressing the ESC key, clicking the Crosshairs button on the toolbar, or choosing **Crosshairs** from the View menu.

You may find the crosshairs helpful when you have the Data Window displayed so that you can see the exact location of all values shown in the Data Window. The mouse pointer disappears when crosshairs are displayed to allow better visibility of the underlying plot(s) at the intersection point.



Even when crosshairs are turned on, you still can use all the menus and toolbars. In fact, you may find it helpful to have the crosshairs displayed when drawing line studies (see page 205).

To turn on the crosshairs

Choose **Crosshairs** from the View menu. A checkmark will appear next to the menu item indicating they are turned on.

Or


Click the crosshairs button from the toolbar.


Working with Indicators


What is an Indicator?

An indicator is a mathematical calculation that can be applied to a security's price, volume or even to another indicator. The result is a value that is used to anticipate future changes in prices. Indicators are plotted either in a separate inner window or overlaid in the base security's inner window (e.g., a moving average).

There are three types of indicators in MetaStock Pro (explained below). The small icon displayed next to indicators in the Indicator QuickList (see page 165) shows you the indicator's type. These small icons are also described below.

Price Indicators . Price indicators are always calculated using security pricing data.

Custom Indicators . Custom indicators are calculated using a formula you created with the Indicator Builder (see page 299).

Plot-based Indicators . Plot-based indicators can be plotted directly on an existing plot (i.e., a price plot or another indicator plot). For example, a moving average is a plot-based indicator since it is always calculated on an existing price or indicator. If a plot-based indicator is not dropped directly on a plot (i.e., you plot it in a new inner window) it is calculated using the base security.

All indicators (price, custom, and plot) appear together in the Indicator QuickList (see page 165) and the Indicators dialog (see page 164).

Plotting an Indicator

There are two ways of plotting an indicator in MetaStock Pro. You can drag and drop an indicator from the Indicator QuickList or you can choose Indicators from the Insert menu to display the Indicators dialog.

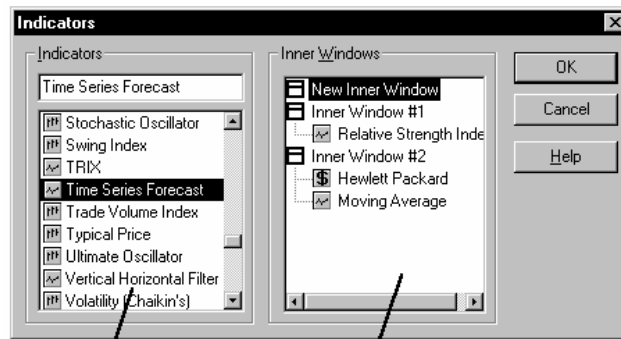
When an indicator is plotted, it is usually calculated on the chart's base security (see page 143). However, some indicators (i.e., "plot-based" indicators) can be calculated on other indicators. For example, a moving average can be calculated on any plot. You could calculate a moving average using an indicator, another moving average, or a price plot.

If an indicator is calculated on a security other than the base security of the chart, the name of the security is shown in parenthesis after the indicator's name.

Indicators calculated on kagi, point & figure, renko, and three line break charts use all the data in each column and then display the average value of the indicator for that column.

Using the Indicators Dialog

The Indicators dialog is accessed by choosing Indicators from the Insert menu. The Indicator dialog lets you choose the indicator(s) and the inner window in which it should be plotted.



Choose one or multiple indicators from this list.

Choose the inner window or plot to use for the indicator from this list.

You can select multiple indicators by holding down the CTRL or SHIFT key as you make your selections.

You can select one (or multiple) indicators from the Indicators list on the left side of the dialog. Pick an inner window in which to plot the indicator(s) from the Inner Windows list on the right side of the dialog. If the selected indicator is a "plot-based" indicator, then the Inner Windows list displays the plots within each of the inner windows. This allows you to choose a specific plot on which to calculate the indicator.

The inner windows listed on the right side of the dialog are labeled Inner Window #1, Inner Window #2, etc. corresponding with the location (top to bottom) in the chart.

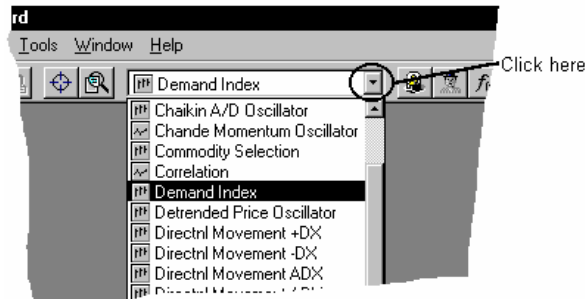
If you choose New Inner Window, the indicator is plotted in a new inner window at the top of the chart.

To plot an indicator using the Indicators dialog

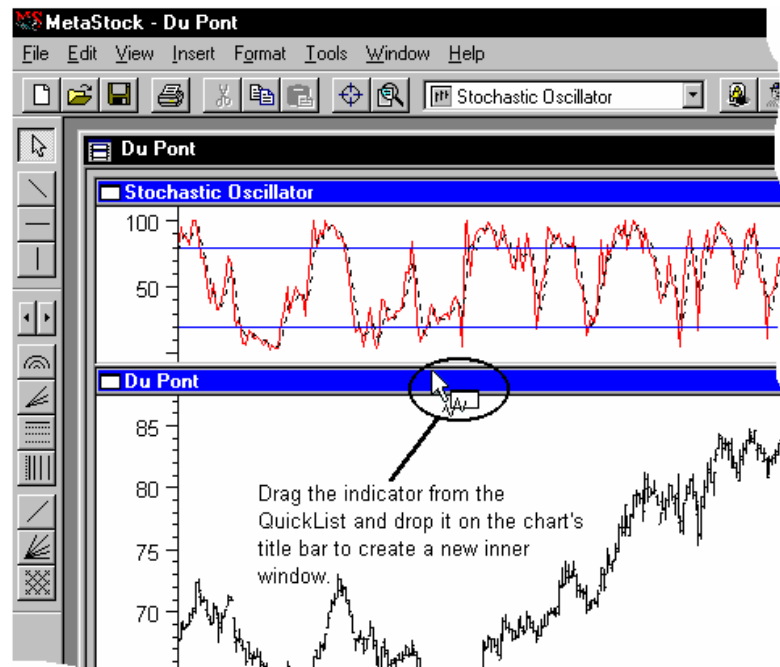
1. Select the chart in which you want to plot an indicator.
2. Choose **Indicators** from the Insert menu.
3. Click the indicator(s) you want to plot in the Indicators list on the left side of the dialog.
4. From the Inner Windows list on the right side of the dialog, choose the inner window in which to plot the indicator.
5. Click the **OK** button.

Using the Indicator QuickList

The Indicator QuickList (located on the standard toolbar) provides quick access to all the indicators in MetaStock Pro.



You can drag indicators from the list and drop them on your charts. If you drop an indicator on a chart's title bar, a new inner window is automatically created for the indicator at the top of the chart. If you drop the indicator on an inner window title bar, the indicator will plot in a new inner window above the title bar. If you drop the indicator on the x-axis, the new inner window will plot at the bottom of the chart.



You can also drop an indicator on an existing plot. Moving averages, Envelopes, and Bollinger Bands are almost always dropped on an existing plot, since you usually want them overlaid on a plot. When you drop an indicator on an existing inner window, the Scaling Options dialog may

appear prompting you to choose how you want to handle the scaling (see page 156).

When dragging an indicator from the QuickList, the status bar (see page 27) provides useful feedback on the location of the mouse. As a visual cue, the plot that will be used for the calculation changes to a unique color as the indicator is being dragged.

A quick way to get to the desired indicator in the QuickList is to display the QuickList and then type the first letter of the indicator's name. The list will quickly advance down the list to indicators beginning with that letter.



Indicators button

If the Standard toolbar (where the QuickList is found) is docked on either the left or right side of the screen (so it appears vertically), the Indicator QuickList changes to a button that displays the Indicators dialog when clicked.

To plot an indicator in a new inner window using the QuickList

1. Click the Indicator QuickList on the toolbar and scroll the list until the desired indicator appears.
2. Position your mouse pointer over the small icon to the left of the desired indicator. Note how the mouse pointer changes to a hand.
3. Click ***and hold*** the left mouse button and drag the indicator until you have it positioned on any inner window title bar within the chart. Notice how the mouse cursor changes appearance when it's positioned over the title bar. You can even drop the indicator on the x-axis if you want it plotted at the very bottom of the chart.
4. Drop the indicator by releasing the mouse button.

To plot an indicator on an existing plot

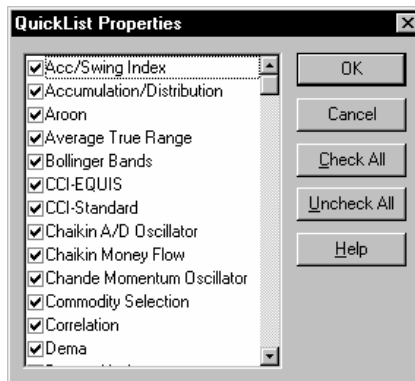
1. Click the Indicator QuickList on the toolbar and scroll the list until the desired "plot-based" indicator appears. A plot based indicator has a icon next to it. See page 163 for more information on plot-based indicators.
2. Position your mouse pointer over the small icon to the left of the desired indicator. Note how the mouse pointer changes to a hand.
3. Click ***and hold*** the left mouse button and drag the indicator until you have it positioned over the plot to calculate on. The color of the plot will change to inform you that it will be used for the indicator's calculation.
4. Drop the indicator by releasing the mouse button.

Controlling which Indicators are in the QuickList

By default, all available indicators (including custom indicators) are displayed in the QuickList. However, you may want to shorten the list by

excluding those you seldom use. This can be done with the QuickList Properties dialog.

The QuickList Properties dialog is displayed by choosing Indicator QuickList from the Format menu, or by right-clicking directly on the QuickList and choosing QuickList Properties.



Check the indicators you want displayed in the QuickList. Remove the check if you prefer not to have the indicator displayed. You can check and uncheck all indicators by using the Check All and Uncheck All buttons.

Modifying an Indicator

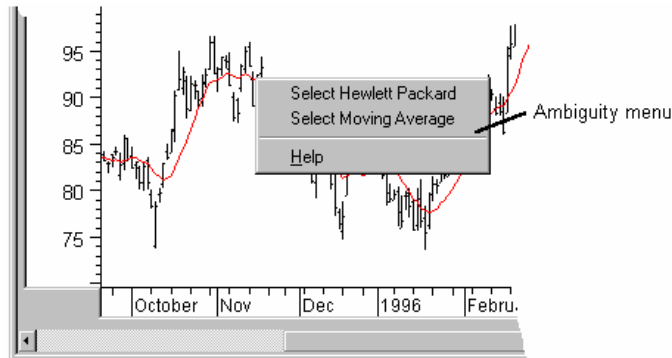
After an indicator is plotted, you can modify any of its properties (e.g., color, number of periods, etc.) with the indicator's Properties dialog. Indicators can also be copied or moved to a new inner window within the same chart or a different chart.

An indicator's Properties dialog can be accessed three ways:

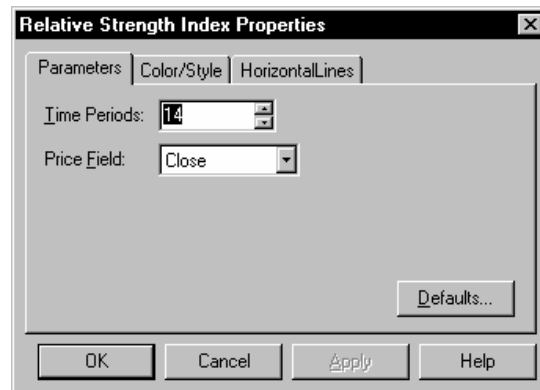
- You can right-click directly on the plotted indicator and choose Properties from the shortcut menu.
- You can double-click directly on the plotted indicator.
- You can select the indicator and choose Selected Object from the Format menu.

You can press the TAB key to cycle through all selectable objects on your chart.

When you are clicking on an indicator and the indicator is closely surrounded by other plots (e.g., prices, moving averages, etc.) a menu will pop up prompting you to choose the desired plot.



The following Properties dialog for the Relative Strength Index is typical of most indicator Property dialogs. Indicators that do not require parameters (e.g., Median Price, Typical Price, etc.) do not have a Parameters page in the Properties dialog.



To modify the properties of an indicator

1. Position the mouse on the plotted indicator and double-click.
2. Make the desired changes from the indicator's Properties dialog.
3. Click the **OK** button.

Properties Common to All Indicators

Every Indicator Properties dialog contains two common pages--the Color/Style page and the Horizontal Line page. You can modify the color/style and horizontal line placement of every indicator in MetaStock Pro.

Every indicator Properties dialog also contains an Apply button. If you click this button, the changes made in the Properties dialog are immediately applied. The Properties dialog remains on the screen. This is helpful if you need to make quick visual adjustments to an indicator.

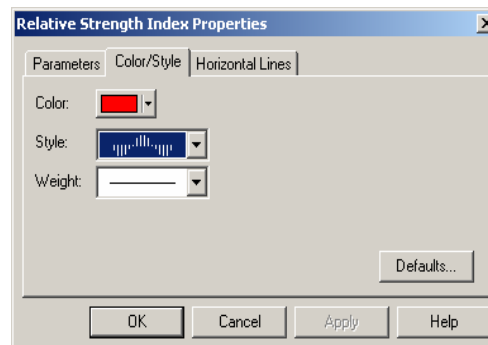
You display an indicator's Properties dialog by right-clicking on the indicator and choosing Properties from the shortcut menu.

Color/Style Page

The Color/Style page is used to modify the selected indicator only. The Color/Style page is located in the indicator's Properties dialog. This dialog is displayed by right-clicking on the indicator and choosing Properties from the shortcut menu.

You can also change the color and line style of the indicator by using the color and line style toolbars (see page 25).

If you want to change the default color/style for all new indicators, choose Default Colors & Styles from the Tools menu.



Color. Choose the indicator color for the selected indicator from the drop-list. MetaStock Pro can automatically rotate through different colors when plotting indicators. See page 171 for more information.

Style. Choose the line style for the selected indicator from the drop-list.

The Invisible style is useful when overlaying one indicator on another (i.e., a moving average overlaid on an RSI). When plotting a moving average on an existing indicator, there may be times that you want to hide the indicator and just show the moving average. If you delete the indicator, the moving average will also disappear since it is dependent on the indicator for the calculation. However, you can hide the indicator, by choosing the Invisible Style from the Color/Style page in the indicator's Properties dialog. To redisplay a hidden indicator, use the TAB key to select it and then choose Selected Object from the Format menu.

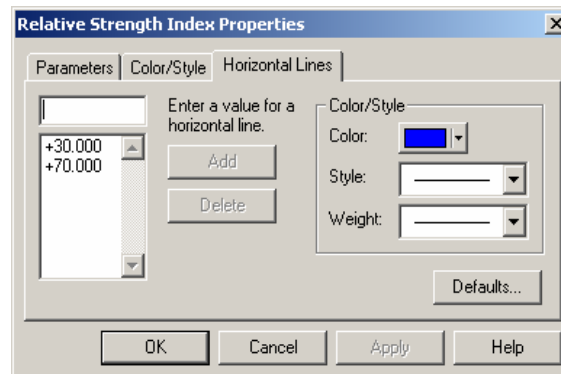
Weight. Choose the thickness of the selected indicator from the drop-list. If you select a heavier weight, the Style will always appear as a solid line.

Horizontal Lines Page

Many indicators require specific values for their interpretation. For example, a Stochastic is generally considered to be at an overbought level above 80 and oversold below 20. Horizontal lines are usually placed at these levels to help in the interpretation.

The Horizontal Lines page allows you to control the placement of these lines for each indicator. Every time the indicator is plotted, the specified horizontal lines are automatically drawn.

The Horizontal Lines page is located in the indicator's Properties dialog. This dialog is displayed by right-clicking on the indicator and choosing Properties from the shortcut menu.

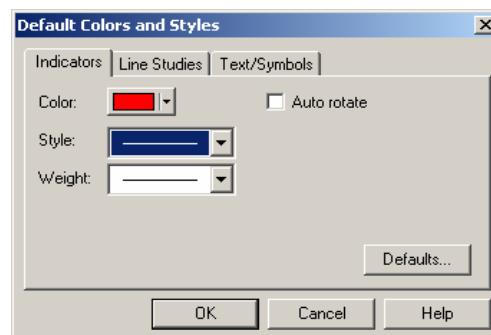


You can also control the color, line style, and weight of the horizontal lines. The color, style, and weight you choose is used for all horizontal lines drawn with the indicator.

Default Colors and Styles Dialog

The Default Colors and Style command in the Tools menu is used to change the default colors and styles used for new plots (i.e., indicators, line studies, and text/symbols). Note that the default colors and styles do not affect existing charts. They only affect new items.

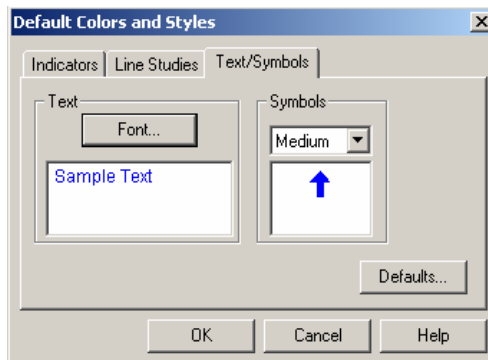
For example, if you always want new indicators plotted as dotted blue instead of solid red, you could use the Default Colors and Styles dialog to make this change.



The Indicators and Line Studies pages contain the usual color, style, and weight drop-lists for modifying indicators and line studies. Note that if you select a heavier weight, the Style will always appear as a solid line, regardless of the line style.

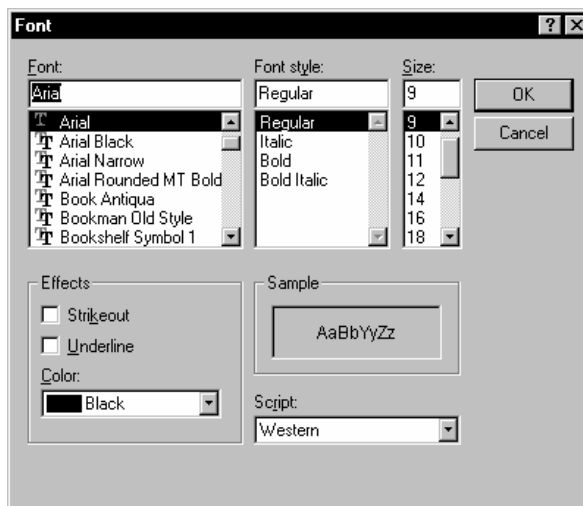
When the Auto Rotate checkbox on the Indicators page is checked, MetaStock Pro automatically chooses different colors for indicators plotted successively in the same inner window. This is particularly useful if you frequently plot multiple indicators (e.g., moving averages) in the same inner window. The background color of the indicator's inner window is automatically skipped.

You can also change the font used for text (see page 223) and the size of symbols (see page 222) with the Text/Symbols page.



Changing Fonts

Click the Font button on the Text/Symbols page of the Default Colors and Styles dialog to change the fonts for text and symbols that appears on charts. Note that this font does not change the fonts associated with the x- and y-axis, or headers/footers. You can change the font for text, the x- and y-axis, symbol labels, and headers/footers on charts using the standard Windows Font dialog.



Font. Choose the font. The number and type of fonts appearing in this list depends on your printer selection.

Font Style. Choose the style for the font.

Font Size. Choose the point size for the font.

Effects. Check the box for the desired effects.

Color. Choose the desired color for the font.

Sample. This box shows how your selected font will appear.

Script. Choose the desired script style for the font.

Copying, Deleting, and Moving Indicators

Just as price plots and line studies can be moved using drag and drop techniques, so can indicators. Perhaps you want to see three of your favorite indicators overlaid on each other in the same inner window. Or maybe you want to copy an RSI of the Dow into your IBM chart. Or maybe you want to delete the moving average plotted on your Corn chart.

Sometimes when you are trying to click on an indicator that is crowded among other plots, a pop-up "ambiguity" menu appears from which you can select the desired plot. See page 147 for more information.

You can select multiple indicators for copying, moving, or deleting by holding down the SHIFT key as you click your mouse.

Copying and Moving Indicators

Copying and moving an indicator plot involves basic drag and drop techniques. The only difference between copying and moving is that you hold the CTRL key down when copying. When the mouse pointer is positioned over an indicator, the mouse pointer displays a four-sided arrow (i.e., the move cursor) indicating that the indicator can be moved or copied.

When an indicator (or any object, for that matter) is being copied, a small plus sign appears next to the mouse pointer while dragging.

When you drag an indicator and drop it into an existing inner window, the Scaling Options dialog may appear prompting you to decide how to handle the scaling (see page 156).

You can copy (or move) an indicator to a *new* inner window by dragging and dropping the indicator on a chart title bar or inner window title bar.

To move (or copy) an indicator to an existing inner window

1. Position the mouse over the indicator you want to move or copy.
2. If copying, hold the CTRL key down. Click ***and hold*** the left mouse button and drag the indicator to another inner window. The inner window can be in the same chart or a different chart.
3. Release the mouse button.



Move cursor

4. Choose the desired option from the Scaling Options dialog (see page 156) and click **OK**.

To move (or copy) an indicator to a new inner window

1. Position the mouse over the indicator you want to move or copy.
2. If copying, hold the CTRL key down. Click ***and hold*** the left mouse button and drag the indicator so that it is positioned over the desired chart title bar, or inner window title bar. The chart can be the same chart or a different chart.
3. Release the mouse button.

Deleting Indicators

You can delete an indicator by right-clicking on the indicator plot and choosing Delete from the shortcut menu. You can also delete an indicator by selecting the indicator and pressing the DEL key. An option in the Application Properties dialog (see page 32) controls whether or not you are asked to confirm the deletion of the object.



To delete an indicator

1. Position the mouse on the desired indicator plot.
2. Click the right mouse button.
3. Choose **Delete** from the shortcut menu or press the DEL key..

Viewing Indicator Values with the Data Window



Data Window button

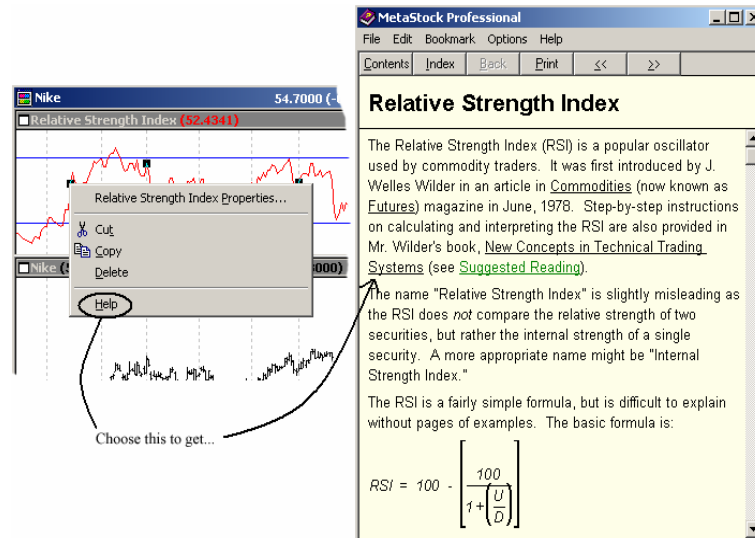
To see the numerical values of a chart at the mouse pointer's location, use the Data Window. The Data Window is displayed by choosing Data Window from the View menu. You can also display the Data Window by clicking the Data Window button on the toolbar. The Data Window continually updates to reflect the numerical values at the mouse pointer's location.

The name of the security being displayed is shown in the title bar of the Data Window. If the Data Window is docked the name appears inside the Data Window itself. Therefore, if you have multiple charts displayed on your screen, you can simply move the mouse from chart to chart and the Data Window will display the appropriate data.

See page 158 for more information on using the Data Window.

Online Indicator Interpretation

If you need help interpreting an indicator, MetaStock Pro's help system contains information on every indicator. Right-click on the plotted indicator and choose Help from the shortcut menu to get a help screen explaining the indicator and how to interpret it.



See page 441 for more information on interpreting indicators.

Indicator Parameters

The parameters for every indicator are listed on the following pages. The parameter pages for color/style and horizontal lines are identical for every indicator. See page 169 for information on the Color/Style page

within the indicator's Properties dialog. See page 169 for information on the Horizontal Lines page within the indicator's Properties dialog.

The parameters for an indicator are specified at the time the indicator is plotted. You can edit the parameters of a plotted indicator by double-clicking on the indicator (see page 167).

Accumulation Swing Index

The parameters for the Accumulation Swing index are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu. Note that the Accumulation Swing Index requires open prices to calculate.

Limit Move. The following table lists the limit moves for several commodities traded on the Chicago Board of Trade:

| Commodity | Limit Move |
|-------------|------------|
| Corn | \$0.10 |
| Heating Oil | \$0.04 |
| Soybeans | \$0.30 |
| T-bonds | \$3.00 |

You may need to adjust the limit moves shown in the above table based on the position of the decimal in your data files. For example, if the price of corn is quoted as \$2.45, the limit move would be \$0.10. However, if the price of corn is quoted as \$245.00, the limit move would be \$10.00.

If the security does not have a limit move (e.g., a stock or some futures), we suggest you enter the maximum value allowed (i.e., \$30,000).

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 446 for interpretation information on the Accumulation Swing Index.

Accumulation/Distribution

There are no parameters for the Accumulation/Distribution indicator.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 446 for interpretation information on the Accumulation/Distribution indicator.

Aroon

The parameters for the Aroon indicator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating Aroon. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 448 for interpretation information on Aroon indicator.

Average True Range

The parameters for the Average True Range are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating Average True Range. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 449 for interpretation information on the Average True Range indicator.

Bollinger Bands

The parameters for the Bollinger Bands are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Deviations. Enter the number of standard deviations by which to shift the upper and lower bands.

Horizontal Shift. Enter the number of periods to shift the Bollinger Bands. For example, enter "5" to shift them five periods to the right; enter "-5" to shift them five periods to the left; etc.

Method. Choose the moving average calculation method (i.e., simple, exponential, weighted, time series, triangular, variable, or volume adjusted).

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating Bollinger Bands.

If you edit the parameters of the middle band, all three bands are affected. If you edit the parameters of the upper or lower bands individually, only that band is affected. Therefore, if you want symmetrical bands, edit the parameters of the middle band only.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 449 for interpretation information on the Bollinger Bands.

Chaikin A/D Oscillator

There are no parameters for the Chaikin A/D Oscillator.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 451 for interpretation information on the Chaikin Oscillator.

Chaikin Money Flow

The parameters for the Chaikin Money Flow indicator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the indicator. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 454 for interpretation information on the Chaikin Money Flow indicator.

Chande Momentum Oscillator

The parameters for the Chande Momentum Oscillator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the indicator. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the indicator.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 455 for interpretation information on the Chande Momentum Oscillator.

Commodity Channel Index (CCI)

The parameters for the CCI are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the Commodity Channel Index. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 456 for interpretation information on the Commodity Channel Index.

Commodity Selection Index

The parameters for the Commodity Selection Index are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the Commodity Selection Index. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Value a \$.01 Move. In Wilder's book (see page 544), he uses \$50 for Soybeans, \$400 for Pork Bellies, and \$375 for Coffee.

Margin Requirement. Enter the margin requirement for the contract in dollars.

Commission Amount. Enter the commission cost in dollars.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 457 for interpretation information on the Commodity Selection Index.

Correlation

Before attempting to plot the Correlation indicator, you must first select two plots. This could be two price plots, an indicator and a price plot, or two indicators. The first plot selected will be the independent variable and the second, the dependent variable.

The parameters for the Correlation indicator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. This parameter specifies the number of time periods that are used to "smooth" the dependent and independent variables when determining their correlation.

Forward Shift. This parameter specifies the number of time periods to shift the independent variable's data forward. This can be used to determine whether a change in an indicator (the independent variable) "leads" a change in prices (the dependent variable). For example, if you find that an indicator has a high positive correlation to the security's price when shifted forward three periods, you may assume that a change in the

indicator today will predict a change in the security's price three periods from now.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 457 for interpretation information on Correlation Analysis.

To plot the Correlation indicator

1. Select the two plots that you want to correlate (i.e., two indicators, a price plot and an indicator, or two price plots). Select the first plot (the independent variable) by simply clicking on it. Select the second plot (the dependent variable) by holding down the SHIFT key and clicking on it. Small square handles will appear on the plots indicating that they are selected.
2. Drag the Correlation indicator from the Indicator QuickList and drop it on the chart.

Dema

The parameters for the Dema indicator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the indicator. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating DEMA.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 459 for interpretation information on the Dema indicator.

Demand Index

There are no parameters for the Demand Index.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 460 for interpretation information on the Demand Index.

Detrended Price Oscillator

The parameters for the Detrended Price Oscillator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the Detrended Price Oscillator. The term "time periods"

refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 461 for interpretation information on the Detrended Price Oscillator.

Directional Movement

There are five indicators comprising the Directional Movement system: +DI, -DI, ADX, ADXR, and DX.

The parameters for the Directional Movement indicators are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating Directional Movement. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 461 for interpretation information on the Directional Movement indicator.

Dynamic Momentum Index

The parameters for the Dynamic Momentum Index are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the Dynamic Momentum Index.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 462 for interpretation information on the Dynamic Momentum Index.

Ease of Movement

The parameters for the Ease of Movement are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating Ease of Movement. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Method. Choose the moving average calculation method (i.e., simple, exponential, weighted, time series, triangular, variable, or volume adjusted).

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 463 for interpretation information on the Ease of Movement indicator.

Envelope

The parameters for Envelopes are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the envelopes. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Vertical Shift %. Enter the percentage to shift the upper and lower envelopes from the base moving average. For example, enter "10" to shift the envelopes 10 percent above and below the base moving average.

Horizontal Shift. Enter the number of periods to shift the envelopes. For example, enter "5" to shift the envelopes five periods to the right; enter "-5" to shift the envelopes five periods to the left; etc.

Method. Choose the moving average calculation method (i.e., simple, exponential, weighted, time series, triangular, variable, or volume adjusted).

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the envelopes.

When you initially plot envelopes, the above options affect the upper and lower envelopes equally. However, after the envelopes are plotted, you can edit the parameters of each band separately.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 464 for interpretation information on Envelopes.

Forecast Oscillator

The parameters for the Forecast Oscillator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the indicator. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the indicator.

Signal Moving Average Time Periods. Enter the number of time periods to use when calculating the Forecast Oscillator's signal line. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Style. Choose the line style for the signal line. Note that the style for the Forecast Oscillator line itself is changed from the Color/Style page in the MACD Properties dialog.

Color. Choose the color for the signal line. Note that the color for the Forecast Oscillator line itself is changed from the Color/Style page of the MACD Properties dialog.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 467 for interpretation information on the Forecast Oscillator.

Fourier Transform

The parameters for the Fourier Transform are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Interpreted. Choose this option if you want MetaStock Pro to interpret the Fourier data and display the information in an easily understood format.

Raw. Choose this option if you want MetaStock Pro to display the raw (i.e., more detailed and complex) Fourier data.

If you select *Raw*, you will be prompted for the following additional parameters:

Time Periods. Enter the number of time periods to analyze.

Sample Length. The Fourier Transform can group a number of data values together and analyze them as a "set of sets." For example, selecting 5 will group the data into sets of 5 periods. The maximum value for the sample length is 1/4 the number of time periods loaded, but the maximum useful sample length is around 5.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the Fourier Transform.

Method. Choose the type of analysis, either Amplitude (strength) or Spectrum.

Smoothing. Choose the smoothing method to remove trends from the data (normalization method). The choices are Detrend (linear regression) and Mean (averaging) .

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 468 for interpretation information on Fourier Transform.

Herrick Payoff Index

The parameters for the Herrick Payoff Index are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu. Note that the Herrick Payoff Index requires open interest to calculate.

One Cent Move. According to Herrick, the recommended input for "the value of a one cent move" is "100" for most commodities. The only exception is for Silver, which should be "50."

Multiplying Factor. The multiplying factor is part of a complex smoothing mechanism. However, the results are similar to the smoothing obtained by a moving average. For example, a multiplying factor of ten produces results similar to a 10-period moving average.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 470 for interpretation information on the Herrick Payoff Index.

Inertia

The parameters for the Inertia indicator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the indicator. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

RVI Periods. Enter the number of periods to use for the Relative Volatility Index (RVI) which the Inertia indicator is based on.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the indicator.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 471 for interpretation information on the Inertia indicator.

Intraday Momentum Index

The parameters for the Intraday Momentum Index are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu. Note that the Intraday Momentum Index requires open prices to calculate.

Time Periods. Enter the number of time periods to use when calculating the indicator. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 472 for interpretation information on the Intraday Momentum Index.

Klinger Oscillator

The parameters for the Klinger Oscillator are shown below. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the oscillator's signal line. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Style. Choose the line style for the signal line. Note that the style for the oscillator itself is changed from the Color/Style page of the Klinger Oscillator Properties dialog.

Color. Choose the color for the signal line. Note that the color for the oscillator itself is changed from the Color/Style page in the Klinger Oscillator Properties dialog.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 474 for interpretation information on the Klinger Oscillator.

Linear Regression Indicator

The parameters for the Linear Regression indicator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the indicator. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the indicator.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 476 for interpretation information on the Linear Regression indicator.

Linear Regression Slope

The parameters for the Linear Regression Slope are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the indicator. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the indicator.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 476 for interpretation information on the Linear Regression Slope.

MACD

The parameters for the MACD are shown below. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

In order to maintain the mathematical integrity of the MACD as prescribed by Gerald Appel, MetaStock Pro does not allow the time periods in the MACD to be changed. The MACD is actually the difference between 0.075 and 0.15 exponential moving averages. No exact time periods (using whole numbers) correspond with these percentages. If you want to plot an MACD-like indicator using moving averages other than the ones recommended by Gerald Appel, use the Price Oscillator (see page 191).

Signal Time Periods. Enter the number of time periods to use when calculating the MACD's signal line. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Style. Choose the line style for the signal line. Note that the style for the MACD line itself is changed from the Color/Style page in the MACD Properties dialog.

Color. Choose the color for the signal line. Note that the color for the MACD line itself is changed from the Color/Style page of the MACD Properties dialog.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 478 for interpretation information on the MACD.

Market Facilitation Index

There are no parameters for the Market Facilitation Index.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 479 for interpretation information on the Market Facilitation Index.

Mass Index

The parameters for the Mass Index are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the Mass Index. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 481 for interpretation information on the Mass Index.

Median Price

There are no parameters for the Median Price.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 481 for interpretation information on the Median Price indicator.

MESA Sine Wave Indicator

The parameters for the MESA Sine Wave indicator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the MESA Sine Wave indicator. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Mesa Lead Sine. Choose the style and color for the lead sine plot.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 482 for interpretation information on the MESA Sine Wave indicator.

Momentum

The parameters for the Momentum indicator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating Momentum. The term "time periods" refers to days if the

chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating Momentum.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 483 for interpretation information on the Momentum indicator.

Money Flow Index

The parameters for the Money Flow Index are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the Money Flow Index. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 483 for interpretation information on the Money Flow Index.

Moving Average

The parameters for a moving average are shown below. These parameters are specified at the time the moving average is plotted. You can edit the parameters of an existing moving average by right-clicking on the moving average and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the moving average. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Vertical Shift %. Enter the percentage to shift the moving average up or down. For example, enter "10" to shift the moving average upward by 10 percent; enter "-5" to shift the moving average downward by 5 percent.

Horizontal Shift. Enter the number of periods to shift the moving average. For example, enter "5" to shift the moving average five periods to the right; enter "-5" to shift the moving average five periods to the left; etc.

Method. Choose the moving average calculation method (i.e., simple, exponential, weighted, time series, triangular, variable, and volume adjusted).

Price Field. Choose the price field (i.e., open, high, low, close, median price, or typical price) to use when calculating the moving average. The

median price (see page 481) is defined as the $(\text{high} + \text{low}) / 2$ and the typical price (see page 532) is defined as the $(\text{high} + \text{low} + \text{close}) / 3$.

When plotting a moving average on an existing indicator, there may be times that you want to hide the indicator and just show the moving average. If you delete the indicator, the moving average will also disappear since it is dependent on the indicator for the calculation. However, you can hide the indicator, by choosing the Invisible Style from the indicator's Properties dialog.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 488 for interpretation information on moving averages.

Negative Volume Index

The parameters for the Negative Volume Index are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the moving average.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 490 for interpretation information on the Negative Volume Index.

On Balance Volume

The parameters for the On Balance Volume are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the moving average.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 493 for interpretation information on On Balance Volume.

Open Interest

There are no parameters for Open Interest. Note that your security files must contain open interest in order to plot open interest.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 494 for interpretation information on the Open Interest.

Option Expiration

There are no parameters for the Option Expiration indicator.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 495 for interpretation information on the Option Expiration indicator.

Option Delta, Gamma, Price, Theta, Vega

The parameters for the Option indicators are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Put or Call. Choose the type of option.

Equity or Future. Choose the underlying security type. The Black-Scholes model must be adjusted for options on futures, because no initial investment (other than a margin deposit) is required to open a future position. You should choose Equity if you are analyzing an index option.

Expiration Date. Enter the date the option contract expires. In the USA, this is usually the third Friday of the expiration month.

Strike Price. Enter the option's strike price.

Interest Rate. Enter the short-term "risk free" interest rate (e.g., 13-week T-bills). The interest rate should be entered as a percentage (e.g., 4.75).

Annual Dividend. Enter the total of the most recent four quarters of dividend payments per share (e.g., 3.00). If no dividends were paid, enter 0.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 494 for interpretation information on Option indicators.

Option Life

The parameters for the Option Life are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Expiration Date. Enter the date the option contract expires. In the USA this is usually the third Friday of the expiration month.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 495 for interpretation information on Option Life.

Option Volatility

There are no parameters for Option Volatility.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 496 for interpretation information on Option Volatility.

Parabolic SAR

The parameters for the Parabolic SAR are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Step. As a trade makes new highs/lows, the Parabolic SAR will rise/fall according to the SAR step size. For example, if the trade makes new highs for three consecutive days, then the SAR step increases by 0.02 each day (i.e., 0.02 to 0.04 to 0.06, etc.). The author (Welles Wilder) recommends a step size of 0.02 for most securities.

Maximum. Enter the maximum value the SAR Step can obtain. The author recommends an SAR Maximum of 0.20 for most securities.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 496 for interpretation information on the Parabolic SAR.

Performance

The parameters for the Performance are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the Performance indicator.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 497 for interpretation information on the Performance indicator.

Polarized Fractal Efficiency

The parameters for the Polarized Fractal Efficiency indicator (PFE) are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the indicator. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Smoothing Periods. Enter the number of periods to use when smoothing the PFE.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the PFE.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 498 for interpretation information on the Polarized Fractal Efficiency indicator.

Positive Volume Index

The parameters for the Positive Volume Index are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the Positive Volume Index.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 499 for interpretation information on the Positive Volume Index.

Price Channel

The parameters for the Price Channel are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the indicator. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 500 for interpretation information on the Price Channel.

Price Oscillator

The parameters for the Price Oscillator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Short-term. Enter the number of time periods in the short-term moving average.

Long-term. Enter the number of time periods in the long-term moving average.

Method. Choose the moving average calculation method (i.e., simple, exponential, weighted, time series, triangular, or variable).

Percent or **Points.** Choose the method to use when displaying the relationship between the two moving averages. Choose Percent to see the ratio (in percent) between the short- and long-term moving averages. Choose Points to see the point difference.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 501 for interpretation information on the Price Oscillator.

Price Rate-Of-Change

The parameters for the Price Rate-Of-Change are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating Price Rate-Of-Change. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Percent or Points. Choose the method to use when displaying the change in the prices. Choose Percent to see the ratio (in percent) between the prices. Choose Points to see the point difference.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 501 for interpretation information on the Price Rate-Of-Change.

Price Volume Trend

The parameters for the Price Volume Trend are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Price Field. Choose the price field (i.e., open, high, low or close) to use when calculating the Price Volume Trend.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 503 for interpretation information on the Price Volume Trend.

Projection Bands

The parameters for the Projection Bands are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the indicator. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 504 for interpretation information on Projection Bands.

Projection Oscillator

The parameters for the Projection Oscillator are shown below. These parameters are specified at the time the indicator is plotted. You can edit

the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the indicator. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Slowing Periods. Enter the number of time periods used in the moving average trigger line.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 504 for interpretation information on the Projection Oscillator.

Qstick

The parameters for the Qstick indicator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu. Note that the Qstick requires open prices to calculate.

Time Periods. Enter the number of time periods to use when calculating the indicator. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Method. Choose the method used to calculate the moving average of the difference between opening and closing prices.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 505 for interpretation information on the Qstick indicator.

r-squared

The parameters for the r-squared indicator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the indicator. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the indicator.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 506 for interpretation information on the r-squared indicator.

Random Walk Index

The parameters for the Random Walk Index are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

The Random Walk Index automatically determines the optimum time periods to use in the calculation. You can control the range of time periods analyzed by setting the minimum and maximum values. The author of the indicator recommends values of 8 and 64 (the defaults) for long-term analysis, and 2 and 7 for short-term.

Minimum Time Periods. Enter the minimum number of time periods to consider when calculating the indicator. The term "time periods" refers to 5 minutes if the chart contains 5-minute data, days if the chart contains daily data, weeks if the chart contains weekly data, etc.

Maximum Time Periods. Enter the number of maximum number of time periods to consider when calculating the indicator. The term "time periods" refers to 5 minutes if the chart contains 5-minute data, days if the chart contains daily data, weeks if the chart contains weekly data, etc.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 509 for interpretation information on the Random Walk Index.

Range Indicator

The parameters for the Range Indicator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the indicator. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Smoothing Periods. Enter the number of periods to use when smoothing the Range Indicator.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 509 for interpretation information on the Range Indicator.

Relative Momentum Index

The parameters for the Relative Momentum Index are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the indicator. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Momentum. Enter the number of periods to use when calculating the momentum component of the Range Indicator.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the indicator.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 510 for interpretation information on the Relative Momentum Index.

Relative Strength Comparative

The parameters for the Relative Strength Comparative indicator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Security and Folder. Click the Browse button to select the security with which to compare the chart's base security. This is usually a market index like the S&P 500. The chart's base security is divided by the selected security.

Normalize To Start At Zero. Check this box if you want the indicator to be "normalized" to start at zero. This is done by subtracting the beginning Relative Strength ratio (for the first bar loaded in the chart) from every subsequent value. This is helpful for comparing one security's Relative Strength with another's.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 511 for interpretation information on the Relative Strength Comparative indicator.

Relative Strength Index (RSI)

The parameters for the RSI are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the Relative Strength Index. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the Relative Strength Index.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 512 for interpretation information on the Relative Strength Index.

Relative Volatility Index

The parameters for the Relative Volatility Index are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the indicator. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the indicator.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 513 for interpretation information on the Relative Volatility Index.

Spread

The parameters for the Spread indicator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Security and Folder. Click the Browse button to select the security with which to spread against the chart's base security. The selected security is subtracted from the chart's base security.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 516 for interpretation information on the Spread indicator.

Standard Deviation

The parameters for the Standard Deviation indicator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the Standard Deviation. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Deviations. Enter the number of standard deviations by which to shift the plot upward.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the Standard Deviation.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 516 for interpretation information on Standard Deviation.

Standard Error

The parameters for the Standard Error indicator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the indicator. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the indicator.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 518 for interpretation information on Standard Error.

Standard Error Bands

The parameters for the Standard Error Bands are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the indicator. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Standard Error. Enter the number of standard errors by which to shift the upper and lower bands.

Horizontal Shift. Enter the number of periods to shift the Standard Error Bands. For example, enter "5" to shift them five periods to the right; enter "-5" to shift them five periods to the left; etc.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the indicator.

Smoothing Periods. Enter the number of periods to use for the smoothing (i.e., the moving average calculation).

Smoothing Method. Choose the moving average calculation method (i.e., simple, exponential, weighted, time series, triangular, variable, or volume adjusted).

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 519 for interpretation information on Standard Error Bands.

Stochastic Momentum Index

The parameters for the Stochastic Momentum Index are shown below. These parameters are specified at the time the indicator is plotted. You

can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

%K Time Periods. Enter the number of time periods used in the %K calculation.

%K Smoothing Periods. Enter the number of time periods used in the internal smoothing of the %K value.

Double Smooth Periods. Enter the number of time periods used in the double smoothing component of the %K value.

%D Time Periods. Enter the number of time periods used in the moving average signal line of %K. This is plotted as a dotted line (default) on top of %K.

Method. Choose the method (i.e., exponential, simple, weighted, time series, triangular, or variable) used to calculate %D.

Style. Choose the line style (i.e., solid, dashed, etc.) used for the %D.

Color. Choose the color used for the %D.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 521 for interpretation information on the Stochastic Momentum Index.

Stochastic Oscillator

The parameters for the Stochastic Oscillator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

%K Time Periods. Enter the number of time periods used in the stochastic calculation.

%K Slowing. Enter the number of time periods used in the internal smoothing of the %K value. A value of 1 is considered a fast stochastic; the default value of 3 is considered a slow stochastic.

%D Time Periods. Enter the number of time periods used in the moving average of %K. This is plotted as a dotted line (default) on top of %K.

%D Method. Choose the method (i.e., exponential, simple, weighted, time series, triangular, or variable) used to calculate %D.

%D Style. Choose the line style (i.e., solid, dashed, etc.) used for the %D.

%D Color. Choose the color used for the %D.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 522 for interpretation information on the Stochastic Oscillator.

Swing Index

The parameters for the Swing Index are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu. Note that the Qstick requires open prices to calculate.

Limit Move. The table below lists the limit moves for several commodities traded on the Chicago Board of Trade:

| Commodity | Limit Move |
|-------------|------------|
| Corn | \$0.10 |
| Heating Oil | \$0.04 |
| Soybeans | \$0.30 |
| T-bonds | \$3.00 |

You may need to adjust the limit moves shown in the above table based on the position of the decimal in your data files. For example, if the price of corn is quoted as \$3.45, the limit move would be \$0.10. However, if the price of corn is quoted as \$345.00, the limit move would be \$10.00.

If the security does not have a limit move (e.g., a stock or some futures), we suggest you enter the maximum value allowed (i.e., \$30,000).

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 525 for interpretation information on the Swing Index.

TEMA

The parameters for the TEMA indicator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the TEMA indicator. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the indicator.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 525 for interpretation information on the TEMA indicator.

Time Series Forecast

The parameters for the Time Series Forecast are shown below. These parameters are specified at the time the indicator is plotted. You can edit

the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the Time Series Forecast. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the Time Series Forecast.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 527 for interpretation information on the Time Series Forecast.

Trade Volume Index

The parameters for the Trade Volume Index are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Minimum Tick. This controls when volume switches from the buy side to the sell side. If the absolute value of the uptick or downtick is less than the Minimum Tick Value, MetaStock Pro will continue to assign the volume to the current side (i.e., buy or sell side). If the absolute value of the price change is greater than the Minimum Tick Value and the price changes direction, MetaStock Pro will switch and begin assigning volume to the opposite side.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the Trade Volume Index.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 529 for interpretation information on the Trade Volume Index.

TRIX

The parameters for the TRIX are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating TRIX. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating TRIX.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 532 for interpretation information on the TRIX indicator.

Typical Price

There are no parameters for Typical Price.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 532 for interpretation information on Typical Price.

Ultimate Oscillator

The parameters for the Ultimate Oscillator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

First Cycle. Enter the number of time periods in the short-term cycle.

Second Cycle. Enter the number of time periods in the intermediate-term cycle.

Third Cycle. Enter the number of time periods in the long-term cycle.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 533 for interpretation information on the Ultimate Oscillator.

Vertical Horizontal Filter (VHF)

The parameters for the VHF are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the Vertical Horizontal Filter. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the Vertical Horizontal Filter.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 533 for interpretation information on the Vertical Horizontal Filter.

Volatility (Chaikin's)

The parameters for the Chaikin's Volatility indicator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Moving Average. Enter the number of time periods to use when smoothing the differences between the high and low prices. The author (Marc Chaikin) recommends a value of 10.

Rate-of-Change. Enter the number of time periods to use when calculating the percent rate-of-change of the moving average. The author (Marc Chaikin) recommends a value of 10.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 534 for interpretation information on Chaikin's Volatility.

Volume

The parameters for the Volume indicator are shown below. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu. Note that your security files must contain volume in order to plot volume.

Zero-Based. Check this box if you want the volume bars to be scaled with a base of zero. If the box is unchecked, the volume is scaled using the lowest volume bar as a base.

Some real-time data vendors do not provide volume with every tick. If this is the case, MetaStock Pro will automatically assign a volume value of "1" for every incoming tick. This allows you to see the number of "ticks" that have come in during a specified period. For example, if the volume on a 1-minute bar is 22, 22 trades came in during that minute.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 535 for interpretation information on Volume.

Volume Oscillator

The parameters for the Volume Oscillator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Short-term. Enter the number of time periods in the short-term moving average.

Long-term. Enter the number of time periods in the long-term moving average.

Method. Choose the moving average calculation method (i.e., simple, exponential, weighted, time series, triangular, variable, or volume adjusted).

Percent or Points. Choose the method to use when displaying the relationship between the two moving averages. Choose Percent to see the ratio (in percent) between the short- and long-term moving averages. Choose Points to see the point difference.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 535 for interpretation information on the Volume Oscillator.

Volume Rate-Of-Change

The parameters for the Volume Rate-Of-Change are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the Volume Rate-Of-Change. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Percent or Points. Choose the method to use when displaying the change in the volume. Choose Percent to see the ratio (in percent) between the volume figures. Choose Points to see the point difference.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 536 for interpretation information on the Volume Rate-Of-Change.

Weighted Close

There are no parameters for Weighted Close.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 537 for interpretation information on the Weighted Close indicator.

Wilder's Smoothing

The parameters for the Wilder's Smoothing indicator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the Wilder's Smoothing indicator. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the Wilder's Smoothing indicator.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 537 for interpretation information on the Wilder's Smoothing indicator.

Williams' %R

The parameters for the Williams' %R are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the Williams' %R. The term "time periods" refers to days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 538 for interpretation information on Williams' %R.

Williams' Accumulation/Distribution

There are no parameters for Williams' Accumulation/Distribution.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 539 for interpretation information on Williams' Accumulation/Distribution.

Zig Zag

The parameters for the Zig Zag are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the Zig Zag.

Reversal Amount. Enter the amount that will cause a reversal. For example, if you enter "5," a five percent move is required to cause a bend (i.e., zig or zag) in the Zig Zag indicator.

Percent or Points. Choose the calculation method to use for the reversal amount. Choose Percent if you want the Reversal Amount calculated in percent. Choose Points if you want the Reversal amount calculated in points.

See page 167 for information on the Color/Style and Horizontal Lines pages. See page 539 for interpretation information on the Zig Zag indicator.

Working with Line Studies

What is a Line Study?

Line studies are plots that you draw or place on a chart to help interpret price or indicator movement. Examples are trendlines, Fibonacci Arcs, ellipses, Gann Angles, vertical lines, etc. Although not officially designated as line studies, text and symbols are very similar to line studies in the way they are placed on a chart. Text and symbols are also covered in this chapter.

Every line study is an object containing its own set of parameters that can be accessed by right-clicking directly on the study.

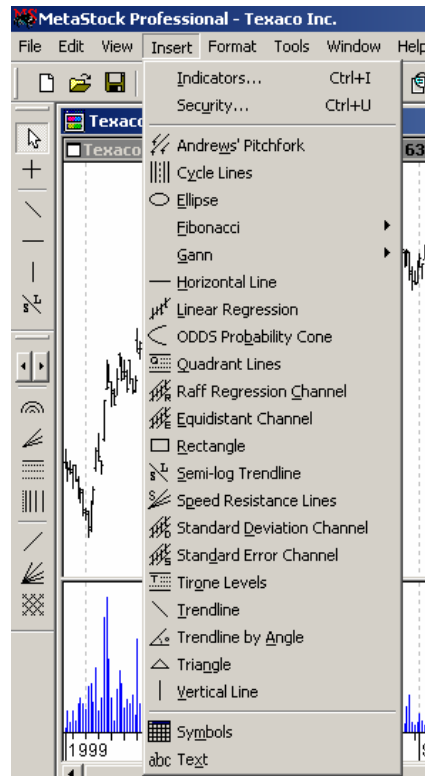
Most line studies are contained within a single inner window. However, some line studies (e.g., cycle lines, Fibonacci Time Zones, and vertical lines) can span vertically across all inner windows within a chart.

There are two types of line studies--those that are line based and those that aren't. Line studies that are line based require you to click and drag a line between a starting and ending point to draw the line study. Those that aren't line based appear as soon as the mouse pointer is inside an inner window. A mouse click anchors the line study.

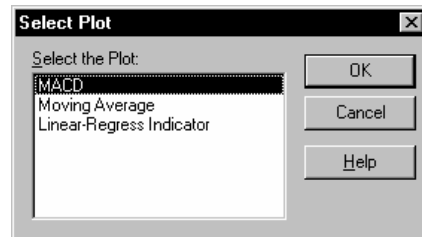
Linear Regression Lines, Quadrant Lines, Speed Resistance Lines, Raff Regression Channels, and Tirone Levels require actual pricing data to plot. When these line studies are plotted on Kagi, Point & Figure, Three Line Break, or Renko charts, they use all the data in all the columns.

Drawing a Line Study

Line studies are drawn on a chart by either selecting the desired button on the appropriate drawing toolbar or by choosing the line study from the Insert menu.



Line studies are attached to the closest plot to the mouse pointer when you first click to begin drawing. You can change the plot a line study is attached to from the Select Plot dialog. Right-click on the line study and choose Scaling to display the Select Plot dialog.

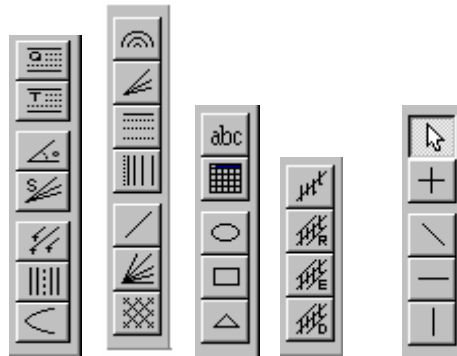


To draw a line study

1. Choose the desired line study from the appropriate drawing toolbar or the Insert menu.
2. If the line study is trendline based, position the mouse at the starting point, ***click and hold*** the left mouse button, and drag the line study to an ending point.
3. If the line study is not trendline based, simply position the mouse at the location you want to anchor it and click the left mouse button.

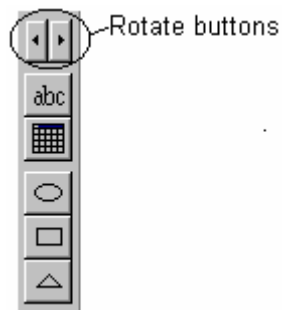
The Five Groups of Line Studies

The following illustrations show the five toolbars of line studies available.



Data Gann Text Channel Trendline

The Studies toolbar combines the Data, Gann, Channel, and Text groups of tools. Use the rotate buttons to rotate between these five groups of lines studies. The Trendline toolbar is always displayed.



Select Mode versus Drawing Mode

When you choose a line study, the mouse pointer changes appearance to indicate that you have switched from "select" mode to "drawing" mode. When you are in drawing mode, you can draw the chosen line study, but you cannot select other objects on the chart (e.g., price plots or line studies).

To return to select mode after drawing a line study, click the Select Mode button on the trendline toolbar. An Application property (see page 31) controls whether you return to select mode immediately after drawing a line study or remain in drawing mode.

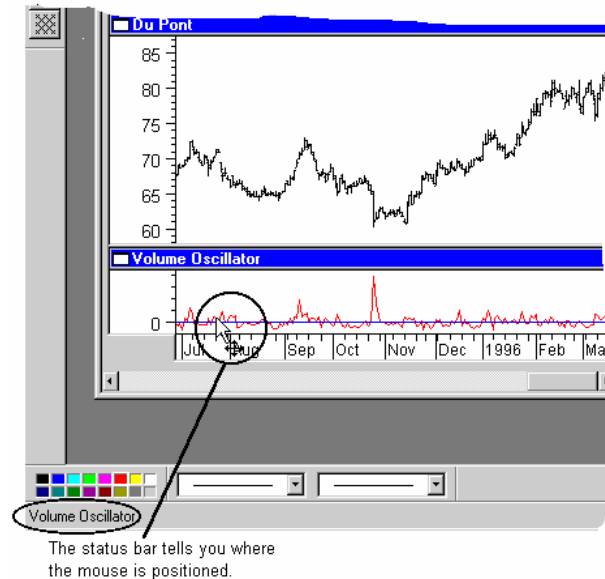


Select Mode button

Helpful Feedback from the Status Bar

The status bar provides helpful feedback when drawing line studies. It tells you where the mouse pointer is positioned by showing the date/time

and the y-axis value as you are drawing, which can be very helpful on a crowded chart.



Modifying a Line Study

After a line study is drawn, you can modify any of its properties (e.g., start/end date, color, etc.) with the line study's Properties dialog. Line studies can also be copied or moved to a new inner window in the same chart or in a different chart. You can also reposition line studies.

A line study's Properties dialog can be accessed three ways:

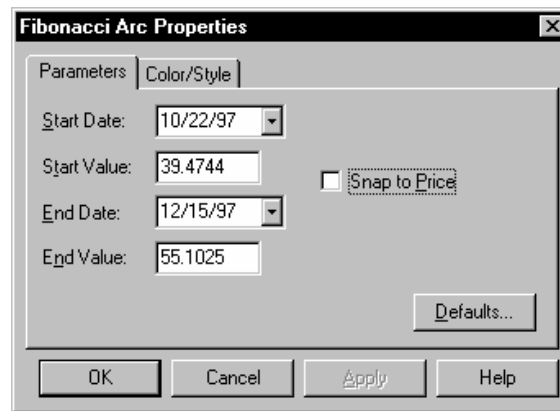
- You can right-click directly on the line study and choose Properties from the shortcut menu.
- You can double-click directly on the line study.
- You can click the line study to select it and then choose Selected Object from the Format menu.

You can press the TAB key to cycle through all selectable objects on a chart.

When you are clicking (either double-clicking or right-clicking) on a line study and the line study is closely surrounded by other plots (i.e., prices, moving averages, etc.), an ambiguity menu may pop up prompting you to choose the desired line study.



The following Properties dialog for a Fibonacci Arc is typical of many line studies.



To modify the properties of a line study

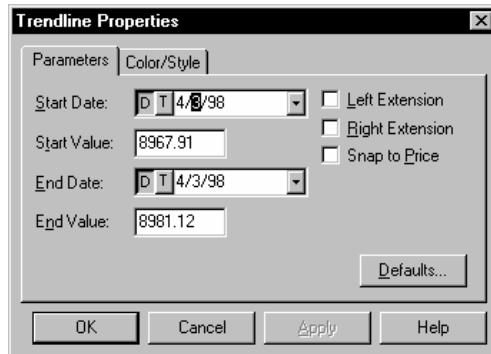
1. Position the mouse on the plotted line study and right-click.
2. Choose **Properties**.
3. Make the desired changes from the line study's Properties dialog.
4. Click the **OK** button.

Properties Common to Many Line Studies

Every line study Properties dialog contains two pages--a Parameters and a Color/Style page. The Color/Style page for every line study is identical, although the Parameters page is unique to each line study. Several controls are common to many line studies as explained below.

Parameters Page

The Parameters page for many line studies includes one (or more) of the seven controls shown in the Trendline Parameters page below.



Start Date. This is the date/time the line study starts. You can modify this date/time by typing in a new one or by selecting the line study and dragging the leftmost handle left or right. Click the "D" button to enter dates. Click the "T" button to enter times.

Start Value. This is the y-axis value at the starting point of the line study. You can modify this value by typing in a new one or by selecting the line study and dragging the leftmost handle up or down.

End Date. This is the date/time the line study ends. You can modify this date/time by typing in a new one or by selecting the line study and dragging the rightmost handle left or right. Click the "D" button to enter dates. Click the "T" button to enter times.

End Value. This is the y-axis value at the ending point of the line study. You can modify this value by typing in a new one or by selecting the line study and dragging the rightmost handle up or down.

Left Extension. Check this box if you want the line study extended to the left before the Start Date. Even though a line study is extended, it retains its original start and end dates so that the original rendering of the trendline can be restored (if desired).

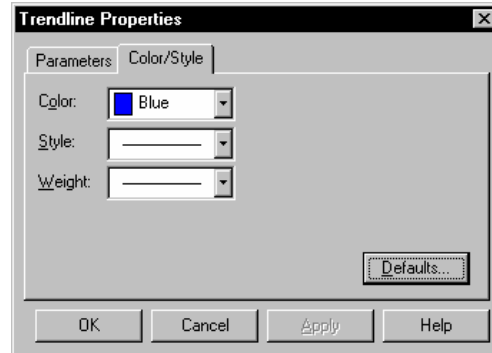
Right Extension. Check this box if you want the line study extended to the right beyond the End Date. Even though a line study is extended, it retains its original start and end dates.

Snap to Price. Check this box if you want the line study's ending points to automatically snap to the open, high, low, or close prices when plotting and dragging. Line studies snap to the high price if the mouse pointer is above the price bar. The end points snap to the low price when the mouse pointer is below the price bar. If the mouse pointer is between the high and low, the line study's end point snaps to either the open or close price depending on which one it's closest to.

Color/Style Page

The Color/Style page is used to modify the selected line study only. If you want to change the color/style for all new line studies, use the Default Colors & Styles command in the Tools menu (see page 170).

You can also change the color and line style of the line study by using the color and line style toolbars (see page 25).



Color. This drop-list is used to choose the line study's color.

Style. This drop-list is used to choose the line study's line style.

Weight. This drop-list is used to choose the thickness of the line study. If you select a heavier weight, the Style will always appear as a solid line.

Adjusting, Copying, Deleting, and Moving Line Studies

Just as price plots and indicators can be moved around using drag and drop techniques, so can line studies. Perhaps you want to copy a trendline to make parallel channels above and below the price plot. Or maybe you'd like to adjust the range of the Fibonacci Retracements a bit. Or maybe you'd like to remove an old trendline from your chart. This can easily be done using common Windows techniques (i.e., click, drag and drop).

Sometimes when you are trying to click on a line study that is crowded among other plots, a pop-up "ambiguity" menu appears from which you can select the desired line study. See page 147 for more information.

You can select multiple line studies for copying, moving, or deleting by holding down the SHIFT key as you click your left mouse button.

Copying and Moving Line Studies

Copying and moving a line study involves basic drag and drop techniques. The only difference between copying and moving is that you hold the CTRL key down when copying. When the mouse pointer is positioned over a line study, the mouse pointer displays a four-sided arrow (i.e., the move cursor) indicating that the line study can be moved. A line study can be dragged to a new location anywhere within the current chart or a different chart.

When a line study (or any object) is being copied, a small plus sign appears next to the mouse pointer while dragging.



When you drag a line study and drop it into an existing inner window, the Scaling Options dialog may appear prompting you to decide how to handle the scaling (see page 156).

Copying a trendline is an excellent way to create channel lines above and below a price plot.



You can select multiple plots by holding down the SHIFT key as you click.

A unique characteristic of line studies is that they can be copied along with an indicator. For example, if you have a trendline drawn on an indicator, you can select both the indicator and trendline and drag them to a new location.

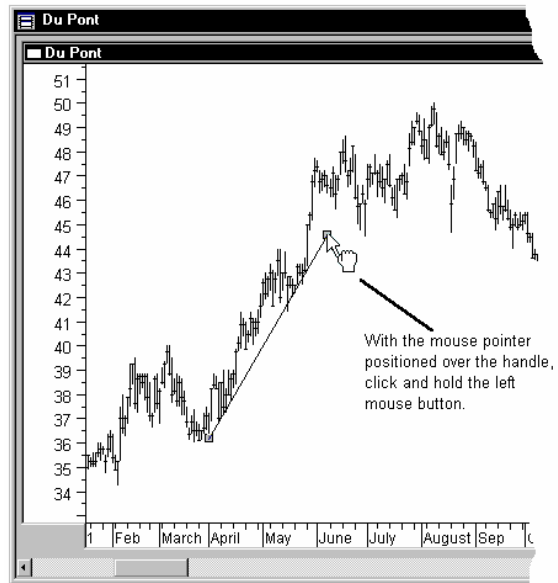
To move (or copy) a line study

1. Position the mouse over the line study you want to move or copy.
2. Hold the CTRL key down (for copying only). Click **and hold** the left mouse button and drag the line study to another location within the inner window.
3. Release the mouse button.
4. Choose the desired option from the Scaling Options dialog (see page 156) and click **OK**.

Adjusting Line Studies

Line studies are adjusted directly on the chart by selecting the line study, positioning the mouse pointer over one of the square handles and dragging. When the mouse pointer is positioned on a handle, a closed hand appears next to the mouse indicating that the line study can be adjusted.

The following illustrations show how a line study is adjusted.



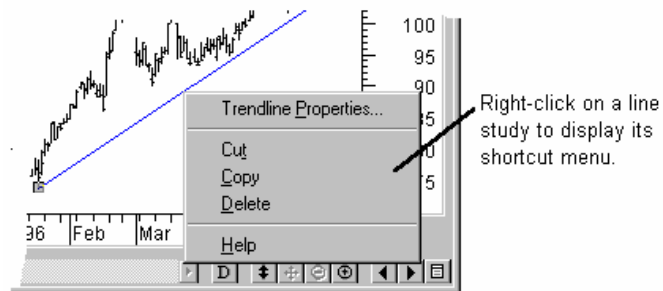
To adjust a line study

1. Position the mouse pointer over the line study you want to adjust and click the left mouse button.
2. Position the mouse pointer over one of the small square handles on the line study.
3. Click ***and hold*** the left mouse button and drag the handle to another location.

4. Release the mouse button.

Deleting Line Studies

You can delete a line study by right-clicking on the line study and choosing Delete from the shortcut menu. You can also delete a line study by selecting the line study and pressing the DEL key. An option in the Application Properties dialog (see page 32) controls whether or not you are asked to confirm the deletion.



If you want to quickly delete all line studies from a chart, choose Delete All from the Edit menu (see page 109).

To delete a line study

1. Position the mouse on the desired line study.
2. Click the right mouse button.
3. Choose **Delete** from the shortcut menu.

To delete all line studies from a chart

1. Select the chart from which you want to delete the line studies.
2. Choose **Delete All** from the Edit menu. Click the **Line Studies** box and click **OK**.

Line Study Parameters

Andrews' Pitchfork

The parameters for Andrews' Pitchfork are shown below. You can edit the parameters of an Andrews' Pitchfork that's already plotted by right-clicking on it and choosing Andrews' Pitchfork Properties from the shortcut menu.

First Date. This is the date/time of the first marked point.

First Value. This is the y-axis value of the first marked point.

Second Date. This is the date/time of the second marked point.

Second Value. This is the y-axis value of the second marked point.

Third Date. This is the date/time of the third marked point.

Third Value. This is the y-axis value of the third marked point.

See page 209 for information on the other controls in this page.

For general information on line studies, see page 205. For interpretation information on Andrews' Pitchfork, see page 447.

Drawing Tips

The Andrews' Pitchfork line study requires that you mark three separate points on your chart. The first point is usually a major peak or trough on the left side of the chart. The second and third points are drawn at a major peak and major trough to the right of the first point.

Cycle Lines

The parameters for Cycle Lines are shown below. You can edit the parameters of Cycle Lines that are already plotted by right-clicking on them and choosing Cycle Lines Properties from the shortcut menu.

Date. This is the date/time on which the dotted "reference" line is drawn. The remaining cycle lines are drawn on either side of the reference line at the specified spacing interval.

Spacing. This is the number of periods between cycle lines. The initial spacing is set by positioning the mouse pointer at a starting point and clicking and dragging the mouse until the lines are the desired distance apart.

Show Lines in All Windows. Check this box if you want the cycle lines to extend vertically across all inner windows within the chart.

For general information on line studies, see page 205. For interpretation information on Cycle Lines, see page 458.

Drawing Tips

When drawing cycle lines, remember to click the mouse (don't release) and drag to control the spacing of the cycle lines.

Ellipse

The parameters for an Ellipse are shown below. You can edit the parameters of an Ellipse that's already plotted by right-clicking on it and choosing Ellipse Properties from the shortcut menu.

Force Circular. Check this box if you want the ellipse to maintain a circular shape at all times (even when resizing).

See page 209 for information on the other controls in this page.

For general information on line studies, see page 205.

Equidistant Channel Trendlines

The parameters for Equidistant Channel Trendlines are shown below. You can edit the parameters of Equidistant Channel Trendlines that are already plotted by right-clicking on them and choosing Equidistant Channel Trendlines Properties from the shortcut menu.

Distance. This is the distance between the two lines, expressed as a y-axis value.

Up. When this box is checked, the channel appears above the line you draw. When the box is unchecked, the channel appears below the line you draw.

Reflections. This number determines how many channels appear in addition to the first one you draw.

See page 209 for information on the other controls in this page.

For general information on line studies, see page 205.

Fibonacci Arcs

You can edit the parameters of a Fibonacci Arc that's already plotted by right-clicking on it and choosing Fibonacci Arcs Properties from the shortcut menu.

See page 209 for information on the controls in this page. For general information on line studies, see page 205. For interpretation information on Fibonacci Arcs, see page 466.

Drawing Tips

Fibonacci Arcs are based on a trendline that you draw between a significant trough and peak. If the trendline is rising, the arcs will point upward; if the trendline is falling, the arcs will point downward.

Fibonacci Arcs are drawn to appear circular on the average screen regardless of the number of periods displayed. This means the locations at which the arcs cross the data will vary depending on the number of periods displayed and the shape of the window; it also means that the arcs may appear oblong on some laptop computers.

Fibonacci Fans

You can edit the parameters of a Fibonacci Fan that's already plotted by right-clicking on it and choosing Fibonacci Fans Properties from the shortcut menu.

See page 209 for information on the controls in this page. For general information on line studies, see page 205. For interpretation information on Fibonacci Fans, see page 466.

Drawing Tips

Fibonacci Fans are based on a trendline that you draw between a significant trough and peak. If the trendline is rising, the fan lines point upward; if the trendline is falling, the fan lines will point downward.

Fibonacci Retracements

You can edit the parameters of a Fibonacci Retracement that is already plotted by right-clicking on it and choosing Fibonacci Retracements Properties from the shortcut menu.

See page 209 for information on the controls in this page. For general information on line studies, see page 205. For interpretation information on Fibonacci Retracements, see page 466.

Show Retracement Labels. Check this box if you want the percent labels to be displayed next to the retracement lines.

Drawing Tips

Fibonacci Retracements are based on a trendline that you draw between a significant trough and peak. If the trendline is rising, the retracement lines will project downward; if the trendline is falling, the retracement lines will project upward.

The number of Fibonacci Retracement levels appearing on the chart depends on the range of the y-axis. If you want to see all nine retracement levels, you may need to manually adjust the minimum and maximum values of the y-axis (see page 124).

Fibonacci Time Zones

The parameters for Fibonacci Time Zones are shown below. You can edit the parameters of Fibonacci Time Zones that are already plotted by right-clicking on them and choosing Fibonacci Time Zones Properties from the shortcut menu.

Date. This is the date/time on which the dotted "reference" line is drawn. The remaining time zone lines are drawn to the right of the reference line at the predefined Fibonacci intervals.

Show Lines in All Windows. Check this box if you want the time zones to extend vertically across all inner windows within the chart.

For general information on line studies, see page 205. For interpretation information on Fibonacci Time Zones, see page 467.

Gann Fans, Grids, and Lines

The parameters for Gann studies are shown below. You can edit the parameters of a Gann study that is already plotted by right-clicking on it and choosing Properties from the shortcut menu.

Rise. This is the number of y-axis points to rise for every Run interval.

Run. This is the number of time periods to run (extend) for every Rise interval. If you want a Gann Line to project to the left, enter a negative value.

Snap to Integer Ratio. Check this box if you always want the ratio of the Rise and Run to be an integer value (i.e., 4 x 1, 3 x 1, 1x1, etc.).

Extend. Check this box if you want the Gann Line to extend in both directions.

For general information on line studies, see page 205. For interpretation information on Gann Studies, see page 469.

Drawing Tip

Gann studies are anchored on the chart by clicking the left mouse button. When a Gann study is selected, two handles (i.e., small squares) appear directly on the study. Click and drag the anchored handle to move the study; click and drag the other handle to change the angle.

Horizontal Line

The parameters for Horizontal Lines are shown below. You can edit the parameters of a Horizontal Line that is already plotted by right-clicking on it and choosing Horizontal Line Properties from the shortcut menu.

Value. This is the location on the y-axis of the horizontal line.

For general information on line studies, see page 205.

Drawing Tip

Look at the y-axis value on the status bar to help you position your horizontal line at the desired position.

Linear Regression Trendline

The parameters for Linear Regression are shown below. You can edit the parameters of a Linear Regression line that is already plotted by right-clicking on it and choosing Linear Regression Properties from the shortcut menu.

Price Field. This is the price field (i.e., open, high, low, or close) to use when calculating the Linear Regression trendline.

Linear Regression requires actual pricing data to plot. When it is plotted on Kagi, point & figure, Three Line Break, or Renko charts, it uses all the data in all the columns.

You can easily draw a parallel line next to a Linear Regression line by choosing Parallel Trendline from the Linear Regression shortcut menu. The shortcut menu is displayed by right-clicking directly on the Linear Regression line plotted on the chart.

See page 209 for information on the other controls in this page. For general information on line studies, see page 205. For interpretation information on Linear Regression, see page 477.

ODDS Probability Cones

The parameters for the ODDS™ Probability Cones are shown below. You can edit the parameters of the cones that are already plotted by right-clicking on them and choosing Properties from the shortcut menu.

A warning appears if you attempt to plot ODDS Probability Cones on a tick chart. This is because tick charts have an undeterminable number of periods in one year. However, if you compress the tick chart (1-minute, 5-minute, etc.) the cones will plot.

Probability. Enter the probability percentage. The higher the percentage the wider the cones. The default value is 68.26% is equal to one standard deviation. Given the volatility, this means there is a 68.26% chance that prices will remain within the cones.

Use Historic Volatility. Choose this button if you want MetaStock Pro to calculate the volatility over the number of periods specified in the box to the right. The calculation is based on the Bookstaber method--the same formula used by the Option Volatility indicator (see page 496). Note that the width of the cones will fluctuate (due to changing volatility) if you choose this method and you drag the cones around the chart.

You also can change the number of periods used in the calculation of the historic volatility directly on the chart by selecting the Probability Cones and then dragging the handles on the horizontal line protruding from the left of the cone's apex.

Use Specific Volatility. Choose this button if you want MetaStock Pro to use a fixed volatility as specified in the box to the right. Note that the width of the cones will remain constant if you choose this method and you drag the cones around the chart.

See page 209 for information on the controls in this page. For general information on line studies, see page 205. For interpretation information on ODDS Probability Cones, see page 491.

Quadrant Lines

You can edit the parameters of a Quadrant Line that is already plotted by right-clicking on it and choosing Quadrant Lines Properties.

Quadrant Lines require actual pricing data to plot. When it is plotted on Kagi, Point & Figure, Three Line Break, or Renko charts, it uses all the data in all the columns.

See page 209 for information on the controls in this page. See page 205 for information on the Select Plot dialog. For general information on line studies, see page 205. For interpretation information on Quadrant Lines, see page 506.

Raff Regression Channels

The parameters for Raff Regression Channels are shown below. You can edit the parameters of Raff Regression Channels that are already plotted by right-clicking on them and choosing Properties from the shortcut menu.

You can easily draw a parallel line next to a Raff Regression Channel by choosing Parallel Trendline from the Raff Regression Channel shortcut menu. The shortcut menu is displayed by right-clicking directly on the Raff Regression Channel plotted on the chart.

Price Field. This is the price field (i.e., open, high, low, or close) to use when calculating the Raff Regression Channels.

Raff Regression Channels require actual pricing data to plot. When it is plotted on kagi, point & figure, three line break, or renko charts, it uses all the data in all the columns.

See page 205 for information on the Select Plot dialog. See page 209 for information on the other controls in this page. For general information on line studies, see page 205. For interpretation information on Raff Regression Channels, see page 508.

Rectangle

You can edit the parameters of a Rectangle that is already plotted by right-clicking on it and choosing Rectangle Properties from the shortcut menu.

See page 209 for information on the controls in this page. For general information on line studies, see page 205.

Speed Resistance Lines

You can edit the parameters of Speed Resistance Lines that are already plotted by right-clicking on them and choosing Speed Resistance Lines Properties from the shortcut menu.

See page 209 for information on the controls in this page. For general information on line studies, see page 205. For interpretation information on Speed Resistance Lines, see page 515.

Standard Deviation Channel

The parameters for the Standard Deviation Channel are shown below. You can edit the parameters of Standard Deviation Channels that are already plotted by right-clicking on them and choosing Properties from the shortcut menu.

You can easily draw a parallel line next to a Standard Deviation Channel by choosing Parallel Trendline from the shortcut menu. The shortcut menu is displayed by right-clicking directly on the Standard Deviation Channel plotted on the chart.

Price Field. This is the price field (i.e., open, high, low, or close) to use when calculating the Standard Deviation Channels.

Units. Enter the number of standard deviations to shift the upper and lower channel lines.

Standard Deviation Channels require actual pricing data to plot. When it is plotted on kagi, point & figure, three line break, or renko charts, it uses all the data in all the columns.

See page 205 for information on the Select Plot dialog. See page 209 for information on the other controls in this page. For general information on line studies, see page 205. For interpretation information on Standard Deviation Channels, see page 517.

Standard Error Channel

The parameters for the Standard Error Channel are shown below. You can edit the parameters of Standard Error Channels that are already plotted by right-clicking on them and choosing Properties from the shortcut menu.

You can easily draw a parallel line next to a Standard Error Channel by choosing Parallel Trendline from the shortcut menu. The shortcut menu is displayed by right-clicking directly on the Standard Error Channel plotted on the chart.

Price Field. This is the price field (i.e., open, high, low, or close) to use when calculating the Standard Error Channels.

Units. Enter the number of standard errors to shift the upper and lower channel lines.

Standard Error Channels require actual pricing data to plot. When it is plotted on kagi, point & figure, three line break, or renko charts, it uses all the data in all the columns.

See page 205 for information on the Select Plot dialog. See page 209 for information on the other controls in this page. For general information on

line studies, see page 205. For interpretation information on Standard Error Channels, see page 520.

Symbols

The Symbols Properties dialog contains two pages--one for controlling the size and color of the symbol, the other for specifying a label to attach to the symbol.

For general information on line studies, see page 205.

To stamp a symbol on a chart

1. Choose **Symbols** from the Insert menu or text toolbar.
2. Click a symbol from the Symbol palette.
3. Position the mouse pointer where you want the symbol to appear on the chart.
4. Click the mouse to stamp the symbol on the chart.

To remove the symbol palette from the screen

Click the Close button in the upper-right corner of the palette.

Symbol Page

The Symbol page is located in the Symbol Properties dialog. This dialog is displayed by right-clicking on a symbol and choosing Symbol Properties from the shortcut menu.

Color. Choose the color for the symbol. You can choose the default color for all new symbols from the Line Studies page of the Default Colors and Styles dialog (see page 170).

Size. Choose the size (i.e., small, medium, or large) for the symbol. You can choose the default size for all new symbols from the Text/Symbols page of the Default Colors and Styles dialog (see page 170).

Label Page

The Label attached to a Symbol and the Symbol itself make up one object. So to edit a Symbol's label, you should right click on the Symbol, choose Symbol Properties from the shortcut menu, and choose the Label tab.

Label. Type the text to attach to the symbol.

Position. Choose whether you want the label to appear above or below the symbol.

Font. This button displays the font dialog where you can change the font style of the label. See page 171 for more information on fonts.

Deleting All Symbols

You can quickly delete all symbols (and arrows) from a chart by choosing Delete All from the Edit menu. If you have enabled the "Confirm

Deletion of Objects" option in the Application Options dialog (see page 32), you will be asked to confirm the deletion.

Drawing Tip

The default size of new symbols is controlled from the Default Colors and Styles dialog (see page 170).

Text

The parameters for Text are shown below. You can edit the Text parameters by right-clicking on the text and choosing Text Properties from the shortcut menu.

Text. Use this box to edit the text.

Font. This button displays the font dialog where you can change the font style of the text. See page 171 for more information on fonts.

Anchor to Date. Check this box if you want the text to stay at the specified x-axis position. If it is unchecked the text remains at the relative screen position. For example, if the text was positioned at the center of the chart, it remains at the center of the chart regardless of any scrolling, resizing, etc.

Choose the Frame/Fill page to control the fill color of the boxed area around the text or to change the color, style, and weight of the frame around the text.

For general information on line studies, see page 205.

To write text on a chart

1. Choose **Text** from the Insert menu or text toolbar.
2. Position the mouse pointer where you want the text to appear on the chart.
3. Click the mouse to display the text box and cursor. Begin typing. You can press ENTER to write multiple lines.
4. Click the mouse outside the text box (or press CTRL+ENTER) to end the writing and anchor the text.

Drawing Tip

The initial default font is controlled from the Default Color and Styles dialog (see page 170).

Tirone Levels

The parameters for Tirone Levels are shown below. You can edit the parameters of Tirone Levels that are already plotted by right-clicking on them and choosing Tirone Levels Properties from the shortcut menu.

Midpoint or Mean. Choose the calculation method for the Tirone Levels. The Midpoint method displays three lines that divide the highest high and lowest low of the range into symmetrical segments. The Mean

method displays five lines ranging between the extreme high and lows and the adjusted mean price.

Tirone Levels require actual pricing data to plot. When it is plotted on kagi, point & figure, three line break, or renko charts, it uses all the data in all the columns.

See page 209 for information on the other controls in this page. See page 205 for information on the Select Plot dialog. For general information on line studies, see page 205. For interpretation information on Tirone Levels, see page 528.

Drawing Tip

When using the Mean method, it is common for the extreme high and/or the extreme low to be so extreme that they do not display with the current scale. Before displaying Mean Tirone Levels, you may want to change the y-axis scaling (see page 123) so that all of the Tirone Levels are visible.

Trendline

You can edit the parameters of a Trendline that is already plotted by right-clicking on it and choosing Trendline Properties from the shortcut menu.

See page 209 for information on the controls in this page.

For general information on line studies, see page 205. For interpretation information on trendlines, see page 529.

Trendline By Angle

The parameters for Trendline By Angle are shown below. You can edit the parameters of a Trendline By Angle that is already plotted by right-clicking on it and choosing Trendline By Angle Properties from the shortcut menu.

Angle. This is the angle (in degrees) of the trendline.

See page 209 for information on the other controls in this page. For general information on line studies, see page 205. For interpretation information on trendlines, see page 529.

Drawing Tip

When using the Trendline by Angle line study, the angle of the trendline is shown and continually updated on the status bar (see page 27).

Triangle

The parameters for a Triangle are shown below. The Triangle line study requires that you mark three separate points on your chart. You can edit the parameters of an Triangle that's already plotted by right-clicking on it and choosing Triangle Properties from the shortcut menu.

First Date. This is the date/time of the first marked point.

First Value. This is the y-axis value of the first marked point.

Second Date. This is the date/time of the second marked point.

Second Value. This is the y-axis value of the second marked point.

Third Date. This is the date/time of the third marked point.

Third Value. This is the y-axis value of the third marked point.

For general information on line studies, see page 205.

Vertical Line

The parameters for Vertical Lines are shown below. You can edit the parameters of a Vertical Line that is already plotted by right-clicking on it and choosing Vertical Line Properties from the shortcut menu.

Date. This is the date/time on which the vertical line is drawn.

Show In All Windows. Check this box if you want the vertical line to extend across all inner windows in the chart.

For general information on line studies, see page 205.

Drawing Tips

Look at the date on the status bar to help you position your vertical line at the desired position.

The inner window in which the vertical line is displayed is determined by where the vertical line was dropped (i.e., the inner window the mouse pointer was in).

Working with the Internet

Internet Integration

The Internet can be a useful source of information, if you know where to look. MetaStock Pro is seamlessly integrated with the Internet, providing instant access to many exclusive resources that help you make more informed trading decisions.

Some of the many things you can do with MetaStock Pro and the Internet are:

- Collect data from an online data vendor using DataOnDemand™
- Collect local data from an end-of-day vendor
- E-mail a bitmap graphic of a chart directly from MetaStock Pro
- Save the active chart as an HTML document
- Request a current intraday quote for the active chart
- Read current company news for the active chart
- Research fundamental information for the active chart
- Display option chains for the active chart
- Launch the Equis International home page
- Learn about technical analysis with the online version of [Technical Analysis from A to Z](#)
- Find a MetaStock user group in your area
- Get help from Equis technical support
- Update MetaStock Pro automatically.

...and more.

Many of these Internet resources are accessed from your chart's shortcut menu. To access information relevant to your current chart, right-click the background of the chart. Sharing your charts with others through e-mail or HTML is done through the File menu. Other Internet resources are available by choosing Equis on the Web from the Help menu.

Collecting Data through the Internet

Collecting price data is quick and easy with the Internet. Some data vendors compatible with The DownLoader (see page 58) can be accessed through the Internet which provides a faster download with fewer errors. Check your DownLoader User's Manual to see if your data vendor provides Internet collection.

The fastest way to view a chart is with DataOnDemand™. You just type or select a symbol and the data flows instantly from your data vendor to your chart. MetaStock Pro typically goes through the Internet to your online data vendor to get the data. See page 42 for more information on DataOnDemand™.

Updating MetaStock Pro

Updating MetaStock Pro with the latest patches and Symbol Database files is easy with the Internet. Simply choose Update Symbol Database or MetaStock Updates from the Tools menu.

See page 49 for more information on updating the Symbol Database.

E-mailing Charts with the Send Command

You can use the Send command in the File menu to send charts via e-mail. You must have one of the following e-mail systems to use this feature:

- MAPI. Microsoft Exchange (or other mail systems compatible with the Messaging Application Programming Interface).
- VIM. Lotus cc:Mail (or other mail system compatible with Vendor Independent Messaging).

To send a chart via e-mail

1. Open the chart you want to send. Make sure it is the selected chart.
2. At this point, you may want to add text or analysis.
3. Choose **Send** from the File menu.

Your MAPI or VIM compatible e-mail software will run. A bitmap file of the MetaStock Pro chart will automatically be inserted into a new message.

Saving Charts as HTML

Documents published on the World Wide Web and those on corporate intranets are usually written in a special scripting language called Hypertext Markup Language (HTML). MetaStock Pro allows you to create a simple HTML file containing a chart and data that is readable by web browser software.

When a chart is saved as HTML, two files are created—an HTML file containing the data, and a graphical image of the chart. The image can be saved in either JPEG, which is more widely supported, or PNG format, which is smaller. The data is the same data that would be displayed in MetaStock Pro's Data Window (see page 158) for the last day (or column) on the chart.

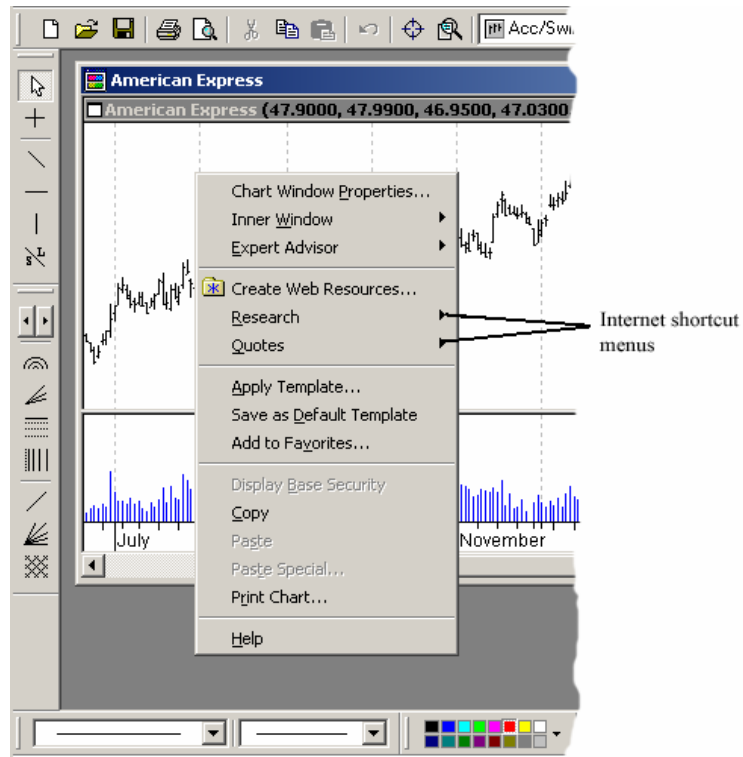
You can view an HTML file by opening it in a web browser such as Microsoft Internet Explorer or Netscape Navigator.

To save a chart as an HTML file

1. Choose **Save As HTML** from the File menu.
2. Type a name for the HTML file in the **File name** box. All HTML files are automatically assigned an HTML extension. Be sure to save the file in a folder you will remember.
3. Choose the graphic format that you prefer.
4. Click the **Save** button.

Internet Shortcut Menus

Equis International has arranged exclusive Internet access to current quotes, news, options data, financial statements, insider trading, and more for MetaStock Pro users. This free information is "chart-centric"—meaning that if you right-click on your chart of "Intel," choose "Research," and click "Company News" from the shortcut menu, news on Intel will be retrieved. Of course, to take advantage of this feature, the computer on which you installed MetaStock Pro must be connected to the Internet.



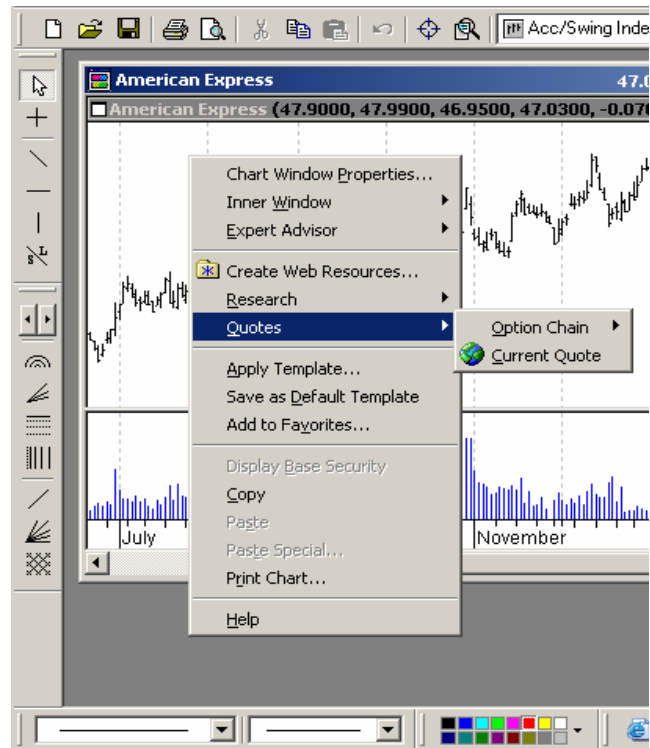
The Internet functionality built into MetaStock Pro is designed to be flexible enough that you can easily update MetaStock Pro to add new Internet-specific features as they become available from Equis.

The choices that appear in the Internet shortcut menus are controlled by a file named "ms80menu.dta". This file is located in your MetaStock program folder. The latest version of this file can be downloaded from the Equis web site at www.equis.com. We encourage you to check the web site periodically for the availability of a new version of the "ms80menu.dta" file.

When you choose one of the Internet features from the shortcut menu, MetaStock Pro automatically launches your default web browser software (e.g., Netscape Navigator, Microsoft Internet Explorer) and displays the web page containing the information.

The Quotes Menu

Current quotes and Option Chains are available from the Quotes menu.



Current price data for the active chart is displayed by choosing Current Quote from the Quotes shortcut menu.



| COMPAQ COMPUTER | CPQ | New York Composite |
|--|--|--------------------|
| Price: 24 ¹³ / ₁₆ | ↑ +1 ⁷ / ₁₆ | +6.15 % |
| Volume: 21.1273M | | US DOLLAR |
| Daily High: 25 ¹ / ₁₆ | 52 Week High: 51 ¹ / ₄ | |
| Daily Low: 23 ¹ / ₂ | 52 Week Low: 20 | |
| Daily Open: 23 ⁵ / ₈ | Price/Earnings Ratio: 0 | |
| Previous Close: 23 ³ / ₈ | Earnings Per Share: -1.56 | |
| <i>Delayed Quote as of 07/07/1999 16:31</i> | | |

[News](#)

[Intraday](#)

[Price History](#)

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The prices shown are based on a 20-minute delayed intraday price quote. To view company news for this security, you may choose the News link from this page.

A list of the put or call options available for the current chart can be displayed by choosing Option Chain from the Quotes shortcut menu. This information is provided by Reuters, and is a MetaStock Pro exclusive.



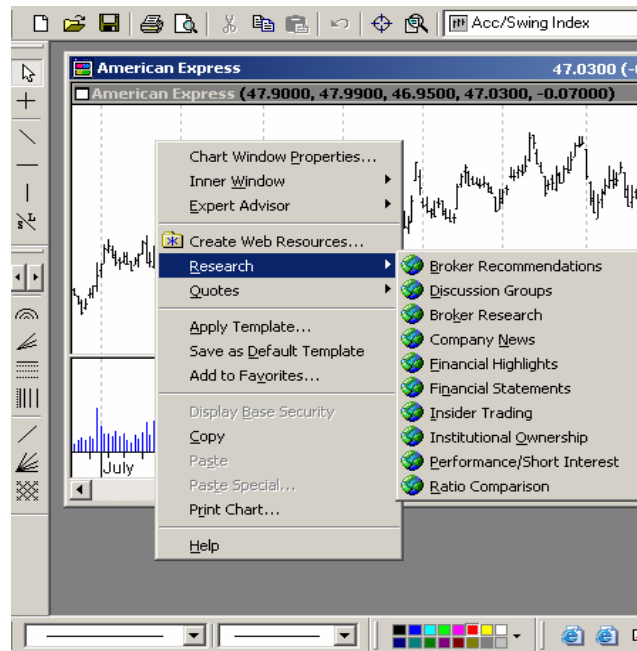
COMPAQ COMPUTER CPQ New York Composite
 PRICE: 24 ¹⁵/₁₆ ↑ +1 ⁹/₁₆ +6.68% US DOLLAR
 VOLUME: 21.1366M *Quotes are delayed at least 20 minutes*

JUL 1999 CALLS

| Symbol | Strike | Last Trade | Net Change | Vol | Open Interest | Daily High | Daily Low | Date |
|---------------------------------|--------|-------------------------------|--------------------------------|-------|---------------|-------------------------------|--------------------------------|-------|
| CPQ Jul9 15.0 C | 15 | 8 ¹ / ₄ | - ¹ / ₄ | 20 | 24 | 8 ¹ / ₄ | 8 ¹ / ₄ | 07/01 |
| CPQ Jul9 17.5 C | 17.5 | 7 ¹ / ₈ | +1 ¹ / ₈ | 10 | 345 | 7 ¹ / ₈ | 7 ¹ / ₈ | 07/07 |
| CPQ Jul9 20.0 C | 20 | 5 | +1 ⁵ / ₈ | 375 | 5517 | 5 | 3 ³ / ₄ | 07/07 |
| CPQ Jul9 22.5 C | 22.5 | 2 ⁵ / ₈ | +1 ³ / ₈ | 2834 | 22189 | 2 ³ / ₄ | 1 ⁵ / ₁₆ | 07/07 |
| CPQ Jul9 25.0 C | 25 | ¹³ / ₁₆ | + ⁹ / ₁₆ | 11830 | 40544 | ¹⁵ / ₁₆ | ³ / ₁₆ | 07/07 |
| CPQ Jul9 27.5 C | 27.5 | ³ / ₁₆ | + ¹ / ₈ | 3221 | 12333 | ³ / ₁₆ | ¹ / ₁₆ | 07/07 |
| CPQ Jul9 30.0 C | 30 | ¹ / ₁₆ | 0 | 145 | 18524 | ¹ / ₁₆ | ¹ / ₁₆ | 07/07 |

The Research Menu

News and fundamental data are available from the Research menu.



Current company news for the active chart is displayed by choosing Company News from the Research menu. Click on a headline to view the news story.



Headlines for CPQ

| Date | Time | Wire* | Headline |
|------------|-------|-------|---|
| 07/07/1999 | 12:17 | BZ | Compaq Takes Complexity, Risk and Implementation Time Out of |
| 07/06/1999 | 18:07 | BZ | Compaq Is First Major Vendor to Deliver Dedicated Appliance Se |
| 07/06/1999 | 12:40 | BZ | Compaq Sets Industry Standard with New Drive Protection System |
| 07/06/1999 | 09:46 | BZ | Compaq Web Advisory: Compaq Armada 1500c Family Continues to G |
| 07/06/1999 | 07:33 | PS | Creative's SBS-52 Powered Speakers to Be Offered With Compaq |
| 07/06/1999 | 07:17 | PS | Creative Labs' Hi-Quality Audio to be Offered on Compaq <CREA > |
| 07/02/1999 | 19:42 | SF | FOCUS - Value funds sizzle, further gains seen |
| 07/02/1999 | 12:49 | SF | BLOCK TRADE - Compaq Computer <CPQ N> 550,000 |
| 07/02/1999 | 11:42 | SF | FOCUS-Compaq<CPQ N> Europe to sell direct |
| 07/02/1999 | 10:17 | SF | *COMPAQ<CPQ N>EUROPE-TO START DIRECT SALES TO CORP CUSTOMERS VI |

*Key PS: PRNewswire BZ: BusinessWire SF: Reuters

Free Broker Recommendations and Research and a variety of fundamental data is also available, including Financial Highlights, Financial Statements, Insider Trading, Institutional Ownership, Performance/Short Interest, and Ratio Comparison.

Investor Market Guide
The benchmark for quality financial information

Home Research Markets What's Hot Screening About Help

Investor Research Center enter ticker symbol for Wall Street research

SEARCH FOR
Symb Name go

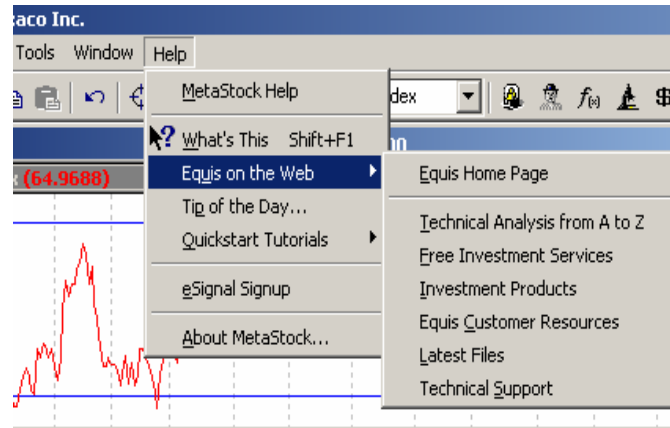
Microsoft Corporation
NASDAQ: MSFT
Sector: Technology
Industry: Software & Programming

Selected Financials

| | SELECTED INCOME STATEMENT ITEMS | | | | |
|----------------------------|---------------------------------|---------------------------|---------------------------|--------------------------|--------------------------|
| | ANNUAL | | | YEAR TO DATE | |
| | 12 MONTHS ENDING 06/30/96 | 12 MONTHS ENDING 06/30/97 | 12 MONTHS ENDING 06/30/98 | 9 MONTHS ENDING 03/31/98 | 9 MONTHS ENDING 03/31/99 |
| Revenue | 8,671,000 | 11,358,000 | 14,484,000 | 10,489,000 | 13,222,000 |
| Operating Expenses | 5,612,000 | 6,487,000 | 8,070,000 | 5,949,000 | 6,197,000 |
| Operating Income | 3,059,000 | 4,871,000 | 6,414,000 | 4,540,000 | 7,025,000 |
| Non-Operating Income | 320,000 | 443,000 | 703,000 | 489,000 | 1,478,000 |
| Non-Operating Expenses | 0 | 0 | 0 | 0 | 0 |
| Income Before Taxes | 3,379,000 | 5,314,000 | 7,117,000 | 5,029,000 | 8,503,000 |

Equis on the Web

The information on the Equis International web site is available with just a few mouse clicks in MetaStock Pro. Choose Equis on the Web from the Help menu.



Select Equis Home Page from the Equis on the Web menu to launch the main Equis International web site.

Choose Technical Analysis from A to Z to read the online version of this book by the founder of Equis, Steve Achelis.

Choose Free Investment Services to view a list of free resources available at www.equis.com.

Choose Investment Products from the Equis on the Web menu to learn more about the family of products available from Equis International.

Choose Equis Customer Resources to find a MetaStock Users Group in your area, check the Equis Events calendar for investment-related events in your area, read the quarterly Equis newsletter, find other investment-related web sites, or locate MetaStock-compatible data vendors.

Choose Latest Files to view a list of the free downloads and patches available for Equis products.

The Equis Technical Support staff is available through the Internet. Choose Technical Support from the Equis on the Web menu.

Select Reuters Money Network to launch the Reuters MoneyNet web site where you can manage your portfolio, read category and market news, view quotes and charts, and more.

The MetaStock Formula Language

What is the MetaStock Formula Language?

The MetaStock formula language is a special programming language used to define and create custom indicators, system tests, explorations, and experts. It is patterned after popular spreadsheet languages.

In its simplest form, the MetaStock formula language is comprised of high-level functions (e.g., `mov()`, `rsi()`, `abs()`), mathematical operators (e.g., `+`, `-`, `/`, `*`), and parameters (open, high, low, close, etc.). Each of these basic components can be combined to create your own indicators with the Indicator Builder, backtest your trading ideas with the System Tester, rank and filter your securities with The Explorer, and generate chart-specific feedback with the Expert Advisor.

In order to effectively use the Indicator Builder, System Tester, Explorer, or Expert Advisor, you need to be familiar with the MetaStock formula language. The MetaStock formula language is the foundation and common link for each of these four tools.

| Custom Indicators | System Tests | Explorations | Experts |
|----------------------------|--------------|--------------|---------|
| MetaStock Formula Language | | | |

The Indicator Builder will be used in this chapter to teach the MetaStock formula language. For specific tutorials on each of the four formula-based tools, refer to their specific chapters.

For information on the Equis Solution Provider program and the MetaStock developers Kit, go to www.equis.com.

Price Array Identifiers

One of the most basic building blocks of a formula is called a price array identifier. A price array identifier "identifies" specific price fields that the formula should operate on. The valid price array identifiers are open, high, low, close, volume, open interest, and indicator.

Price array identifiers can be abbreviated as shown in the following table. Note that these are **not** case-specific.

| Long Name | Abbreviation |
|----------------|--------------|
| Open | O |
| High | H |
| Low | L |
| Close | C |
| Volume | V |
| Open Interest | OI |
| Indicator | P |
| Previous Value | PREV |

Examples of the use of price array identifiers in formulas are shown below. The actual price array identifier component of the formulas are **in bold** for these examples.

```
mov( close,10, simple )
if ( h > ref(h,-1), mov(h,20,s), mov(c,20,s) )
stdev( volume, 20 )
```

Mathematical Operators

Mathematical operators are the "glue" that binds formulas. Formulas can contain the following mathematical operators. (They also can contain advanced operators such as square root, as explained later.)

| | |
|---|---------------------------|
| + | Addition |
| - | Subtraction (or negative) |
| * | Multiplication |
| / | Division |

The following formulas illustrate the use of operators (**bolded**) in a formula:

```
( H + L ) / 2
mov(c,10,s)-mov(c,20,s) / (h + l + c)
close + ((1.02 * high)-high)
```

Operator Precedence

Parentheses were used in many of the preceding formulas in this chapter to control the operation precedence (the order in which the operators are

calculated). MetaStock Pro always does operations within the innermost parentheses first.

When parentheses are not used, the precedence is as follows:

- Negative values
- * Multiplication
- / Division
- + Addition
- Subtraction
- < Less than
- > Greater than
- <= Less than or equal to
- >= Greater than or equal to
- = Equal to
- <> Not equal to
- And Logical "And"
- Or Logical "Or"
- := Variable assignment operator

The expression "H + L / 2" (without parenthesis) would be calculated by MetaStock Pro as "L / 2" plus "H," since division has a higher precedence. This would result in a much different value than "(H + L) / 2."

For ease of reading, we recommend that you always use parenthesis to control precedence.

Formula Functions

In addition to the four mathematical operators, MetaStock Pro contains over 200 "functions" that perform mathematical operations. See page 252 for a complete listing of all built-in functions.

The following formula consists of a single function that plots the square roots of the closing prices. The names of the actual functions in the following examples are **in bold**.

```
sqrt( CLOSE )
```

The following formula consists of a single function that plots a 14-period RSI indicator.

```
rsi( 14 )
```

The following formula consists of a single function that plots a 10-period simple moving average.

```
mov( c , 10 , s )
```

The following formula consists of two functions. The result is the difference between the MACD indicator and a 9-period exponential moving average of the MACD.

```
macd( ) - mov( macd( ) , 9 , exponential )
```

As you've probably noticed, this syntax is very similar to the syntax used to enter formulas in spreadsheets.

All functions *must* be followed by a pair of parentheses. If an opening parenthesis is not the first character after a function name, an error message will be displayed.

Function Parameters

Parameters provide a function the necessary information required to calculate. For example, the `sqrt()` function requires a single "parameter" within the parentheses. Other functions, such as `macd()`, do not require any parameters. Others, like the Volume Oscillator require four parameters.

The following formula calculates a 14-period Money Flow Index. The actual parameters are **in bold** in the following examples.

```
mfi(14)
```

Some functions require multiple parameters within the parentheses. For example, the moving average function (shown below) requires three parameters.

```
mov(rsi(14), 30, simple)
```

In the above formula, the parameters instruct MetaStock Pro to calculate a 30-period simple moving average of a 14-period RSI. Note that another function (i.e., `rsi(14)`) serves as one of the parameters.

If you forget to insert the proper parameter, MetaStock Pro will display a window reminding you of the expected parameter.

Locating Errors in Formulas

MetaStock Pro does an excellent job of reporting errors in formulas. In fact, it is impossible to enter an invalid formula. This doesn't mean your formulas will always work as you expect them to, because MetaStock Pro does not know what you are trying to create. However, it does mean that the *syntax* of the formula (e.g., function names, parameters, operators, parentheses, etc.) will always be valid.

When you enter a formula, MetaStock Pro tests the formula's syntax. If an error is found, the formula will be redisplayed, the cursor will be positioned at the error location, and a message explaining the error will be displayed.

The effect of this error-reporting technique is that MetaStock Pro helps you enter valid formulas. This is illustrated in the following example.

Suppose you want to plot a formula containing a 10-period exponential moving average of the closing price and all you can remember is that the moving average function is "mov" (see page 305 if you don't remember a function name).

1. Enter what you do know in the Formula box of the Indicator Editor dialog:

```
mov
```

and click the OK button.

The cursor will be positioned after the "mov" function name and the message "*A '(' must immediately follow a function name*" will be displayed.

2. Now add an opening parenthesis

```
mov (
```

and click OK.

This time, the cursor will be positioned after the "(" and the message "*Price array (e.g., HIGH, LOW, CLOSE, etc.) or function expected*" will be displayed.

3. Enter the price array identifier "CLOSE."

```
mov (CLOSE
```

and click OK.

If you continue this process (i.e., enter partial formulas and then respond to the error message), MetaStock Pro will prompt you through the formula entry process until the formula's syntax is correct (shown below).

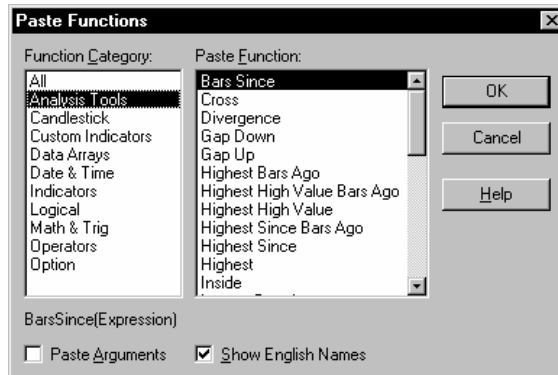
```
mov (CLOSE , 10 , EXPONENTIAL )
```

This is a valuable technique! Any time you are not sure of the syntax of a formula or function, click OK.

Inserting Functions

The preceding section explained how MetaStock Pro helps you correct syntax errors within formulas. This section explains how MetaStock Pro can help you remember (and enter) the 200+ functions.

Clicking the Functions button while editing a formula displays the Paste Functions dialog. This dialog lists the categories of the available functions on the left-hand side and the function names within the category on the right-hand side.



Exploring the Paste Functions dialog is an excellent way to learn more about formulas.

Clicking OK when the Paste Functions dialog is displayed will insert the function that is currently highlighted into your formula (at the location of the cursor). The function can be inserted with a description of the required arguments (if required) by checking the Paste Arguments checkbox. The list on the right side of the dialog can display the actual function names or the English names of the functions by checking/unchecking the Show English Names checkbox.

See page 305 for more information on pasting functions into formulas.

Writing Comments

When writing long, complex formulas, it is helpful to make comments throughout the formula to describe what is going on. Experienced programmers will attest to the fact that the prudent use of comments makes programming code much easier to debug and work with.

Comments can be entered in a formula by surrounding them with "{" and "}" braces. The following formula contains two comments (shown in **bold**).

```
macd() {the MACD times} * ((H+L+C) / 3) {the average price}
```

Note that comments within comments will cause an error message to be displayed.

Nesting Functions

As has been eluded to in earlier examples, a function can be "nested" within a function. The nested function can serve as the main function's data array parameter. The following examples show functions nested within functions. The nested functions are **in bold**.

```
stdev( stoch(5,3), 10 )
mov( rsi(15), 10, SIMPLE)
mov( mov( rsi(15), 20, W), 10, SIMPLE)
```

The first example calculates a stochastic oscillator and then calculates a 10-period standard deviation of the stochastic oscillator.

The second example calculates a 10-period simple moving average of a 15-period Relative Strength Index (RSI).

The third example calculates a 20-period weighted moving average of a 15-period RSI, and then calculates a 10-period simple moving average of this moving average.

This technique (placing functions within functions) is referred to as the "nesting of functions."

The if() function

The if() function is used to create conditional (i.e., "if-then") statements. It is perhaps the most used function in the MetaStock formula language. It contains three parameters as shown in the following example.

```
if( close > mov(c,10,s), rsi(9), rsi(14) )
```

The above "if" statement reads (in English) as follows: If today's close is greater than today's 10-day simple moving average of the close, then plot a 9-day RSI, otherwise, plot a 14-day RSI.

The next formula plots "positive volume" if the close is greater than the median price. Otherwise, "negative volume" is plotted.

```
if( CLOSE > (HIGH+LOW)/2, +V, -V )
```

A good example of the if() function can be found in the On Balance Volume example (see page 310).

If you simply want an expression to be evaluated as either true or false, it can be done without the use of the if() function. The following formula will result in either a 1 (true) or a 0 (false).

```
rsi(14) > 70
```

If the 14-period RSI is greater than 70, then this formula will evaluate to "true" and return the number 1. If it is below 70, the formula will evaluate to "false" and return the number 0. This is done without the if() function being used. The formula below uses the if() function and will return the same results, but it is longer.

```
if(rsi(14) > 70, 1, 0 )
```

Using "And" and "Or" Operators

If a formula requires multiple conditions, you can combine the conditions with "and" and "or" operators. For example, maybe you'd like to plot a +1 when the MACD is greater than zero *and* the RSI is greater than 70. The formula could be written two ways:

```
macd() > 0 AND rsi(14) > 70
```

or

```
if(macd() > 0 and rsi(14) > 70, +1, 0)
```

You can add as many conditions within a formula as space allows. For example:

```
If(macd() > 0 AND rsi(14) > 70 AND CCI(14) > 100 AND  
close > mov(close,10,e), +1, 0)
```

You can even combine AND and OR operators within the same formula as follows:

```
If((macd() > 0 OR close > mov(close,10,e)) AND rsi(14)  
> 70, +1, 0)
```

The formula above says to plot a "+1" if either the MACD is greater than zero or the close is above its moving average, and the RSI is greater than 70.

Note that parentheses were placed around the OR condition because precedence specifies that the AND condition be evaluated first (see page 236). If the parentheses were not placed around the OR condition, the moving average and the RSI would have been grouped together with the AND condition, which is not how we want the formula evaluated.

Referencing Existing Custom Indicators

You can reference other custom indicators using the `fml()` function. For example, the function `"fml('My MACD')"` is the value of the formula that contains the text "My MACD" in its name. The entire name is not required--only enough of the name to make it unique. However, preference is given to the formula name that exactly matches. So if another formula named "MyMACD2" existed, "MyMACD" would be used since it matches exactly.

The following formula plots the value of the formula named "Down Day" if the close is less-than-or-equal-to a 10-period exponential moving average of the closing prices. Otherwise, it plots the value of the formula named "Up Day."

```
if( close <= mov(close, 10, E), fml("Down Day"),  
fml("Up Day") )
```

This technique (referencing formulas from within formulas) is referred to as the "nesting of formulas." Using nested formulas is an excellent way to simplify long and/or complex formulas.

Also note, that nested formulas may reference nested formulas that reference nested formulas (etc.). However, circular references (e.g., formula "My MACD" calls formula "My RSI" that calls formula "My MACD") will cause an error message to be displayed when the formula is plotted.

If a multiplot formula is referenced, only the value of last plot in the multiplot formula is returned.

If you need to reference the value of a specific variable in a custom indicator rather than the value of the custom indicator itself, use the `fmlvar()` function (see page 246).

Referencing Securities with the Security Data Function

The Security Data function allows a formula to access price data for any online or local security. This function can be used in any of MetaStock Pro's formula tools.

Online securities are referenced by including "ONLINE:" before the symbol. Local securities are referenced by including the full path to the security file. If the security exists in the same folder as the base security, the path does not need to be included. The symbol, including the path or online reference, is enclosed in quotation marks.

To reference Microsoft's close as an online security:

```
Security("ONLINE:MSFT",C)
```

To reference Microsoft's close as a local security using the full path:

```
Security("C:\Metastock Data\Sample\MSFT",C)
```

To reference Microsoft's close as a local security in the same folder as the base security:

```
Security("MSFT",C)
```

The last type of reference is particularly useful if you use local data exclusively, and store all of your securities in the same local data folder.

For example, the following indicator displays a 30-day moving average of Microsoft's close on any chart, if your online data vendor is active.

```
Mov(Security("ONLINE:MSFT",C),30,S)
```

The same formula could be written as:

```
Security("ONLINE:MSFT",Mov(C,30,S))
```

Performance Tips

- Use Tick or 1-minute data for optimum results when plotting an indicator on a chart which references online intraday securities. Intervals higher than 1-minute must be compressed before the indicator can be recalculated, which slows calculation time.
- The Live Bars option found on the Real-time page of Application Properties (see page 36) causes all indicators on a chart to recalculate with each incoming tick. The Security Data function is particularly slow when this option is enabled. Disabling this option will cause all indicators, including the Security Data function, to recalculate only when the full bar has been completed.
- Retrieving data from an online source is slower than referencing data in a local data file. Any formula using the Security Data function to

access online data will take longer to calculate than when accessing only local data.

Using Variables to Enhance and Simplify

In order to shorten, simplify, enhance, and make the maintenance of complex formulas easier, you may want to use variables. A variable is an alphanumeric name (up to 20 characters) that is assigned to an expression or a single value. Up to 20 variables can be used in a formula. Variables must be assigned before the variable is used in the formula. A semi-colon must be used at the end of the variable assignment line. Variables cannot be assigned within a function.

Naming of Variables

The following rules apply to the naming of variables:

- Variable names cannot contain commas, parenthesis, spaces, underscores, etc.
- Variable names cannot duplicate names already used by functions (e.g., mov, rsi, cci, if, etc.).
- A variable cannot be assigned a name that matches the parameters reserved for use in formulas (e.g., open, high, low, close, simple, o, c, l, h, s, e, w, etc.).

The following would produce an error, since the letter "s" is reserved for the moving average function, mov(), to mean "simple."

```
s := (h+l+c)/3;
```

- Variable names must contain at least one alpha letter (e.g., T1234).
- Variable names are **not** case sensitive (e.g., "PERIODS" is the same as "periods").

Using Variables to Represent Numbers

Suppose you would like to be able to quickly adjust the time periods throughout a formula without having to edit each use of the time periods individually. This could be accomplished by assigning the time periods to a variable—in this case, a variable named "periods".

```
periods := 10;  
c > mov(c,periods, s) and ref(c,-1) >  
ref(mov(c,periods,s),-1) and h > mov(h,periods,s) and  
ref(h,-1) > ref(mov(h,periods,s),-1)
```

In the above formula, the number "10" will be substituted wherever the variable named "periods" appears in the formula. When you want to adjust the time periods in this formula, simply edit the number assigned to the "periods" variable. If you change "10" to "20," the number "20" will be substituted throughout the formula.

Of course, you could also assign multiple variables to represent multiple numbers as follows:

```
periods1 := 10;
periods2 := 20;
c > mov(c,periods1, s) and ref(c,-1) >
ref(mov(c,periods1,s),-1) and h > mov(h,periods2,s)
and ref(h,-1) > ref(mov(h,periods2,s),-1)
```

In this case, the variables "periods1" and "periods2" represent two different values that can be used as many times as desired throughout the formula.

Using Variables to Represent Mathematical Expressions

Variables can be assigned to represent a mathematical expression (i.e., formula). Perhaps this is the most useful benefit of variables. Assigning variables to represent formulas (especially long, complex ones) makes formulas easier to read, easier to modify, and faster to calculate.

For example, the following formula (designed to spot securities locked between support and resistance levels), is quite complex and difficult to read. It can be simplified by using variables. It was originally written before variable support was added to MetaStock's formula language.

```
( If ( Abs ( ( Trough ( 1, L, 1 ) -
Trough ( 2, L, 1 ) ) / Trough ( 2, L, 1 ) ) < .015 AND
Abs ( ( Trough ( 2, L, 1 ) -
Trough ( 3, L, 1 ) ) / Trough ( 3, L, 1 ) ) < .015, { then }
( Trough ( 1, L, 1 ) + Trough ( 2, L, 1 ) + Trough ( 3, L, 1 ) ) / 3, 0 ) <> 0
and
( If ( Abs ( ( Peak ( 1, H, 1 ) - Peak ( 2, H, 1 ) ) / Peak ( 2, H, 1 ) ) < .015
AND Abs ( ( Peak ( 2, H, 1 ) -
Peak ( 3, H, 1 ) ) / Peak ( 3, H, 1 ) ) < .015, { then }
( Peak ( 1, H, 1 ) + Peak ( 2, H, 1 ) + Peak ( 3, H, 1 ) ) / 3, 0 ) <> 0
and
c >= ( If ( Abs ( ( Trough ( 1, L, 1 ) -
Trough ( 2, L, 1 ) ) / Trough ( 2, L, 1 ) ) < .015 AND
Abs ( ( Trough ( 2, L, 1 ) -
trough ( 3, L, 1 ) ) / Trough ( 3, L, 1 ) ) < .015, { then }
( Trough ( 1, L, 1 ) + Trough ( 2, L, 1 ) + Trough ( 3, L, 1 ) ) / 3, 0 ) ) and
c <= ( If ( Abs ( ( Peak ( 1, H, 1 ) - Peak ( 2, H, 1 ) ) / Peak ( 2, H, 1 ) ) < .015
AND Abs ( ( Peak ( 2, H, 1 ) -
Peak ( 3, H, 1 ) ) / Peak ( 3, H, 1 ) ) < .015, { then }
( Peak ( 1, H, 1 ) + Peak ( 2, H, 1 ) + Peak ( 3, H, 1 ) ) / 3, 0 )
```

By defining two variables (**in bold**) to represent the two expressions that are used repeatedly, you can simplify the formula substantially. In addition to being easier to read, the simplified formula also calculates quicker since the support and resistance expressions now only need to calculate once.

```
Support := ( If ( Abs ( ( Trough ( 1, L, 1 ) -
trough ( 2, L, 1 ) ) / Trough ( 2, L, 1 ) ) < .015 AND
Abs ( ( Trough ( 2, L, 1 ) -
```

```
trough(3,L,1))/Trough(3,L,1))<.015,{then}
(Trough(1,L,1)+Trough(2,L,1)+Trough(3,L,1))/3,0));
```

```
Resistance:= (If(Abs((Peak(1,H,1)-
Peak(2,H,1))/Peak(2,H,1))<.015 AND Abs((Peak(2,H,1)-
Peak(3,H,1))/Peak(3,H,1))<.015,
{then}(Peak(1,H,1)+Peak(2,H,1)+Peak(3,H,1))/3,0));
Support <> 0 and Resistance <> 0 and close >= Support
and close <= Resistance
```

Note that you could also create individual custom indicators named "support" and "resistance" to do the calculations. (See page 242 for more information on using the fml() function.) These custom indicators could then be called using the fml() function as follows:

```
fml("support") <> 0 and fml("resistance") <> 0 and
close >= fml("support") and close <= fml("resistance")
```

However, using variables is generally more desirable than using the fml() function for several reasons—the most important being calculation speed and self-containment (i.e., the entire function can be read and edited in one place).

Referencing Variables within Custom Indicators

Since custom indicators can contain variables, you can reference a specific variable within a custom indicator rather than the entire custom indicator. The fmlvar() function is used to do this.

For example, if the custom indicator named "MyMACD" contains a variable named "SignalLine," and you only want to reference the SignalLine variable, it could be done as follows using the fmlvar() function:

```
fmlvar("MyMACD", "SignalLine" )
```

If the variable does not exist within the custom indicator, you will receive an error message.

See page 244 for more information on using variables within formulas.
See page 261 for more information on the fmlvar() function.

Self Referencing Formulas Using PREV

The PREV constant allows you to create self-referencing formulas. A self-referencing formula is one that is able to reference the “previous” period’s value of itself.

For example, the following is an example of a self-referencing formula:

```
((H+L+C)/3) + PREV
```

This simple formula divides the high, low, and closing prices by 3 and then adds this value to yesterday’s value of the ((H+L+C)/3).

The calculation of the popular indicator On Balance Volume illustrates the use of the PREV function.

```
(if(c>ref(c,-1),1,-1)*volume)+PREV
```

Although On Balance Volume can be calculated without the use of the PREV function, an exponential moving average cannot (other than using the mov() function). The following formula shows how a 18% exponential moving average (approximately 10-periods) is calculated using the PREV function.

```
(close*0.18)+(PREV*0.82)
```

The "P" Data Array Identifier

A special data array identifier (i.e., "P" variable) is used to reference any indicator or price plot. With custom indicators, the "P" variable represents the plot the custom indicator is dropped on.

With system tests and explorations, the "P" variable represents the selected plot. This may be useful if you want an indicator, exploration, system test, or expert to calculate on a plot other than the chart's base security.

If you drop a custom indicator containing the "P" variable on high/low/close price bars, the close is used for the "P" variable. For example, the following custom indicator plots an "MACD-type" indicator (i.e., the difference between 12- and 26-period exponential moving averages) of the plot it is dropped on.

```
mov( P, 12, E) - mov( P, 26, E)
```

If you plot the predefined Accumulation/Distribution indicator and then drop the above custom indicator on it from the QuickList, the result will be an MACD of the Accumulation/Distribution indicator.

Of course, you could write the preceding formula without using the "P" identifier as shown below, but you would have to modify it if you wanted an MACD of an indicator other than the Accumulation/ Distribution. By using the "P" identifier, the formula becomes more versatile.

```
mov( ad(), 12, E) - mov( ad(), 26, E)
```

In a custom indicator, the values for HIGH, LOW, CLOSE, VOLUME, OPEN, and OPEN INTEREST **always** come from the base security. For example, if you drop the custom indicator "HIGH - LOW / P" on a price plot that is not the chart's base security, the HIGH and LOW values will still come from the base security. The "P" value will represent the CLOSE of the security it was dropped on.

To plot a custom indicator with the "P" variable

1. Write a custom indicator using the "P" variable in place of the data array identifier (e.g., mov(p,10,e), sum(p,25), stdev(p,12), etc.).
2. Drag the custom indicator from the QuickList and drop it on the plot you want the "P" variable to calculate on.

To run a system test, exploration, or expert that contains a "P" variable

1. Write a system test, exploration, or expert using the "P" variable in place of the data array identifier (e.g., `mov(p,10,e)`, `sum(p,25)`, `stdev(p,12)`, etc.).
2. Select the plot (i.e., indicator or price plot) to use for the "P" variable by clicking directly on the plot. The plot is selected when small square "handles" appear on the plot.
3. Run the system test or exploration.

Formula Tips

General

The two most important "formula tips" have already been mentioned: (1) use the Paste Formula dialog (see page 239) and (2) click OK when entering a formula to check its syntax (see page 238).

Multiple Indented Lines

When writing long custom indicators, you should try to use multiple lines and consistent indentation for ease of reading. You can indent a line of the formula by typing CTRL+TAB. For example, the formula...

```
cum(if(close > ref(close,-1),+V, if(close <
ref(close,-1),-V,0))
```

is easier to read on multiple indented lines as follows:

```
cum(
    if(close > ref(close,-1),
        +V,
        if(close < ref(close,-1),
            -V,
            0))
)
```

Upper versus Lower-case Characters

The case used when entering formulas does not matter (e.g., "c" and "C" are treated the same). When MetaStock Pro checks for syntax errors, it automatically modifies the case to make the formula easier to read. The case within comments is not altered.

Comments

The prudent use of comments makes formulas easier to read. (Remember, comments are any text enclosed in braces, i.e., {}.)

You can use comments while developing formulas to "comment out" sections of the formula. For example, the second half of the following formula has been commented out so the first half can be tested. After the first half of the formula has been tested, you can remove the comments and test the entire formula.

```
( mov(fml("MA1"),10,S) / fml("MA2") ) { * stoch(5,3) }
```

Spacing

Blank spaces within formulas are optional. However, the prudent use of spaces can make formulas easier to read.

Clipboard Commands

You can use the standard clipboard command accelerator keys while editing custom indicators to transfer formulas from one custom indicator to another. To copy the highlighted text, press CTRL+C; to cut, press CTRL+X; to paste, press CTRL+V.

Variables

Use variables to speed up the calculation of formulas. Rather than repeating an expression or formula over and over, assign it to a variable and then reference the variable.

Using the Formula Organizer to Import and Export

The Formula Organizer is a wizard that allows you to import and export any MetaStock formula-based files including custom indicators, system tests, explorations, and experts. For example, you can use the Formula Organizer to import a set of add-on custom indicators, experts, etc. purchased from a third party. You could also create a set of add-on indicators, explorations, etc. to distribute to your colleagues, and even protect your formulas with a password.

Starting with your custom indicators, the Formula Organizer wizard will walk you through the steps necessary to import and/or export your files. To protect your formulas with a password, choose the export option, then enter a password when prompted.

To import/export custom indicators, system tests, explorations, and/or experts

1. Run MetaStock Pro.
2. Choose **Indicator Builder** from the Tools menu.
3. Click the **Organize** button to launch the Formula Organizer Wizard.
4. Follow the on-screen instructions.

Glossary

This glossary defines the terms used with the MetaStock formula language. Understanding (or remembering) these terms is not required, however, adding these terms to your vocabulary will make discussion easier with other MetaStock analysts.

COMMENT: Text within a formula that is not part of the formula. A comment must be surrounded by the characters { and }.

CONSTANT: A specific type of parameter that is required by a function. Constants can be subdivided into the following groups:

CALCULATION METHOD CONSTANT: Used to define the mode of calculation. Defined as PERCENT or POINTS. (PERCENT and POINTS can be abbreviated to % or \$.)

COMPARISON CONSTANT: Used in the if() function to define the comparison operation. Defined by >, >=, <, <=, <>, or =.

FORMULA CONSTANT: Used within the fml() function to reference another formula. A formula constant is specified as the name of another formula enclosed in quotation marks (e.g., fml("My Formula")).

MOVING AVERAGE TYPE CONSTANT: Used to define the moving average calculation method. Defined as EXPONENTIAL, SIMPLE, TIME SERIES, TRIANGULAR, VARIABLE, or WEIGHTED. (These can be abbreviated as E, S, T, TRI, VAR, and W.)

NUMERIC CONSTANT: A single numeric value. A function requiring a numeric constant cannot accept a data array since a data array may contain multiple, rather than single, numeric values. An example of a numeric constant is the "10" in the formula "mov(C,10,E)."

DATA ARRAY: A data array defines a specific set of information (data) that is used within a formula. Data arrays can be subdivided into more specific definitions:

FUNCTION RESULT ARRAY: A data array that is created as the result of the execution of a function.

LITERAL ARRAY: A data array defined using a single numeric constant.

PRICE ARRAY: An array containing the information stored in the high, low, close, etc., data arrays.

FORMULA: A combination of comments, constants, functions, mathematical operators and/or price array identifiers.

FUNCTION: A pre-defined mathematical operation that can be performed on a set of parameters to produce a desired data array.

OPERATOR, MATHEMATICAL: The +, -, *, and / operators.

OPERATOR, LOGICAL: The <, >, <=, >=, =, <>, AND, and OR operators.

PARAMETER: An item contained within a function. When a function has multiple parameters, they are separated by commas.

PRECEDENCE: The order in which a formula is evaluated (see page 236).

PRICE ARRAY IDENTIFIERS: The letters or words used to reference price arrays (Open, High, Low, Close, Volume, Open Interest, PREV, and the selected Plot).

Error Messages

Most of the error messages that are displayed when you enter and plot custom indicators are self-explanatory. This section clarifies some of the more common error messages.

A reference to a formula name is no longer valid.

This error occurs when a formula is plotted containing a reference (i.e., "fml()") to a non-existent formula name.

Does not contain an executable formula.

An attempt was made to execute a custom indicator that does not contain a valid formula.

Formula too complex.

This error is caused by functions (not formulas) being nested too deeply or by a complex mathematical expression that uses numerous mathematical operators that are not grouped using parentheses.

Grouping operators with parentheses may fix this problem. However, a better solution is to split the too-complex formula into smaller formulas and then nest the smaller formulas using the fml() function (see page 261).

Insufficient memory to continue formula execution.

MetaStock Pro ran out of memory to store temporary values.

This can be alleviated by reducing the number of periods of data currently loaded or by reducing references to nested formulas.

Overflow in function.

The result of a formula calculation generated a value that was too large to store.

The formula must be modified to produce results with smaller values (e.g., divide certain data arrays or function results by 100).

Too many numeric constants defined in formula.

A maximum of 20 different numeric constants (see page 249) may be used in each formula.

This error can be eliminated by splitting the formula that received the error into smaller formulas and then nesting the smaller formulas using the fml() function (see page 261).

Value out of valid range in function.

A parameter in a function is invalid.

Examples:

The formula "mov(C, -5, E)" will always generate this message, because -5 is not a valid moving average time period.

The formula "mov(C, 200, E)" will generate this message if fewer than 200 time periods of data are loaded.

The formula "mov(macd(), 74, E)" will generate this message if fewer than 100 time periods are loaded. This is because the MACD does not plot until the 26th day, which leaves fewer than 74 periods to calculate a 74-day moving average.

You should edit the formula and change the invalid parameter, or load more time periods.

Functions

The following list of functions can be used to create custom indicators (see page 299), explorations (see page 369), system tests (see page 319), and experts (see page 397).

Candlestick functions begin on page 288.

Some of the pattern finding functions (i.e., Inside, Outside, Rally, and Reaction) are based on information provided in the pamphlet [Using the Volume Reversal Survey in Market Analysis](#) by Mark A. Leibovit (520-282-1275).

Simulation Functions

New as of version 8.0, these functions let you use values that occur in a system test simulation to determine rules for buying and selling. For example, if you want the simulation to place a Sell Order when the equity dips below 5,000, you could write:

```
if(Simulation.AccountCash < 5000,1,0)
```

Note that these functions only work in the Buy Order, Sell Order, Sell Short Order and Buy to Cover Order rules in the Enhanced System Tester Dialog. Also, the CurrentPosition simulation functions only work in the Sell Order and Buy to Cover rules.

For explanations of what each simulation represents, check the Show English Names box at the bottom of the Paste Functions dialog.

Standard Functions

Absolute Value

| | |
|----------|---|
| SYNTAX | abs(DATA ARRAY) |
| FUNCTION | Calculates the absolute value of the DATA ARRAY. |
| EXAMPLE | The formula "abs(-10)" will return +10; the formula "abs(10)" also returns +10. |

Accumulation/Distribution

| | |
|--------|------|
| SYNTAX | ad() |
|--------|------|

FUNCTION Calculates the predefined Accumulation/
Distribution indicator.

Accumulation Swing Index

SYNTAX `aswing(LIMIT MOVE)`

FUNCTION Calculates the predefined Accumulation
Swing Index. The Swing Index requires
opening prices.

EXAMPLE `aswing(3.0)`

SEE ALSO The swing() function (see page 281).

Addition

SYNTAX `add(DATA ARRAY, DATA ARRAY)`

FUNCTION Adds the two parameters together.

EXAMPLE The formula "add(H, 10.7)" adds 10.7 to the
high prices (this formula also could be written
as "H + 10.7").

SEE ALSO The sub() function (see page 281).

Alert

SYNTAX `alert(EXPRESSION, PERIODS)`

FUNCTION Extends a "true" result of EXPRESSION for
the specified number of periods. This true
result is held true over the number of periods
specified even if a "false" result is generated.

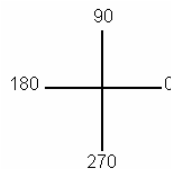
EXAMPLE `alert(cross(rsi(14),70),5)`

SEE ALSO See page 366 for information on using the
Alert function within a system test.

Arc Tangent

SYNTAX `atan(Y DATA ARRAY, X DATA ARRAY)`

FUNCTION Returns the arc tangent of Y/X. The value is
returned in degrees from 0 to 359.9. The
degrees are returned as shown below:



EXAMPLE The formula "atan(10, 0)" returns 90.

SEE ALSO The cos() function (see page 256) ; the sin()
function (see page 280).

Aroon Down

SYNTAX `arooldown(PERIODS)`

FUNCTION Calculates the Aroon Down component of the Aroon indicator.

EXAMPLE aroondown(14)

Aroon Up

SYNTAX aroonup(PERIODS)

FUNCTION Calculates the Aroon Up component of the Aroon indicator.

EXAMPLE aroonup(14)

Average Directional Movement

SYNTAX adx(PERIODS)

FUNCTION Calculates the predefined Average Directional Movement indicator.

EXAMPLE adx(14)

SEE ALSO The adxr() function (see page 258); the csi() function (see page 256); the dx() function (see page 258); the mdi() function (see page 270); the pdi() function (see page 274) .

Average True Range

SYNTAX atr(PERIODS)

FUNCTION Calculates the predefined Average True Range indicator.

EXAMPLE atr(20)

Bars Since

SYNTAX barssince(DATA ARRAY)

FUNCTION Calculates the number of bars (time periods) that have passed since DATA ARRAY was true.

Important: When using the barssince() function in an exploration, you must choose the "Load ___ Records" button in the Explorer Options dialog (see page 371) and specify a value equal to the number of bars loaded in your chart; otherwise, the exploration results may not be accurate.

EXAMPLE barssince(macd() < 0)

Bollinger Band Bottom

SYNTAX bbandbot(DATA ARRAY, PERIODS, METHOD, DEVIATIONS)

FUNCTION Calculates the bottom Bollinger Band of DATA ARRAY using METHOD calculation method and shifted downward DEVIATION

standard deviations. Valid methods are SIMPLE, EXPONENTIAL, WEIGHTED, TIMESERIES, TRIANGULAR, and VARIABLE (these can be abbreviated as S, E, W, T, TRI, and VAR).

EXAMPLE `bbandbot(close, 10, S, 2)`

Bollinger Band Top

SYNTAX `bbandtop(DATA ARRAY, PERIODS, METHOD, DEVIATIONS)`

FUNCTION Calculates the top Bollinger Band of DATA ARRAY using METHOD calculation method and shifted upward DEVIATION standard deviations. Valid methods are SIMPLE, EXPONENTIAL, WEIGHTED, TIMESERIES, TRIANGULAR, and VARIABLE (these can be abbreviated as S, E, W, T, TRI, and VAR).

EXAMPLE `bbandtop(close, 10, S, 2)`

Buying Pressure

SYNTAX `buyp()`

FUNCTION Calculates the buying pressure component of the Demand Index (see page 459). Buying pressure is a measurement of the amount of volume related to buying.

Ceiling

SYNTAX `ceiling(DATA ARRAY)`

FUNCTION Calculates the lowest integer that is greater than DATA ARRAY.

EXAMPLE The formula "`ceiling(7.2)`" returns 8; the formula "`ceiling(-7.2)`" returns -7.

SEE ALSO The `floor()` function (see page 260); the `int()` function (see page 265).

Chaikin A/D Oscillator

SYNTAX `co()`

FUNCTION Calculates the predefined Chaikin Oscillator.

Chaikin's Money Flow

SYNTAX `cmf(PERIODS)`

FUNCTION Calculates the predefined Chaikin Money Flow indicator over the last PERIOD number of periods.

EXAMPLE `cmf(14)`

Chande Momentum Oscillator

SYNTAX `cmo(DATA ARRAY, PERIODS)`

FUNCTION Calculates the predefined Chande Momentum Oscillator of DATA ARRAY over the last PERIOD number of periods.

EXAMPLE `cmo(c,14)`

Commodity Channel Index (EQUIS)

SYNTAX `ccie(PERIODS)`

FUNCTION Calculates the predefined Commodity Channel Index (EQUIS).

EXAMPLE `ccie(14)`

Commodity Channel Index (Standard)

SYNTAX `cci(PERIODS)`

FUNCTION Calculates the predefined Commodity Channel Index (Standard).

EXAMPLE `cci(14)`

Commodity Selection Index

SYNTAX `csi(PERIODS, VALUE, MARGIN, COMMISSION)`

FUNCTION Calculates the predefined Commodity Selection Index.

EXAMPLE `csi(14, 50, 2500,25)`

SEE ALSO The `adx()` function (see page 254); the `adxr()` function page 258); the `dx()` function (see page 258); the `mdi()` function (see page 270); the `pdi()` function (see page 274).

Correlation Analysis

SYNTAX `correl(INDEPENDENT, DEPENDENT,PERIODS, SHIFT)`

FUNCTION Calculates the predefined Correlation indicator. Compares the correlation of DEPENDENT to INDEPENDENT over PERIODS time periods, after shifting DEPENDENT to the right SHIFT-periods.

EXAMPLE The formula "`correl(macd(), CLOSE, 5, 10)`" compares the MACD indicator to the closing price 10-periods in the future, after statistically averaging each data array over the preceding 5-periods.

SEE ALSO The `tsf()` function (see page 282); the `stdev()` function (see page 280).

Cosine

SYNTAX `cos(DATA ARRAY)`

FUNCTION Returns the cosine of DATA ARRAY.
Assumes that the DATA ARRAY values are in degrees.

EXAMPLE cos(C)

SEE ALSO The atan() function (see page 253); the sin() function (see page 280).

Cross

SYNTAX cross(DATA ARRAY 1, DATA ARRAY 2)

FUNCTION Plots a "+1" on the day that DATA ARRAY 1 crosses above DATA ARRAY 2. Otherwise, "0" is plotted.

If you want to know when DATA ARRAY 1 crosses below DATA ARRAY 2, use the formula "cross(DATA ARRAY 2, DATA ARRAY 1)"

EXAMPLE cross(close, mov(close,9,e))

Cumulate

SYNTAX cum(DATA ARRAY)

FUNCTION Calculates a cumulative sum of the DATA ARRAY from the first period in the chart.

EXAMPLE The formula "cum(1)" calculates an indicator that rises one point for each day since the beginning of the chart; the formula "cum(C)" calculates the cumulative total of all closing prices from the beginning of the chart.

SEE ALSO The sum() function (see page 281).

Day Of Month

SYNTAX dayofmonth()

FUNCTION Plots the day of the month. If today was July 15th, "15" would be plotted.

Day Of Week

SYNTAX dayofweek()

FUNCTION Plots the day of the week. 1=Monday, 2=Tuesday, 3=Wednesday, 4=Thursday, 5=Friday, 6=Saturday, 7=Sunday.

Delta

SYNTAX delta(TYPE, DATE, PRICE, INTEREST, DIVIDEND)

FUNCTION Calculates the predefined Delta indicator. See the option() function (page 273) for a description of the parameters used in the delta() function.

EXAMPLE delta(EC, 961220, 125, 7.50, 4.75)
SEE ALSO The gamma() function (see page 262); the
life() function (see page 272) ; the option()
function (see page 276); the theta() function
(see page 282); the vega() function (see
page 284); and the volo() function (see page
285).

Dema

SYNTAX dema(DATA ARRAY, PERIODS)
FUNCTION Calculates the predefined DEMA indicator
EXAMPLE dema(c,14)
SEE ALSO The tema() function (see page 282).

Demand Index

SYNTAX di()
FUNCTION Calculates the predefined Demand Index.

Detrended Price Oscillator

SYNTAX dpo(PERIODS)
FUNCTION Calculates the predefined Detrended Price
Oscillator.
EXAMPLE dpo(25)

Directional Movement Index

SYNTAX dx(PERIODS)
FUNCTION Calculates the predefined Directional
Movement Index.
EXAMPLE dx(14)
SEE ALSO The adx() function (see page 254); the adxr()
function page 258); the csi() function (see
page 256); the mdi() function (see page
270); the pdi() function (see page 274)

Directional Movement Rating

SYNTAX adxr(PERIODS)
FUNCTION Calculates the predefined Directional
Movement Rating.
EXAMPLE adxr(14)
SEE ALSO The adx() function (see page 254); the dx()
function (see page 258); the csi() function
(see page 256); the mdi() function (see page
270); the pdi() function (see page 274)

Divergence

SYNTAX divergence(DATA ARRAY 1, DATA ARRAY
2, % MINIMUM CHANGE)

FUNCTION Plots a +1 if DATA ARRAY 1 diverges from DATA ARRAY 2 (i.e., DATA ARRAY 1 is increasing and DATA ARRAY 2 is decreasing). Plots a -1 if DATA ARRAY 1 converges from DATA ARRAY 2 (i.e., DATA ARRAY 1 is decreasing and DATA ARRAY 2 is increasing). A zero is plotted if they are moving in the same direction. Movements in DATA ARRAY 1 less than % MINIMUM CHANGE are ignored.

The Divergence function is based on the Zig Zag formula. First, a % MINIMUM CHANGE Zig Zag is calculated for DATA ARRAY 1. Next, a Zig Zag is calculated for DATA ARRAY 2 using the % MINIMUM CHANGE required to match the number of Zig Zag segments in DATA ARRAY 1 over the data range loaded. The two Zig Zags are then compared for divergence and convergence.

EXAMPLE The formula "divergence(close, rsi(21), 3)" looks for divergences between the close and a 21-period RSI. Movements in the close less than 3% are ignored.

Division

SYNTAX div(DATA ARRAY, DATA ARRAY)
FUNCTION Divides the first parameter by the second. Division by zero produces a result of zero.
EXAMPLE The formula "div(10, 2)" returns 5 (this formula also could be written as "10 / 2").
SEE ALSO The mul() function (see page 272).

Dynamic Momentum Index

SYNTAX dmi(DATA ARRAY)
FUNCTION Calculates the predefined Dynamic Momentum Index.
EXAMPLE dmi(CLOSE)

Ease of Movement

SYNTAX emv(PERIODS, METHOD)
FUNCTION Calculates a PERIODS moving average of the Ease of Movement value using METHOD calculation method. Valid methods are SIMPLE, EXPONENTIAL, WEIGHTED, TIMESERIES, TRIANGULAR, and VARIABLE. (These can be abbreviated as S, E, W, T, TRI, and VAR.)

EXAMPLE The formula "emv(14,S)" returns the value of the Ease of Movement indicator smoothed with a 14-period simple moving average.

Exponent

SYNTAX exp(DATA ARRAY)

FUNCTION Calculates e raised to the DATA ARRAY power.

SEE ALSO The log() function (see page 267).

External Formula

SYNTAX ExtFml("DLL NAME.FUNCTION NAME",argument 1,...,argument n)

FUNCTION Returns the values of the function contained in an MSX DLL. This is only available if an MSX DLL is present.

EXAMPLE ExtFml("MyDLL.MyFunction",close) would reference a function called MyFunction contained in the MSX DLL called MyDLL, and use the closing price of the security in its calculation.

For more information on the Equis Solution Provider program and the MetaStock Developers Kit go to www.equis.com

Fast Fourier Transform

SYNTAX fft(DATA ARRAY, PERIODS, LENGTH, DETREND or MEAN, AMPLITUDE or POWER)

FUNCTION Calculates the PERIODS time period Fourier indicator of the DATA ARRAY, given sample LENGTH using the DETREND or MEAN method, and displays the AMPLITUDE or POWER spectrum.

EXAMPLE The formula "fft(CLOSE, 100, 1, DETREND, POWER)" returns the default Fast Fourier indicator.

Floor

SYNTAX floor(DATA ARRAY)

FUNCTION Calculates the highest integer that is less than DATA ARRAY.

EXAMPLE The function "floor(13.9)" returns 13. The formula "floor(-13.9)" returns -14.

SEE ALSO The ceiling() function (see page 255); the int() function (see page 265).

Forecast Oscillator

| | |
|----------|--|
| SYNTAX | forecastosc(DATA ARRAY, PERIODS) |
| FUNCTION | Calculates the predefined Forecast Oscillator. |
| EXAMPLE | forecastosc(close, 14) |

Formula Call

| | |
|----------|--|
| SYNTAX | fml("FORMULA_NAME") |
| FUNCTION | Calculates the value of another formula. The formula can be referenced using the FORMULA_NAME in quotes. |

When referencing a formula's name, the name must be contained in quotation marks (e.g., fml("Secret A")).

If you change a formula's name, you must also change any fml() calls that reference that formula.

| | |
|---------|--|
| EXAMPLE | The formula "fml("Secret A") * fml("MyMACD")" calculates the value of the formula named "Secret A" multiplied by "MyMACD." |
|---------|--|

| | |
|----------|--|
| SEE ALSO | See page 242 for more details on using the fml() function. |
|----------|--|

Formula Variable Call

| | |
|----------|---|
| SYNTAX | fmlvar("FORMULA_NAME", "VARIABLE_NAME") |
| FUNCTION | Calls the custom indicator named FORMULA_NAME and returns the value contained in the custom indicator's variable named VARIABLE_NAME. |

Both the formula's name and the variable's name must be contained in quotation marks (e.g., fmlvar("Secret A", "MyVar")).

If you change a formula or variable name, you must also change any fmlvar() calls that reference that formula and variable.

| | |
|---------|---------------------------------------|
| EXAMPLE | fmlvar("MyIndicator", "MyVariableA") |
|---------|---------------------------------------|

| | |
|----------|---|
| SEE ALSO | See page 246 for more details on using the fmlvar() function. |
|----------|---|

Fraction

| | |
|----------|---|
| SYNTAX | frac(DATA ARRAY) |
| FUNCTION | Eliminates the integer portion of DATA ARRAY and returns the fractional part. |

EXAMPLE The formula "frac(10.7)" returns 0.7; the formula "frac(-19.8)" returns -0.8.

SEE ALSO The int() function (see page 265).

Gamma

SYNTAX gamma(TYPE, DATE, PRICE, INTEREST, DIVIDEND)

FUNCTION Calculates the predefined Gamma indicator. See the option() function (page 276) for a description of the parameters used in the gamma() function.

EXAMPLE gamma(EC, 961220, 125, 7.50, 4.75)

SEE ALSO The delta() function (see page 257); the life() function (see page 272); the option() function (see page 276); the theta() function (see page 282); the vega() function (see page 284); and the volo() function (see page 285).

Gap Down

SYNTAX gapdown()

FUNCTION Plots a "+1" on the day a security's prices gap down. Otherwise a "0" is plotted. A gap down occurs if yesterday's low is greater than today's high.

Gap Up

SYNTAX gapup()

FUNCTION Plots a "+1" on the day a security's prices gap up. Otherwise a "0" is plotted. A gap up occurs if yesterday's high is less than today's low.

Herrick Payoff Index

SYNTAX hpi(CENTS, MULTIPLYING FACTOR)

FUNCTION Calculates the predefined Herrick Payoff Index.

EXAMPLE hpi(100, 10)

Highest

SYNTAX highest(DATA ARRAY)

FUNCTION Calculates the highest value in the DATA ARRAY since the first day loaded in the chart.

EXAMPLE The formula "highest(rsi(14))" returns the highest Relative Strength Index value since the first day loaded in the chart ; "highest (close)" returns the highest closing price since the first day loaded in the chart.

SEE ALSO

The hhv() function page 263; the llv() function (see page 268); the lowest() function (see page 267).

Highest Bars Ago

SYNTAX

highestbars(DATA ARRAY)

FUNCTION

Calculates the number of periods that have passed since the DATA ARRAY's highest value. This includes all data loaded in the chart.

EXAMPLE

The formula "highestbars(close)" returns the number of periods that have passed since the closing price reached its highest peak.

Highest High Value

SYNTAX

hhv(DATA ARRAY, PERIODS)

FUNCTION

Calculates the highest value in the DATA ARRAY over the preceding PERIODS (PERIODS includes the current day).

EXAMPLE

The formula "hhv(CLOSE, 5)" returns the highest closing price over the preceding five periods; "hhv(H,7)" returns the highest high price over the preceding seven periods.

SEE ALSO

The Stochastic Oscillator example (see page 311); the llv() function (see page 268).

Highest High Value Bars Ago

SYNTAX

hhvbars(DATA ARRAY, PERIODS)

FUNCTION

Calculates the number of periods that have passed since the DATA ARRAY reached its PERIODS period peak.

EXAMPLE

The formula "hhvbars(close,50)" returns the number of periods that have passed since the closing price reached its 50-period peak.

Highest Since

SYNTAX

highestsince (Nth, EXPRESSION, DATA ARRAY)

FUNCTION

Returns the highest value of DATA ARRAY since the Nth most recent occurrence of EXPRESSION was true. This includes all data loaded in the chart.

EXAMPLE

The formula "highestsince(2, cross(c,mov(c,10,s), close)" returns highest value of the close since the second most

recent occurrence of the close crossing above its 10-day moving average.

Highest Since Bars Ago

SYNTAX highestsincebars(Nth, EXPRESSION, DATA ARRAY)

FUNCTION Calculates the number of periods that have passed from the highest value of DATA ARRAY (after the Nth most recent occurrence of EXPRESSION was true). This includes all data loaded in the chart.

Put another way, this function returns the number of periods that have passed since the highestsince() function returned its value.

EXAMPLE The formula "highestsincebars(2, cross(c,mov(c,10,s), close)" returns the number of periods that have passed since the highest value of the close (after the second most recent occurrence of the close crossing above its 10-day moving average).

Hour

SYNTAX hour()

FUNCTION On an intraday chart, plots the number of hours that have passed during the day using a 24 hour clock. For example, if the current time is recorded as 13:15:22, the hour() function will return "13" .

If

SYNTAX if(DATA ARRAY > >= < <= <> = DATA ARRAY, THEN DATA ARRAY, ELSE DATA ARRAY)

FUNCTION A conditional function that returns the second parameter (THEN) if the conditional expression defined by the first parameter is true; otherwise, the third parameter is returned (ELSE).

EXAMPLE The formula "if(1<2,3,4)" will always return the value three.

SEE ALSO The On Balance Volume example (see page 310); The Indicator Builder Tutorial (see page 300). For more details on using the if() function, see page 241.

Inertia

SYNTAX inertia(REGRESSION PERIODS, RVI PERIODS)

FUNCTION Calculates the predefined Inertia indicator. The RVI PERIODS is the number of periods used for the Relative Volatility Index component of the indicator.

EXAMPLE inertia(20,14)

Input

SYNTAX input("PROMPT TEXT", MINIMUM VALUE, MAXIMUM VALUE, DEFAULT VALUE)

FUNCTION This function instructs MetaStock Pro to prompt for input when a custom indicator is plotted. This function is only supported by the Custom Indicator Builder.

prompt text. This defines the text displayed next to the input box. This is used to describe what should be entered.

minimum value. This argument is the smallest value that can be entered. If you attempt to enter a value smaller than this value, MetaStock Pro displays a message.

maximum value. This argument is the largest value that can be entered. If you attempt to enter a value larger than this value, MetaStock Pro displays a message.

default value. This argument defines the default value (i.e., the value that will appear in the box when the dialog is initially displayed.) . Note that the default value is used if another formula using the fml() function calls the custom indicator.

EXAMPLE input("Enter the number of periods",1,50,9)

Inside

SYNTAX inside()

FUNCTION Plots a "+1" when an inside day occurs. An inside day occurs when today's high is less than yesterday's high and today's low is greater than yesterday's low. A range is determined by the first Inside Day and is only broken by a Rally, Reaction, or Outside day.

Integer

SYNTAX int(DATA ARRAY)

FUNCTION Removes the fractional portion of DATA ARRAY and returns the integer part.

EXAMPLE The formula "int(10.7)" returns 10; the formula "int(-19.8)" returns -19.

SEE ALSO

The ceiling() function (see page 255); the floor() function (see page 260); the frac() function (see page 261).

Intraday Momentum Index

SYNTAX

imi(PERIODS)

FUNCTION

Calculates the predefined Intraday Momentum Index.

EXAMPLE

imi(14)

IsDefined()

SYNTAX

isdefined(DATA ARRAY)

FUNCTION

Returns 1 if all data necessary to calculate the formula is available, 0 if not.

EXAMPLE

The formula "isdefined(mov(c,20,s))" will return a 0 if there are less than 20 periods of data loaded in the chart.

IsUndefined()

SYNTAX

isundefined(DATA ARRAY)

FUNCTION

Returns 0 if all data necessary to calculate the formula is available, 1 if not.

EXAMPLE

The formula "isundefined(mov(c,20,s))" will return a 1 if there are less than 20 periods of data loaded in the chart.

Klinger Oscillator

SYNTAX

kvo()

FUNCTION

Calculates the predefined Klinger Oscillator.

EXAMPLE

The formula "kvo()" returns the value of the Klinger Oscillator (i.e., the solid line). The formula "mov(kvo(),13,E)" returns the value of the KVO's trigger line (i.e., the dotted line).

Last Value in Data Array

SYNTAX

lastvalue(DATA ARRAY)

FUNCTION

This function loads an entire data array with the last calculated value of the specified DATA ARRAY. The result of this function can be used in place of a constant in any function argument.

If DATA ARRAY is undefined (e.g., only 100-days loaded and you request the last value

of a 200-day moving average) then the lastvalue function returns zero.

Since this function loads an entire data array with the last value of another array, it allows a formula to look into the future. This is unacceptable for most indicators, but is very beneficial for things like pattern recognition.

EXAMPLE

The formula "mov(close,lastvalue(fml("Determine Periods")),s)" calculates a moving average using the number of periods returned by the indicator named "Determine Periods".

Linear Regression Indicator

SYNTAX linearreg(DATA ARRAY, PERIODS)
FUNCTION Calculates the predefined Linear Regression indicator.
EXAMPLE linearreg(c, 50)

Linear Regression Slope

SYNTAX linregslope(DATA ARRAY, PERIODS)
FUNCTION Calculates the predefined Linear Regression Slope indicator.
EXAMPLE linregslope(c, 50)

Logarithm (natural)

SYNTAX log(DATA ARRAY)
FUNCTION Calculates the natural logarithm of DATA ARRAY.
SEE ALSO The exp() function (see page 260).

Lowest

SYNTAX lowest(DATA ARRAY)
FUNCTION Calculates the lowest value in the DATA ARRAY since the first day loaded in the chart.
EXAMPLE The formula "lowest(rsi(14))" returns the lowest Relative Strength Index value since the first day loaded in the chart; "lowest (close)" returns the lowest closing price since the first day loaded in the chart.
SEE ALSO The hhv() function (see page 263); the llv() function (see page 268); the highest() function (see page 262).

Lowest Bars Ago

SYNTAX lowestbars(DATA ARRAY)

| | |
|----------|--|
| FUNCTION | Calculates the number of periods that have passed since the DATA ARRAY's lowest value. This includes all data loaded in the chart. |
| EXAMPLE | The formula "lowestbars(close)" returns the number of periods that have passed since the closing price reached its lowest point. |

Lowest Low Value

| | |
|----------|--|
| SYNTAX | llv(DATA ARRAY, PERIODS) |
| FUNCTION | Calculates the lowest value in the DATA ARRAY over the preceding PERIODS (PERIODS includes the current day). |
| EXAMPLE | The formula "llv(CLOSE, 14)" returns the lowest closing price over the preceding 14 periods. |
| SEE ALSO | The Stochastic Oscillator example (see page 311); the hhv() function (see page 263). |

Lowest Low Value Bars Ago

| | |
|----------|--|
| SYNTAX | llvbars(DATA ARRAY, PERIODS) |
| FUNCTION | Calculates the number of periods that have passed since the DATA ARRAY reached its PERIODS period trough. |
| EXAMPLE | The formula "llvbars(close,50)" returns the number of periods that have passed since the closing price reached its 50 period trough. |

Lowest Since

| | |
|----------|---|
| SYNTAX | lowestsince (Nth, EXPRESSION, DATA ARRAY) |
| FUNCTION | Returns the lowest value of DATA ARRAY since the Nth most recent occurrence of EXPRESSION was true. This includes all data loaded in the chart. |
| EXAMPLE | The formula "lowestsince(2, cross(c,mov(c,10,s), close)" returns lowest value of the close since the second most recent occurrence of the close crossing above its 10-day moving average. |

Lowest Since Bars Ago

| | |
|----------|--|
| SYNTAX | lowestsincebars(Nth, EXPRESSION, DATA ARRAY) |
| FUNCTION | Calculates the number of periods that have passed from the lowest value of DATA ARRAY (after the Nth most recent occurrence of EXPRESSION was true). This includes all data loaded in the chart. |

EXAMPLE Put another way, this function returns the number of periods that have passed since the `lowestsince()` function returned its value.

The formula "`lowestsincebars(2, cross(c,mov(c,10,s), close)`" returns the number of periods that have passed since the lowest value of the close (after the second most recent occurrence of the close crossing above its 10-day moving average).

MACD

SYNTAX `macd()`

FUNCTION Calculates the predefined MACD indicator.

EXAMPLE The formula "`macd()`" returns the value of the MACD indicator (i.e., the solid line). The formula "`mov(macd(),9,E)`" returns the value of the MACD's signal line (i.e., the dotted line).

Market Facilitation Index

SYNTAX `marketfacindex()`

FUNCTION Calculates the predefined Market Facilitation Index.

EXAMPLE `marketfacindex()`

Mass Index

SYNTAX `mass(PERIODS)`

FUNCTION Calculates the predefined Mass Index.

EXAMPLE `mass(25)`

Maximum

SYNTAX `max(DATA ARRAY, DATA ARRAY)`

FUNCTION Returns the largest of the two parameters.

EXAMPLE The formula "`max(CLOSE, 10)`" returns either the closing price or 10, whichever is greater. The formula "`max(-14, 13)`" always returns 13.

Median Price

SYNTAX `mp()`

FUNCTION Calculates the predefined Median Price indicator.

SEE ALSO The `typ()` function (see page 283).

MESA Lead Sine

SYNTAX `mesaleadsine(CYCLE LENGTH)`

FUNCTION Calculates the predefined MESA Lead Sine indicator that plots along with MESA Sine Wave indicator (see page 482).

EXAMPLE mesaleadsine(20)

SEE ALSO The mesasinewave() function (see page 270).

MESA Sine Wave

SYNTAX mesasinewave(CYCLE LENGTH)

FUNCTION Calculates the predefined MESA Sine Wave indicator (see page 482).

EXAMPLE mesasinewave(20)

SEE ALSO The mesaleadsine() function (see page 269).

Midpoint

SYNTAX mid(DATA ARRAY, PERIODS)

FUNCTION Returns the midpoint of the DATA ARRAY over the specified time PERIOD. The midpoint is the value halfway between the highest and lowest DATA ARRAY values during the specified PERIOD.

EXAMPLE The formula "mid(CLOSE, 7)" is equivalent to "llv(C,7) + ((hhv(C,7) 12/10/2002- llv(C,7)) / 2)."

SEE ALSO The hhv() function (see page 263); the llv() function (see page 268).

Minimum

SYNTAX min(DATA ARRAY, DATA ARRAY)

FUNCTION Returns the smallest of the two parameters.

EXAMPLE The formula "min(CLOSE, 10)" returns the closing price or 10, whichever is less. The formula "min(-14, 13)" always returns -14.

SEE ALSO The max() function (see page 269).

Minus Directional Movement

SYNTAX mdi(PERIODS)

FUNCTION Calculates the predefined Minus Directional Movement indicator.

EXAMPLE mdi(14)

SEE ALSO The adx() function on page 254; the adxr() function on page 258; the csi() function on page 256; the dx() function on page 258; the pdi() function on page 274.

Minute

SYNTAX

minute()

FUNCTION

On an intraday chart, plots the number of minutes that have passed during the current hour. For example, if the current time is recorded as 10:15:22, the minute() function will return "15".

Modulus

SYNTAX

mod(DATA ARRAY, DATA ARRAY)

FUNCTION

Calculates the remainder (i.e., the fractional portion) of DATA ARRAY divided by DATA ARRAY. A division by zero produces a zero result.

EXAMPLE

The formula "mod(10, 3)" returns 1.0; the formula "mod(-10.7, 3)" returns -1.7. You could write an equivalent formula as "-10.7 - (int(-10.7 / 3) * 3)."

Momentum

SYNTAX

mo(PERIODS)

FUNCTION

Calculates the predefined Momentum indicator.

EXAMPLE

mo(12)

Money Flow Index

SYNTAX

mfi(PERIODS)

FUNCTION

Calculates the predefined Money Flow Index.

EXAMPLE

mfi(14)

SEE ALSO

The rsi() function (see page 279).

Month

SYNTAX

month()

FUNCTION

Plots the month of the year for the price. If a bar was plotted on 10/15/96, "10" would be plotted.

Moving Average

SYNTAX

mov(DATA ARRAY, PERIODS, METHOD)

FUNCTION

Calculates a PERIODS moving average of DATA ARRAY using METHOD calculation method.

Valid methods are EXPONENTIAL, SIMPLE, TIMESERIES, TRIANGULAR, WEIGHTED, VARIABLE, AND VOLUMEADJUSTED (these can be abbreviated as E, S, T, TRI, W, VAR, and

VOL).

EXAMPLE

The formula "mov(CLOSE, 25, EXPONENTIAL)" returns the value of a 25-period exponential moving average of the closing prices.

Multiplication

SYNTAX

mul(DATA ARRAY, DATA ARRAY)

FUNCTION

Calculates DATA ARRAY multiplied by DATA ARRAY.

EXAMPLE

The function "mul(CLOSE, 2)" returns the closing price multiplied by two. (This function also could be written as "C * 2.")

SEE ALSO

The div() function (see page 259).

Negative

SYNTAX

neg(DATA ARRAY)

FUNCTION

Calculates the negative of DATA ARRAY.

EXAMPLE

The formula "neg(10)" returns -10; the formula "neg(-12)" returns +12. This formula also could be written "-(-12)."

Negative Volume Index

SYNTAX

nvi()

FUNCTION

Calculates the predefined Negative Volume Index.

SEE ALSO

The pvi() function (see page 274).

On Balance Volume

SYNTAX

obv()

FUNCTION

Calculates the predefined On Balance Volume indicator.

SEE ALSO

The example formula (see page 310).

Option Expiration

SYNTAX

optionexp()

FUNCTION

Calculates the predefined Next Option Expiration indicator.

SEE ALSO

The Option Life function (see page 272).

Option Life

SYNTAX

life(EXPIRATION DATE)

FUNCTION

Calculates the predefined Option Life indicator.

EXAMPLE `life(970121)` displays the number of days until January 21, 1997.

SEE ALSO The `delta()` function (see page 257); the `gamma()` function (see page 262); the `option()` function (see page 276); the `theta()` function (see page 282); the `vega()` function (see page 284); and the `vol()` function (see page 285).

Outside

SYNTAX `outside()`

FUNCTION Plots a "+1" when an outside day occurs. An outside day occurs when today's high is greater than yesterday's high and today's low is less than yesterday's low. A range is determined by the first Outside Day and is only broken by a Rally, Reaction, or Inside day.

Parabolic SAR

SYNTAX `sar(STEP, MAXIMUM)`

FUNCTION Calculates the predefined Parabolic SAR indicator.

EXAMPLE `sar(0.02, 0.20)`

Peak Bars Ago

SYNTAX `peakbars(Nth, DATA ARRAY, % MINIMUM CHANGE)`

FUNCTION Plots the number of bars that have passed from the Nth peak. This uses the Zig Zag function (see page 287) to determine the peaks. N=1 would return the number of bars that have passed since the most recent peak. N=2 would return the number of bars that have passed since the 2nd most recent peak. Etc.

EXAMPLE `peakbars(1,close,5)`

Peak Value

SYNTAX `peak(Nth, DATA ARRAY, % MINIMUM CHANGE)`

FUNCTION Plots the value of DATA ARRAY Nth peak(s) ago. This uses the Zig Zag function (see page 539) to determine the peaks. N=1 would return the value of the most recent peak. N=2 would return the value of the 2nd most recent peak. Etc.

EXAMPLE `peak(1,close,5)`

Performance

| | |
|----------|--|
| SYNTAX | per() |
| FUNCTION | Calculates the predefined Performance indicator. |

Plus Directional Movement

| | |
|----------|---|
| SYNTAX | pdi(PERIODS) |
| FUNCTION | Calculates the predefined Plus Directional Movement indicator. |
| EXAMPLE | pdi(14) |
| SEE ALSO | The adx() function on page 254; the adxr() function on page 258; the csi() function on page 256; the dx() function on page 258. |

Polarized Fractal Efficiency

| | |
|----------|---|
| SYNTAX | pfe(DATA ARRAY, PERIODS, SMOOTHING PERIODS) |
| FUNCTION | Calculates the predefined Polarized Fractal Efficiency indicator. |
| EXAMPLE | pfe(c,10,5) |

Positive Volume Index

| | |
|----------|--|
| SYNTAX | pvi() |
| FUNCTION | Calculates the predefined Positive Volume Index. |
| SEE ALSO | The nvi() function (see page 272). |

Power

| | |
|----------|---|
| SYNTAX | power(DATA ARRAY, POWER) |
| FUNCTION | Calculates DATA ARRAY raised to the POWER power. A negative DATA ARRAY value raised to a non-integer POWER causes an error message to be displayed. |
| EXAMPLE | The formula "power(10, 3)" returns 1,000. |

Precision

| | |
|----------|---|
| SYNTAX | prec(DATA ARRAY, PRECISION) |
| FUNCTION | Truncates DATA ARRAY to PRECISION decimal places. |
| EXAMPLE | The formula "prec(10.12981, 2)" returns 10.120. The formula "prec(10.12981, 4)" returns 10.12980. Small binary rounding errors may cause some minor distortion in the decimal portion of any number stored in a computer. |

Price Channel High

| | |
|----------|---|
| SYNTAX | pricechannelhigh(PERIODS) |
| FUNCTION | Calculates the top channel line of the Price Channel indicator. |
| EXAMPLE | pricechannelhigh(14) |

Price Channel Low

| | |
|----------|--|
| SYNTAX | pricechannellow(PERIODS) |
| FUNCTION | Calculates the bottom channel line of the Price Channel indicator. |
| EXAMPLE | pricechannellow(14) |

Price Oscillator

| | |
|----------|--|
| SYNTAX | oscp(PERIODS, PERIODS, MA_METHOD, DIFF_METHOD) |
| FUNCTION | Calculates the PERIODS/PERIODS predefined Price Oscillator indicator calculated using the MA_METHOD moving average method expressed in DIFF_METHOD. Valid MA_METHODs are SIMPLE, EXPONENTIAL, WEIGHTED, TIMESERIES, TRIANGULAR, and VARIABLE (these can be abbreviated as S, E, W, T, TRI, VAR). Valid DIFF_METHODs are PERCENT and POINTS (these can be abbreviated as % and \$). |
| EXAMPLE | The formula "oscp(1, 25, E, \$)" returns a 1-period/25-period exponential price oscillator expressed in points. |
| SEE ALSO | The oscv() function (see page 285). |

Price Volume Trend

| | |
|----------|---|
| SYNTAX | pvt() |
| FUNCTION | Calculates the predefined Price Volume Trend indicator. |

Projection Band Bottom

| | |
|----------|--|
| SYNTAX | Projbandbot(PERIODS) |
| FUNCTION | Calculates the bottom Projection Band. |
| EXAMPLE | projbandbot(21) |

Projection Band Top

SYNTAX Projbandtop(PERIODS)
FUNCTION Calculates the top Projection Band.
EXAMPLE projbandbot(21)

Projection Oscillator

SYNTAX Projosc(REGRESSION PERIODS,
SLOWING PERIODS)
FUNCTION Calculates the predefined Projection
Oscillator.
EXAMPLE projosc(21,3)

Put/Call Price

SYNTAX option(TYPE, DATE, PRICE, INTEREST,
DIVIDEND)
FUNCTION Calculates the predefined Put/Call Price
indicator.
EXAMPLE The formula "option(EC, 961231, 125, 8.5,
6.31)" calculates the fair market value of an
equity call that matures on December 31,
1996, at a strike price of \$125. The current
market interest rates are 8.5% and the
security paid an annual dividend of \$6.31.

TYPE specifies whether the security is an
Equity or a Future (i.e., E or F) and if a Put or
Call price (i.e., P or C) should be calculated.
Valid TYPEs are EC, EP, FC, and FP.
(These types also can be spelled out as
CALL, PUT, FUTURECALL, and
FUTUREPUT.)

The DATE is the date that the option expires.
The DATE must be entered as a number in
the YYMMDD format. For example,
December 31, 1996, should be entered as
961231. This date format is used regardless
of the date format specified in the
Configuration section.

The PRICE parameter specifies the option's
strike price.

The INTEREST parameter specifies a "risk
free" market interest rate (e.g., 8.75).

The DIVIDEND parameter specifies the total
dividends received over the last 12 months.

SEE ALSO

The delta() function (see page 257); the
gamma() function (see page 262); the life()

function (see page 272); the theta() function (see page 282); the vega() function (see page 284); and the volo() function (see page 285).

Qstick

| | |
|----------|---|
| SYNTAX | qstick(PERIODS) |
| FUNCTION | Calculates the predefined Qstick indicator. |
| EXAMPLE | qstick(21) |

r-squared

| | |
|----------|---|
| SYNTAX | rsquared(DATA ARRAY, PERIODS) |
| FUNCTION | Calculates the predefined Rsquared indicator. |
| EXAMPLE | rsquared(c, 21) |

Rally

| | |
|----------|---|
| SYNTAX | rally() |
| FUNCTION | Plots a "+1" when a rally day occurs. Otherwise, a "0" is plotted. A rally day occurs when today's high is greater than the previous rally day's high and today's low is greater than or equal to the previous rally day's low. |

Rally With Volume

| | |
|----------|--|
| SYNTAX | rallywithvol() |
| FUNCTION | Plots a "+1" when a rally with volume day occurs. Otherwise, a "0" is plotted. A rally with volume occurs when today's high is greater than the previous rally day's high and today's low is greater than or equal to the previous rally day's low. Today's volume must be greater than the previous rally day's volume. |

Random Walk Index of Highs

| | |
|----------|---|
| SYNTAX | rwih(MINIMUM PERIODS, MAXIMUM PERIODS) |
| FUNCTION | Calculates the predefined Random Walk Index of the highs indicator. |
| EXAMPLE | rwih(6,39) |

Random Walk Index of Lows

| | |
|--------|---|
| SYNTAX | rwil(MINIMUM PERIODS, MAXIMUM PERIODS) |
|--------|---|

FUNCTION Calculates the predefined Random Walk Index of the lows indicator.

EXAMPLE `rwil(6,39)`

Range Indicator

SYNTAX `rangeindicator(PERIODS, SMOOTHING PERIODS)`

FUNCTION Calculates the predefined Range Indicator.

EXAMPLE `rangeindicator(10,3)`

Rate of Change

SYNTAX `roc(DATA ARRAY, PERIODS, DIFF_METHOD)`

FUNCTION Calculates the PERIODS rate-of-change of DATA ARRAY expressed as DIFF_METHOD.

Valid DIFF_METHODS are PERCENT and POINTS (these can be abbreviated as % and \$).

EXAMPLE The formula `"roc(CLOSE, 12, PERCENT)"` returns the 12-period percent rate-of-change of the closing prices.

Reaction

SYNTAX `reaction()`

FUNCTION Plots a "+1" when a reaction day occurs. Otherwise, a "0" is plotted. A reaction day occurs when today's high is less than or equal to the previous reaction day's high and today's low is less than the previous reaction day's low.

Reaction With Volume

SYNTAX `reactionwithvol()`

FUNCTION Plots a "+1" when a reaction day occurs. Otherwise, a "0" is plotted. A reaction day occurs when today's high is less than or equal to the previous reaction day's high and today's low is less than the previous reaction day's low. Today's volume must be greater than the previous reaction day's volume.

Reference

SYNTAX `ref(DATA ARRAY, PERIODS)`

FUNCTION References a previous or subsequent element in a DATA ARRAY. A positive PERIOD references "n" periods in the future;

a negative PERIOD references "n" periods ago.

EXAMPLE The formula "ref(CLOSE, -12)" returns the closing price 12 periods ago. Thus, you could write the 12-day price rate-of-change (expressed in points) as "C 12/10/2002- ref(C, -12)." The formula "ref(C, +12)" returns the closing price 12 periods ahead.

Relative Momentum Index

SYNTAX rmi(DATA ARRAY, PERIODS, MOMENTUM PARAMETER)
FUNCTION Calculates the predefined Relative Momentum Index.
EXAMPLE rmi(c,20,20)

Relative Strength Index (RSI)

SYNTAX rsi(PERIODS)
FUNCTION Calculates the predefined RSI indicator.
EXAMPLE rsi(14)

Relative Volatility Index

SYNTAX rvi(PERIODS)
FUNCTION Calculates the predefined Relative Volatility Index.
EXAMPLE rvi(21)

Round

SYNTAX round(DATA ARRAY)
FUNCTION Rounds DATA ARRAY to the nearest integer.
EXAMPLE The formula "round(+10.5)" returns +11. The formula "round(-10.4)" returns -10.
SEE ALSO The ceiling() function on page 255; the floor() function on page 260; the int() function on page 265.

Security Data

SYNTAX security("SYMBOL",DATA ARRAY)
FUNCTION Returns the value of DATA ARRAY for the specified security. If the security is in the same folder as the base security, a path is not required. You may also specify online data by using ONLINE: as the path.
EXAMPLES security("c:\MetaStock Data\Sample\IBM",C)
security("ONLINE:IBM",C)
security("IBM",C)

Selling Pressure

SYNTAX sellp()
FUNCTION Calculates the selling pressure component of the Demand Index (see page 459). Selling pressure is a measurement of the amount of volume related to selling.

Sine

SYNTAX sin(DATA ARRAY)
FUNCTION Returns the sine of DATA ARRAY. This function assumes that the DATA ARRAY values are in degrees.

EXAMPLE You can plot a sine wave using the formula "sin(cum(5))." Increasing the value in this formula (i.e., "5") will increase the frequency of the sine wave.

SEE ALSO The atan() function (see page 253); the cos() function (see page 256).

Square Root

SYNTAX sqrt(DATA ARRAY)
FUNCTION Calculates the square root of DATA ARRAY. The square root of a negative number always returns a zero result.

EXAMPLE The formula "sqrt(16)" returns 4.
SEE ALSO The Standard Deviation example formula (31008).

Standard Deviation

SYNTAX stdev(DATA ARRAY, PERIODS)
FUNCTION Calculates the predefined Standard Deviation indicator.

EXAMPLE stdev(CLOSE, 21)

Standard Error

SYNTAX ste(DATA ARRAY, PERIODS)
FUNCTION Calculates the predefined Standard Error indicator.

EXAMPLE ste(CLOSE, 21)

Standard Error Band Bottom

SYNTAX stebandbot(DATA ARRAY, PERIODS, ERRORS)
FUNCTION Calculates the bottom Standard Error Band of DATA ARRAY shifted downward ERRORS standard errors.

EXAMPLE stebandbot(close, 21, 2)

Standard Error Band Top

| | |
|----------|--|
| SYNTAX | stebandtop(DATA ARRAY, PERIODS, ERRORS) |
| FUNCTION | Calculates the bottom Standard Error Band of DATA ARRAY shifted upward ERRORS standard errors. |
| EXAMPLE | stebandtop(close, 21, 2) |

Stochastic Momentum Index

| | |
|----------|---|
| SYNTAX | stochmomentum(PERIODS, SMOOTHING, DOUBLE SMOOTHING) |
| FUNCTION | Calculates the predefined Stochastic Momentum Index. |
| EXAMPLE | stochmomentum(10,40,3) |

Stochastic Oscillator

| | |
|----------|--|
| SYNTAX | stoch(%K PERIODS, %K SLOWING) |
| FUNCTION | Calculates the predefined Stochastic Oscillator. |
| EXAMPLE | The formula "stoch(5, 3)" returns the value of a 5-period %K slowed 3-periods. |
| SEE ALSO | The Stochastic example formula (see page 311). |

Subtraction

| | |
|----------|---|
| SYNTAX | sub(DATA ARRAY, DATA ARRAY) |
| FUNCTION | Calculates DATA ARRAY minus DATA ARRAY. |
| EXAMPLE | The formula "sub(10, 2)" returns eight. (This formula also could be written as "10 - 2.") |
| SEE ALSO | The add() function (see page 253). |

Summation

| | |
|----------|---|
| SYNTAX | sum(DATA ARRAY, PERIODS) |
| FUNCTION | Calculates a cumulative sum of the DATA ARRAY for the specified number of lookback PERIODs (including today). |
| EXAMPLE | The formula "sum(CLOSE, 12)" returns the sum of the preceding 12 closing prices. A 12-period simple moving average could be written "sum(C,12) / 12." |
| SEE ALSO | The cum() function (see page 257). |

Swing Index

| | |
|--------|---------------------|
| SYNTAX | swing(LIMIT MOVE) |
|--------|---------------------|

FUNCTION Calculates the predefined Swing Index indicator. The Swing Index requires opening prices.

EXAMPLE swing(3.0)

SEE ALSO The aswing() function (see page 253).

Tema

SYNTAX tema(DATA ARRAY, PERIODS)

FUNCTION Calculates the predefined TEMA indicator

EXAMPLE tema(c,14)

SEE ALSO The dema() function (see page 258).

Theta

SYNTAX theta(TYPE, DATE, PRICE, INTEREST, DIVIDEND)

FUNCTION Calculates the predefined Theta indicator. See the option() function (page 276) for a description of the parameters used in the theta() function.

EXAMPLE theta(EC, 961220, 125, 7.50, 4.75)

SEE ALSO The delta() function (see page 257); the gamma() function (see page 262); the life() function (see page 272); the option() function (see page 276); the vega() function (see page 284); and the volo() function (see page 285).

Tick

SYNTAX tick()

FUNCTION Plots the number of ticks that have come in during the current minute. For example, if the current tick is recorded as 10:15:22, "22" represents the tick count in the 15th minute of the 10th hour. At the start of the 16th minute, the tick count will reset to "0." Note that this function only works on charts with an intraday interval set to "0" (i.e., tick charts).

When plotted on tick charts, the value will range from 0 to 999—meaning up to 999 ticks can be recorded in one minute. Using this function on bar charts (e.g., 1-minute, 5-minute, etc) will result in a value of zero.

Time Series Forecast

SYNTAX tsf(DATA ARRAY, PERIODS)

FUNCTION Calculates the predefined PERIODS Time Series Forecast indicator of DATA ARRAY.

EXAMPLE The formula "tsf(CLOSE, 10)" returns a 10-period Time Series Forecast of the closing prices.

SEE ALSO The correl() function (see page 256).

Trade Volume Index

SYNTAX tvi(MINIMUM TICK)

FUNCTION Calculates the predefined Trade Volume Index.

EXAMPLE tvi(0.125)

SEE ALSO The obv() function (see page 272) .

TRIX

SYNTAX trix(PERIODS)

FUNCTION Calculates the predefined TRIX indicator.

EXAMPLE trix(12)

Trough Bars Ago

SYNTAX troughbars(Nth, DATA ARRAY, % MINIMUM CHANGE)

FUNCTION Plots the number of bars that have passed from the Nth trough. This uses the Zig Zag function (see page 287) to determine the troughs. If Nth is 1, then this will return the number of bars that have passed since the most recent trough. If Nth is 2, this will return the number of bars that have passed since the 2nd most recent trough. Etc.

EXAMPLE troughbars(1,close,5)

Trough Value

SYNTAX trough(Nth, DATA ARRAY, % MINIMUM CHANGE)

FUNCTION Plots the value of DATA ARRAY Nth trough(s) ago. This uses the Zig Zag function (see page 287) to determine the troughs. N=1 would return the value of the most recent trough. N=2 would return the value of the 2nd most recent trough. Etc.

EXAMPLE trough(1,close,5)

Typical Price

SYNTAX typical()

FUNCTION Calculates the predefined Typical Price indicator.

Ultimate Oscillator

SYNTAX ult(CYCLE1, CYCLE2, CYCLE3)

FUNCTION Calculates the predefined Ultimate Oscillator indicator using the three cycle lengths supplied as parameters. Note that each of the three parameters must be greater than the preceding parameter or an error message will be displayed (e.g., "ult(5, 5, 5)" is not valid).

EXAMPLE The formula "ult(7, 14, 21)" returns the default Ultimate Oscillator.

Value When

SYNTAX valuewhen (Nth, EXPRESSION, DATA ARRAY)

FUNCTION Returns the value of the DATA ARRAY when the EXPRESSION was true on the Nth most recent occurrence. This includes all data loaded in the chart.

EXAMPLE The formula "valuewhen(2, cross(c,mov(c,10,s), rsi(20))" returns the value of the RSI on the 2nd most recent occurrence of the closing price crossing above its 10-day moving average.

Variance

SYNTAX var(DATA ARRAY, PERIODS)

FUNCTION Calculates the statistical variance of DATA ARRAY over the specified time PERIOD.

EXAMPLE var(CLOSE, 20)

SEE ALSO The stdev() function (see page 280) ; the Standard Deviation example (see page 310).

Vega

SYNTAX vega(TYPE, DATE, PRICE, INTEREST, DIVIDEND)

FUNCTION Calculates the predefined Vega indicator. See the option() function (page 2763) for a description of the parameters used in the vega() function.

EXAMPLE vega(EC, 961220, 125, 7.50, 4.75)

SEE ALSO The delta() function (see page 257); the gamma() function (see page 262); the life() function (see page 272); the option() function (see page 276); the theta() function (see page 282); and the volo() function (see page 285).

Vertical Horizontal Filter

SYNTAX vhf(DATA ARRAY, PERIODS)

FUNCTION Calculates the predefined Vertical Horizontal Filter of DATA ARRAY over the specified time PERIOD.

EXAMPLE vhf(C, 28)

Volatility, Chaikin's

SYNTAX vol(MA PERIODS, ROC PERIODS)

FUNCTION Calculates the predefined Chaikin's Volatility indicator.

EXAMPLE vol(10, 10)

Volatility, Option

SYNTAX volo()

FUNCTION Calculates the predefined Option Volatility indicator.

EXAMPLE volo()

SEE ALSO The delta() function (see page 257); the gamma() function (see page 262); the life() function (see page 272); the option() function (see page 276); the theta() function (see page 282); and the vega() function (see page 284).

Volume Oscillator

SYNTAX oscv(PERIODS, PERIODS, MA_METHOD, DIFF_METHOD)

FUNCTION Calculates the PERIODS/PERIODS predefined Volume Oscillator indicator calculated using the MA_METHOD moving average method expressed in DIFF_METHOD.

Valid MA_METHODs are SIMPLE, EXPONENTIAL, WEIGHTED, TIMESERIES, TRIANGULAR, and VARIABLE (these can be abbreviated as S, E, W, T, TRI, and VAR).

Valid DIFF_METHODs are PERCENT and POINTS (these can be abbreviated as % and \$).

EXAMPLE oscv(1, 25, SIMPLE, \$)

SEE ALSO The oscp() function (see page 275).

Weighted Close

SYNTAX wc()

FUNCTION Calculates the predefined Weighted Close indicator.

Wilder's Smoothing

SYNTAX wilders(DATA ARRAY, PERIODS)

FUNCTION Calculates the predefined Wilder's Smoothing indicator.

EXAMPLE wilders(CLOSE, 14)

SEE ALSO The mov() function (see page 271).

Williams' %R

SYNTAX willr(%R PERIODS)

FUNCTION Calculates the predefined Williams' %R indicator.

EXAMPLE willr(14)

Williams' A/D

SYNTAX willa()

FUNCTION Calculates the predefined Williams A/D indicator.

Writeif

SYNTAX writeif(EXPRESSION, "TRUE TEXT", "FALSE TEXT")

FUNCTION This function can only be used within an expert commentary. If EXPRESSION evaluates to "true", then the TRUE TEXT string is displayed within the commentary. If EXPRESSION evaluates to "false", then the FALSE TEXT string is displayed.

EXAMPLE writeif(c > mov(c,200,s), "The close is above the 200-period moving average.", "The close is below the 200-period moving average.")

SEE ALSO For more detailed Information on using the writeif() function within an expert commentary, see page 408.

Writeval

SYNTAX writeval(DATA ARRAY)

or

writeval(DATA ARRAY , FORMAT)

FUNCTION This function can only be used within an expert commentary. It is used to display the numeric value and decimal format of DATA ARRAY. The decimal format is X.Y where X is the total number of digits, and Y is the

EXAMPLE
SEE ALSO

number of digits to the right of the decimal point.

`writeval(stoch(39,3) - stoch(12,3) ,5.2)`

For more detailed Information on using the `writeval()` function within an expert commentary, see page 409.

Year

SYNTAX
FUNCTION

`year()`

Plots the year. If a bar was plotted on 10/15/96, the function will return "1996."

Zig Zag

SYNTAX
FUNCTION

`zig(DATA ARRAY, MINIMUM CHANGE, DIFF_METHOD)`

Calculates the MINIMUM CHANGE predefined Zig Zag indicator of DATA ARRAY using the DIFF_METHOD method of calculation.

Valid DIFF_METHODs are PERCENT and POINTS (these can be abbreviated as % and \$).

EXAMPLE

`zig(CLOSE, 5, PERCENT)`

Candlestick Functions

The Candlestick functions allow you to locate specific Japanese Candlestick patterns. Each function plots a "+1" when the pattern is found; otherwise a "0" is plotted.

The brief interpretations provided for the patterns shown on the following pages were taken from two books written by Steve Nison. For more in-depth coverage on these and other Japanese Candlestick patterns and charting techniques, Equis International recommends Mr. Nison's books: [Japanese Candlestick Charting Techniques](#) and [Beyond Candlesticks](#). See page 544 for more information on these books.

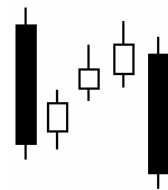
Please note that candlestick pattern recognition is subjective. What one person calls a "Big Black Candle" may not qualify as such for someone else. To find these patterns on a chart, MetaStock Pro must rely on predefined rules. These rules were defined based upon our own experience and with Steve Nison's assistance.

Important: *When using the Candlestick functions in an exploration, you must choose the "Load __ Records" button in the Explorer Options dialog (see page 378) and specify at least "10"; otherwise the exploration results may be inaccurate.*

Bearish 3 Method Formation

SYNTAX

`bear3formation()`



PATTERN

A long black body followed by three small, usually white, bodies and another long black body. The three white bodies are contained within the first black body's range.

INTERPRETATION

A bearish continuation pattern.

Bearish Harami

SYNTAX

`bearharami()`



PATTERN

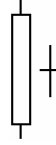
A small black body is contained within an unusually large white body.

INTERPRETATION

A bearish pattern when preceded by an uptrend.

Bearish Harami Cross

SYNTAX `bearharamicross()`



PATTERN

A Doji contained within a large white body.

INTERPRETATION

A top reversal signal.

Big Black Candle

SYNTAX `bigblack()`



PATTERN

An unusually long black body with a wide range between high and low, and prices open near the high and close near the low.

INTERPRETATION

A bearish pattern.

Big White Candle

SYNTAX `bigwhite()`



PATTERN

An unusually long white body with a wide range between high and low, and prices open near the low and close near the high.

INTERPRETATION

A bullish pattern.

Black Body

SYNTAX `black()`



PATTERN

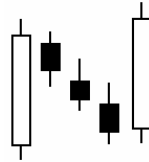
A candlestick formed when the closing price is lower than the opening price.

INTERPRETATION

A bearish signal. More important when part of a pattern.

Bullish 3 Method Formation

SYNTAX `bull3formation()`



PATTERN

A long white body followed by three small, usually black, bodies and another long white body. The three black bodies are contained within the first white body's range.

INTERPRETATION

A bullish continuation pattern.

Bullish Harami

SYNTAX

`bullharami()`



PATTERN

A small white body is contained within an unusually large black body.

INTERPRETATION

A bullish pattern when preceded by a downtrend.

Bullish Harami Cross

SYNTAX

`bullharamicross()`



PATTERN

A Doji contained within a large black body.

INTERPRETATION

A bottom reversal signal.

Dark Cloud Cover

SYNTAX

`darkcloud()`



PATTERN

A long white candlestick is followed by a black candlestick. The black candlestick opens above the white candlestick's high and closes well into the white candlestick's body.

INTERPRETATION

A bearish reversal signal during an uptrend.

Doji

SYNTAX

`doji()`

PATTERN



INTERPRETATION

The open and close are the same.

Doji lines are usually components of many important candlestick patterns.

Doji Star

SYNTAX

`dojistar()`

PATTERN



INTERPRETATION

A Doji which gaps above or below a white or black candlestick.

A reversal signal with confirmation during the next trading day.

Engulfing Bearish Line

SYNTAX

`engulfingbear()`

PATTERN



INTERPRETATION

A small white body followed by and contained within a large black body.

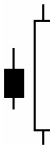
A major top reversal signal.

Engulfing Bullish Line

SYNTAX

`engulfingbull()`

PATTERN



INTERPRETATION

A small black body followed by and contained within a large white body.

A major bottom reversal signal.

Evening Doji Star

SYNTAX

`eveningdojistar()`

PATTERN



A large white body followed by a doji that gaps above the white body. The third candlestick is a black body that closes well into the white body.

INTERPRETATION

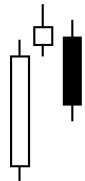
A major top reversal signal, more bearish than the regular evening star pattern because of the Doji.

Evening Star

SYNTAX

`eveningstar()`

PATTERN



A large white body followed by a small body (white or black) that gaps above the white body. The third candlestick is a black body that closes well into the white body.

INTERPRETATION

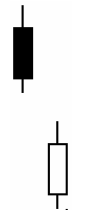
A major top reversal signal.

Falling Window

SYNTAX

`fallingwindow()`

PATTERN



A window (i.e., gap) between the low of the first candlestick and the high of the second candlestick. This produces the same results as the Gap Down function (see page 262).

INTERPRETATION

A rally to the window is highly probable. The window should provide resistance.

Gravestone Doji

SYNTAX

`gravestonedoji()`

PATTERN



The open and close are at the low of the period.

INTERPRETATION

A market top reversal signal. The longer the upper shadow the more bearish the signal.

Hammer

SYNTAX

`hammer()`



PATTERN

A small body (white or black) near the high with a long lower shadow with little or no upper shadow.

INTERPRETATION

A bullish pattern during a downtrend.

Hanging Man

SYNTAX

`hangingman()`



PATTERN

A small body (white or black) near the high with a long lower shadow with little or no upper shadow. The lower shadow should be two or three times the height of the body.

INTERPRETATION

A bearish pattern during an uptrend.

Inverted Black Hammer

SYNTAX

`invblackhammer()`



PATTERN

An upside-down hammer with a black body.

INTERPRETATION

A bottom reversal signal with confirmation the next trading day.

Inverted Hammer

SYNTAX

`invhammer()`



PATTERN

An upside-down hammer (white or black).

INTERPRETATION

A bottom reversal signal with confirmation the next trading day.

Long Legged Doji

SYNTAX

`longleggeddoji()`

PATTERN



A Doji pattern with very long upper and lower shadows.

INTERPRETATION

A market top reversal signal.

Long Lower Shadow

SYNTAX

`longlowershadow()`

PATTERN



A candlestick (black or white) with a lower shadow that has a length 2/3 or more of the total range of the candlestick.

INTERPRETATION

A bullish signal, particularly when around price support levels.

Long Upper Shadow

SYNTAX

`longuppershadow()`

PATTERN



A candlestick (black or white) with an upper shadow that has a length 2/3 or more of the total range of the candlestick.

INTERPRETATION

A bearish signal, particularly around price resistance levels.

Morning Doji Star

SYNTAX

`morningdojistar()`

PATTERN



A large black body followed by a doji that gaps below the black body. The third candlestick is a white body that closes well into the black body.

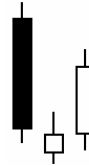
INTERPRETATION

A major bottom reversal signal, more bullish than the regular morning star pattern because of the Doji.

Morning Star

SYNTAX

`morningstar()`



PATTERN

A large black body followed by small body (white or black) that gaps below the black body. The third candlestick is a white body that closes well into the black body.

INTERPRETATION

A major bottom reversal signal.

On Neck-Line

SYNTAX

`onneckline()`



PATTERN

A black candlestick in a downtrend followed by a small white candlestick with its close near the low of the black candlestick.

INTERPRETATION

A bearish pattern where the market should move lower when the white candlestick's low is penetrated.

Piercing Line

SYNTAX

`piercingline()`



PATTERN

A black candlestick followed by a white candlestick that opens lower than the black candlestick's low, but closes more than halfway into the black body.

INTERPRETATION

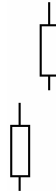
A bottom reversal signal.

Rising Window

SYNTAX

`risingwindow()`

PATTERN



A window (i.e., gap) between the high of the first candlestick and the low of the second candlestick. This produces the same results as the Gap Up function (see page 262).

INTERPRETATION

A selloff to the window is highly probable. The window should provide support.

Separating Lines

SYNTAX

`separatinglines()`

PATTERN



In an uptrend, a black candlestick is followed by a white candlestick with the same opening price.



In a downtrend, a white candlestick is followed by a black candlestick with the same opening price.

INTERPRETATION

A continuation pattern. The prior trend should resume.

Shaven Bottom

SYNTAX

`shavenbottom()`

PATTERN



A candlestick (white or black) with no lower shadow.

INTERPRETATION

See Inverted Hammer (see page 293) interpretation.

Shaven Head

SYNTAX

`shavenhead()`

PATTERN



A candlestick (white or black) with no upper shadow.

INTERPRETATION

See Hammer (see page 293) and Hanging Man (see page 293) interpretations.

Shooting Star

SYNTAX

`shootingstar()`

PATTERN



A candlestick (white or black) with a small body, long upper shadow, and little or no lower shadow.

INTERPRETATION

A bearish pattern in an uptrend.

Spinning Top

SYNTAX

`spinningtop()`

PATTERN



A candlestick (white or black) with a small body. The size of the shadows is not important.

INTERPRETATION

A neutral pattern. Spinning tops are more important when part of other formations.

Three Black Crows

SYNTAX

`3blackcrows()`

PATTERN



Three long black candlesticks with consecutively lower closes that close near or at their low prices.

INTERPRETATION

A top reversal signal.

Three White Soldiers

SYNTAX

`3whitesoldiers()`

PATTERN



Three white candlesticks with consecutively

higher closes that close near or at their high prices.

INTERPRETATION *A bottom reversal signal.*

Tweezer Bottoms

SYNTAX `tweezerbottoms()`

PATTERN



Two or more candlesticks with matching bottoms. The size or color of the candlestick does not matter. The candlesticks do not have to be consecutive.

INTERPRETATION *Minor reversal signal that is more important when the candlesticks form another pattern.*

Tweezer Tops

SYNTAX `tweezertops()`

PATTERN



Two or more candlesticks with matching tops.

INTERPRETATION *Minor reversal signal that is more important when the candlesticks form another pattern. The candlesticks do not have to be consecutive.*

White Body

SYNTAX `white()`

PATTERN



A candlestick formed when the closing price is higher than the opening price.

INTERPRETATION *A bullish signal. More important when part of a pattern.*

Creating Your Own Indicators

What is the Indicator Builder?

With all the built-in indicators that MetaStock Pro offers, you may be wondering why you'd ever need to create your own indicators. Well, technical analysis is constantly evolving. The hot new indicator of today is soon overshadowed by another. For this reason, MetaStock Pro provides a powerful tool called the Indicator Builder that lets you create indicators.

Maybe you've read about a new indicator in a trade magazine or a new book. Chances are, you'll be able to create the indicator with the Indicator Builder.

The Indicator Builder is considered a "power tool," that is, it is not considered a mainstream, basic feature of the program. To effectively use the Indicator Builder, you'll need to understand basic mathematical concepts and logical expressions.

Due to the inherent complexity in the design and creation of custom indicators, trading systems, explorations, and experts, Equis cannot provide free support for this process. However, support is available for a reasonable fee. Call Equis at 801-265-9998 for details or fill-out the FORMULA HELP.DOC file found in the MetaStock Pro folder. This file is viewable with Wordpad.

For information on the Equis Solution Provider program and the MetaStock Developer's Kit, go to www.equis.com.

Indicators created with the Indicator Builder are plotted exactly like built-in indicators. They can be dragged from the Indicator QuickList or plotted from the Indicators dialog.

If you are familiar with writing formulas in spreadsheet programs (i.e., Microsoft Excel, Lotus 1-2-3, etc.), this probably looks familiar to you. You may be able to start writing your own indicators immediately. If this looks foreign to you, don't worry--the Indicator Builder Tutorial will help you get up to speed.

Indicator Builder Tutorial

The Basics

In addition to the predefined indicators listed in the Indicator QuickList (see page 165), MetaStock Pro provides a robust collection of tools that you can use to create your own indicators. This chapter explains how to create and plot these "custom indicators."

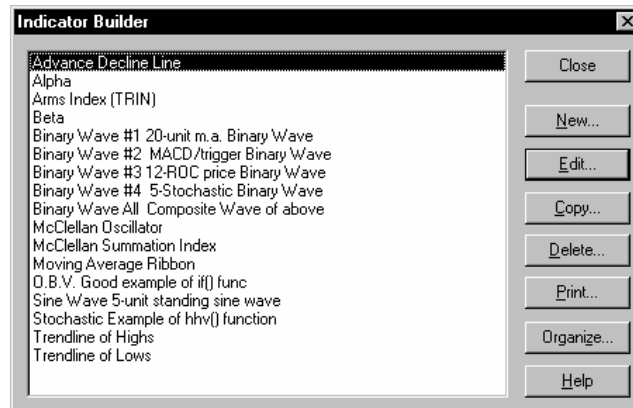
In order to create a custom indicator, you need to be familiar with the MetaStock formula language. For more detailed information on the MetaStock formula language, see page 235.

You can create up to 2,000 different custom indicators. The indicators are automatically stored by MetaStock Pro so that you do not have to re-enter them each time you want to plot the formula.

The formulas created at the Indicator Builder menu and the formulas used to calculate the built-in indicators (i.e., Stochastics, RSI, etc.) are completely independent of each other. Changes made to the custom indicators will *not* affect the predefined indicators.

The Indicator Builder Dialog

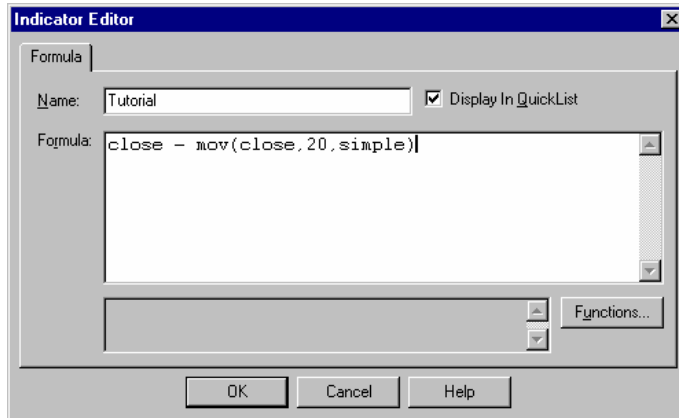
With a chart on the screen, choose Indicator Builder from the Tools menu. The Indicator Builder dialog will appear (the custom indicators appearing in your list will be different than the ones shown below). The Indicator Builder dialog is the jumping off point for creating new custom indicators and/or editing existing custom indicators.



Creating a New Custom Indicator

1. With the Indicator Builder dialog displayed, click the **New** button. Type the name of the formula as "Tutorial."

2. Click the **Display in QuickList** checkbox so that the custom indicator will appear in the Indicator QuickList on the standard toolbar.
3. Click in the **Formula** edit box where you can begin writing the actual formula.



4. Type the following formula in the Formula edit box.

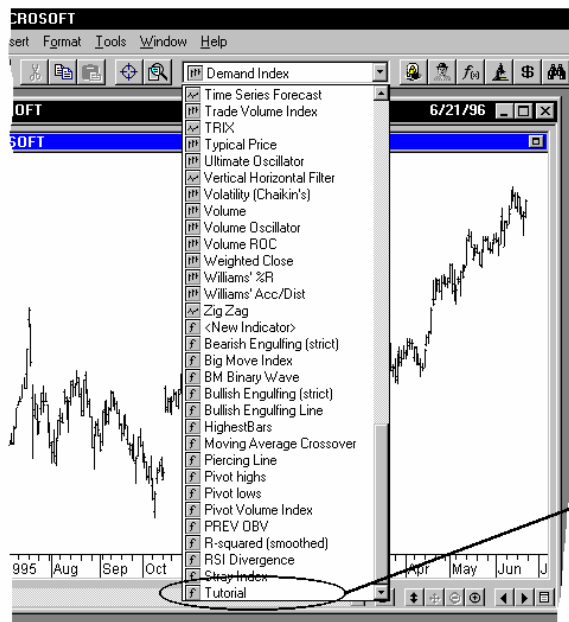
`close - mov(close,20,simple)`

This formula simply subtracts a 20-period simple moving average from the close. For more detailed information on the MetaStock formula language, see page 235.

5. Click the **OK** button to save the new "Tutorial" custom indicator.

Plotting a Custom Indicator

1. Click on the Indicator QuickList (see page 165) to display the built-in and custom indicators.



2. Drag the custom indicator named "Tutorial" from the QuickList and drop it on a chart's title bar. A new inner window will open and plot the results of the custom indicator.



Custom indicator icon

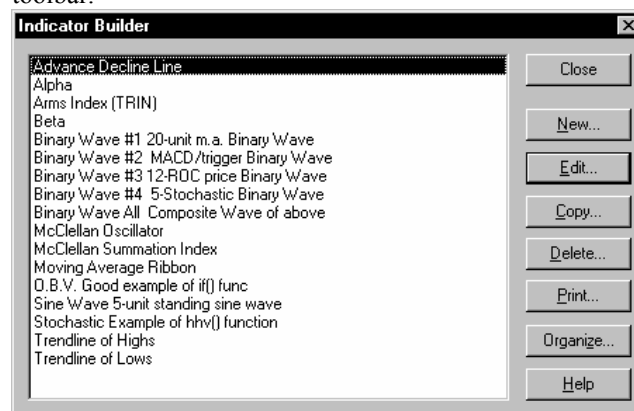
You can distinguish a custom indicator from other indicators in the QuickList by the unique icon to the left of the custom indicator's name.

Indicator Builder Dialog



Indicator Builder button

The Indicator Builder dialog is displayed by choosing Indicator Builder from the Tools menu or the Indicator Builder button on the standard toolbar.



New. This displays the Indicator Editor dialog from which you can name and define a new custom indicator.

You can select multiple custom indicators by holding down the SHIFT or CTRL key as you click the mouse.

Edit. This displays the Indicator Editor dialog from which you can edit the selected custom indicator.

Copy. This makes a copy of the selected custom indicator in the Indicator Editor dialog. After making any changes, press the OK button to save a copy of the custom indicator. See page 304 for more information on copying custom indicators.

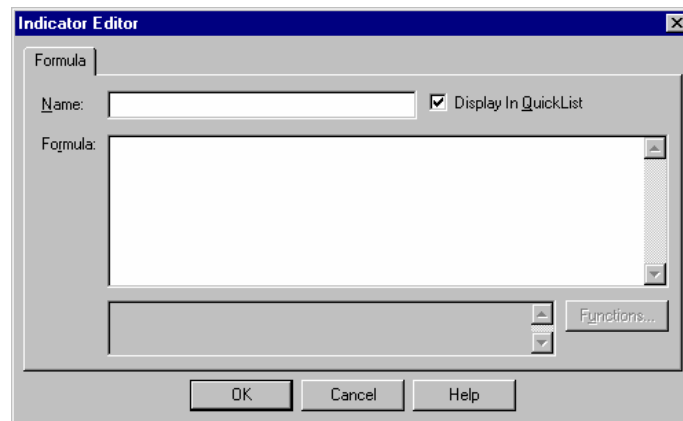
Delete. This deletes the selected custom indicators. See page 304 for more information on deleting custom indicators.

Print. This prints the selected custom indicators. See page 304 for more information on printing custom indicators.

Organize. Use this to display the Formula Organizer Wizard from which you can import and export explorations, system tests, custom indicators, and experts. This is normally used if you have purchased add-on products from Equis or a third party. See page 249 for more information on the Formula Organizer Wizard.

Indicator Editor Dialog

The Indicator Editor dialog is used to create new custom indicators and to edit existing custom indicators.



Name. You can enter a name with up to 50 characters. The name you enter will appear in the inner window title bar when plotted. The list of custom indicators in the Indicator Builder dialog is sorted by name.

Display in QuickList. Check this box if you want the name of the custom indicator to appear in the QuickList. Once in the QuickList, it can be dragged and dropped just like any other indicator (see page 165).

Formula. Enter the formula for the custom indicator here. A formula can contain up to 2,500 characters on multiple lines. Press ENTER to place a line break. See page 248 for tips on using multiple lines. See page 235 for more information on the MetaStock formula language.

Functions. This displays the Paste Functions dialog where you can choose from a list of available functions and have the function pasted in the formula. This button is disabled unless your cursor is in the Formula edit box. See page 305 for more information.

You can use the standard clipboard commands (accelerator keys only) while editing a formula (see page 249).

Copying and Deleting Custom Indicators

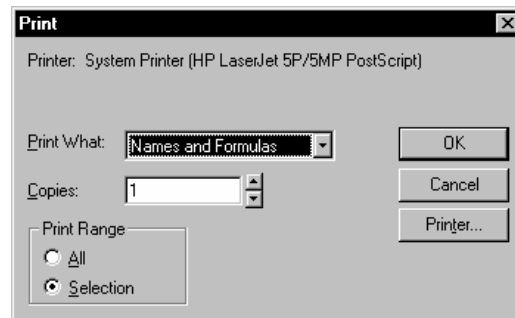
You can make a copy of the selected custom indicator in the Indicator Builder dialog using the Copy button. This is useful when you want to design a new custom indicator that is very similar to another.

For example, if Custom Indicator A was very similar to a new indicator you want to create, you could save time by using the Copy command in the Indicator Builder dialog to make a copy rather than rewriting it. You could then make the minor modifications necessary and give it a new name.

You delete the selected custom indicators from the Indicator Builder dialog using the Delete button. The Delete button displays the Delete Custom Indicator dialog.

Printing Custom Indicators

You can print the names and/or formulas of the selected custom indicators to the default printer using the Print dialog. The Print dialog is accessed by choosing Print from the Indicator Builder dialog.



Print What. Choose whether you want to print the Names Only or the Names and Formulas for the selected custom indicators.

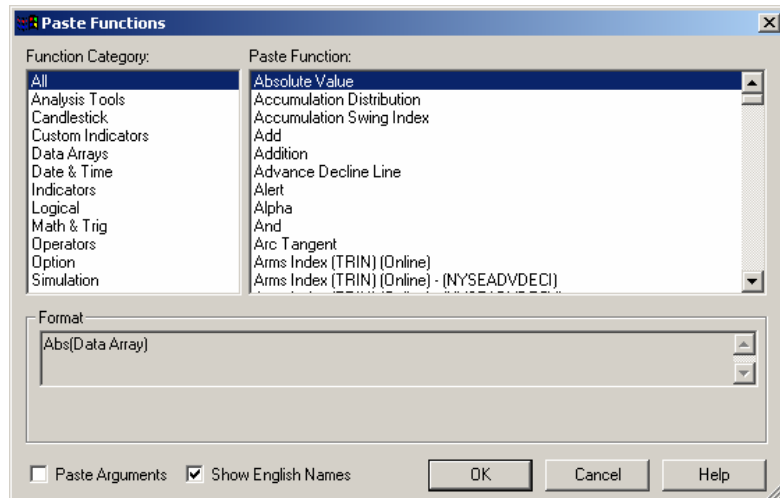
Copies. Choose the number of copies to print.

Print Range. Choose whether you want to print the Selected Custom Indicator(s) or All Custom Indicators.

Printer. This displays a dialog from which you can select the desired printer, orientation, and paper size.

Pasting Functions Into Formulas

Use the Functions button at the bottom of the Indicator Editor dialog to paste functions directly into the formula you are editing. Not only does this feature save time, but it also relieves you from having to memorize the functions (or refer to the manual) and their parameters. (See page 252 for information on the specific functions available.)



The Paste Functions dialog breaks the functions down into 12 categories. The categories are listed in the Function Category list on the left side of the dialog. The functions for the selected category are listed to the right either by their English name or their function name, depending on whether the Show English Names checkbox is checked. MSX DLL's will also be listed as categories, with their included functions. For more information on creating MSX DLL's using the MetaStock Developer's Kit, go to www.equis.com.

As you scroll the Paste Function list, the syntax of the highlighted function is displayed near the bottom of the dialog. If you want the arguments of the function pasted, check the Paste Arguments checkbox.

Clicking the OK button (or double-clicking the function name) pastes the selected function into the formula at the cursor location.

To paste a function in a formula

1. While editing a formula in the Indicator Editor dialog, click the **Functions** button.
2. Click on a category from the Functions Category list.
3. Double-click the name of the function to paste.

Creating Custom Indicators with Multiple Plots

Many indicators require two or more plots for their correct interpretation. One such indicator is the MACD. The MACD uses a moving average (called the signal line) to generate crossover signals.

Every unassigned expression (i.e., those expressions not assigned to a variable) in a custom indicator will result in a separate plot on the chart. For example, the following formula entered as a custom indicator will result in two plots:

```
DiffOfAvg:= mov(c,39,s)-mov(c,200,s);
DiffOfAvg;
mov(DiffOfAvg,9,s);
```

The first statement assigns the expression "mov(c,39,s)-mov(c,200,s)" to a variable named "DiffOfAvg." The second statement results in a plot of DiffOfAvg. The third statement results in a plot of a 9-period moving average of DiffOfAvg. Notice that each expression must end with a semi-colon.

If you use the fml() function (see page 242) to call a custom indicator containing multiple plots, only the last plot in the custom indicator will be returned by the fml() function.

For example, if a formula using the fml() function called the following custom indicator, only the 10-period moving average would be returned, since it is the last plot.

```
mov(close,30,s);
mov(close,20,s);
mov(close,10,s);
```

To change the color of the individual plots of a multiple plot indicator, plot the indicator, then change the properties of each plot.

To change the colors of a multiple plot indicator

1. Plot the indicator from the QuickList or the Indicators dialog.
2. Right click the plot that you would like to change.
3. Choose **Properties** from the shortcut menu.
4. Change the color, then click **OK**.

Creating Custom Indicators that Prompt for Input

Most of the pre-defined indicators in MetaStock Pro prompt you for input to use during the calculation (e.g., time periods, percent, points, etc.). You can also instruct custom indicators to prompt for input by using a special function called input().

The input() function uses the following syntax:

```
input("prompt text",minimum value, maximum value,
default value);
```

Prompt text. This defines the text that is displayed next to the input box. This is used to describe what should be entered.

Minimum value. This is the smallest value that can be entered. If you attempt to enter a value smaller than this value, MetaStock Pro displays a message.

Maximum value. This is the largest value that can be entered. If you attempt to enter a value larger than this value, MetaStock Pro displays a message.

Default value. This is the default value (i.e., the value that will appear in the box when the dialog is initially displayed). Note that the default value is always used when another formula calls the custom indicator using the fml() function.

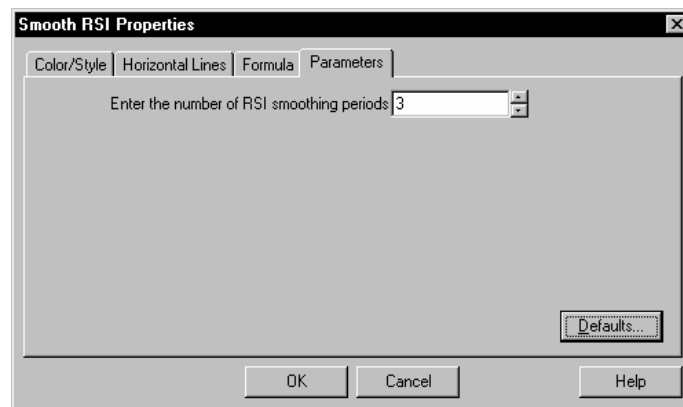
A maximum of six input() functions can be used within a custom indicator. MetaStock Pro prompts for all inputs before the custom indicator is calculated, regardless of where the input() functions appears in the custom indicator. You can only use the input() function in custom indicators. System tests, explorations, and experts will not accept the input() function.

If you use the fml() function (see page 261) to call a custom indicator that uses the input() function, you will not be prompted for the inputs in the referenced custom indicator. All inputs in a referenced custom indicator automatically use their default values.

The following custom indicator will prompt you for the number of time periods to use for the moving average (i.e., smoothing periods) of the RSI indicator:

```
SmoothingPeriods:= input("Enter the number of RSI  
smoothing periods",1,9,3);  
mov(rsi(14), SmoothingPeriods,s);
```

When the custom indicator is plotted, the following input dialog appears prompting you to "Enter the number of RSI smoothing periods". Note that if your custom indicator required multiple inputs, all of the inputs would appear in this dialog.



In almost all cases you will want to assign the `input()` function to a variable (as shown in the previous example); otherwise it has very limited use. The `input()` function cannot be embedded within other functions. For example, the following use of the `input()` function is *not* valid:

```
mov(close, input("Enter periods",1,39,10), simple);
```

However, this can be rewritten using a variable as follows:

```
maperiods:= input("Enter periods",1,39,10);  
mov(close,maperiods,simple);
```

The only potential use of the `input()` function as a stand-alone expression is to plot a horizontal line at a specified value:

```
Input("Plot a horizontal line at ",1,10000,5);
```

This custom indicator will plot a horizontal line at the input value. This may prove useful for those that desire more precision (than the horizontal line study) when drawing support/resistance lines.

Sample Custom Indicators

This section provides samples of several popular indicators written with the MetaStock formula language. These are simply provided as examples; all of these indicators are standard predefined indicators in MetaStock Pro (i.e., you don't need to create these to plot them). However, these do provide good examples of the MetaStock formula language.

For information on interpreting these indicators, see page 441.

Accumulation/Distribution

This Accumulation/Distribution formula uses the `cum()` function (see page 257) to keep a running total of the daily values.

```
cum( ((C-L) - (H-C)) / (H-L) * V)
```

Bollinger Bands

Bollinger Bands use the `stdev()` function (see page 280) to calculate the upper and lower bands. The middle band is a 20-period simple moving average.

```
Periods:=input("Enter the number of periods:  
",5,50,20);  
mov(C, Periods, S);  
mov( C, Periods, S ) + ( 2 * stdev( C, Periods ) );  
mov( C, Periods, S ) - ( 2 * stdev( C, Periods ) )
```

Chaikin A/D Oscillator

The Chaikin Oscillator can reference the predefined Accumulation/Distribution indicator using the `ad()` function as shown below.

```
ShortMA:= input("Enter shorter moving average periods",3,10,3);
LongMA:= input("Enter longer moving average periods",10,30,10);
mov( ad(), ShortMA, E) - mov( ad(), LongMA, E);
```

Or, it can include the actual Accumulation/Distribution formula as shown below.

```
mov(cum(((C-L)-(H-C))/(H-L))*V),3,E)-mov(cum(((C-L)-(H-C))/(H-L))*V),10,E)
```

Median Price

```
(high + low) / 2
```

Momentum

The Momentum formula uses the `ref()` function (see page 278) to reference the closing price 12 periods ago.

```
(close / ref( close, -12 )) * 100
```

Moving Average MACD

Most analysts (including Equis International's) say that the MACD indicator is "the difference between 12-day and 26-day exponential moving averages." However, the indicator is *really* the difference between 0.15 and 0.075 exponential moving averages (whereas, when expressed in decimal form, the 12- and 26-day exponential moving averages are actually 0.153846 and 0.076923 exponential moving averages). See page 484 for more information on exponential moving average calculation methods.

Due to these minor differences in the exponential values, the following formula is slightly different than the predefined MACD indicator.

Remember that you can plot the true MACD indicator using the `macd()` function (see page 269).

```
mov( close, 12, E) - mov( close, 26, E)
```

The MACD's trigger (which is a 9-day exponential moving average of the MACD indicator) can be calculated as shown below:

```
mov( macd(), 9, E)
```

Negative Volume Index

You must use the `nvi()` function to calculate the predefined Negative Volume Index. However, a similar indicator can be calculated using the following formula:

```
cum( if( V < ref(V,-1), roc(C,1,%), 0 ))
```

On Balance Volume

The following formula calculates the On Balance Volume indicator:

```
( If( C > Ref( C, -1), 1, If( C < Ref( C, -1 ), -1, 0 ) ) * VOLUME ) PREV
```

Note that the PREV constant (see page 246) represents the value of the indicator on the previous day.

Positive Volume Index

You must use the pvi() function to calculate the predefined Positive Volume Index. However, a similar indicator can be calculated using the following formula:

```
cum( if( V > ref(V,-1), roc(C,1,%), 0 )
```

Price Oscillator

The following formula calculates a 10-period/20-period exponential Price Oscillator expressed in points:

```
mov( close, 10, E) - mov( close, 20, E)
```

The following formula calculates a 10-period/20-period exponential Price Oscillator expressed in percent:

```
(( mov(C,10,E) - mov(C,20,E) )/mov(C,20,E)) * 100
```

Price Rate-Of-Change

The following formula calculates the 12-period Price Rate-Of-Change:

```
(( C - ref(C,-12)) / ref(C,-12)) * 100
```

The 12-period rate-of-change can also be written using the roc() function shown below:

```
roc( close, 12, % )
```

The 12-period rate-of-change can be expressed in "points" using the following formula:

```
close - ref(close, -12)
```

Price Volume Trend

The following formula uses the cum() function (see page 257) to calculate the Price Volume Trend:

```
cum( ((C - ref(C,-1)) / ref(C,-1)) * V)
```

This formula also can be written using the roc() function (see page 278) as shown below:

```
cum( roc(close, 1, %) * volume )
```

Standard Deviation

A 4-period Standard Deviation indicator can be written as follows. The first statement assigns a 4-period simple moving average to the variable named "4PeriodMA". The second statement sums the squares of the

differences between the moving average and the closing prices on each of the preceding four periods. It then calculates the square root of this total.

```
4PeriodMA:= Mov( CLOSE, 4, S );  
Sqrt(( Power(4PeriodMA - C, 2) +  
Power((4PeriodMA)- Ref(C,-1), 2) +  
Power((4PeriodMA)- Ref(C,-2), 2) +  
Power((4PeriodMA)- Ref(C,-3), 2) ) / 4 )
```

An easier method is to take the square root of the variance function as shown below:

```
sqrt( var( close, 4 ) )
```

Of course, the easiest way is to write the Standard Deviation formula using the predefined stdev() function (see page 280).

Stochastic Momentum Index

The following formula calculates a 13,25,2 Stochastic Momentum Index.

```
100 * ( Mov( Mov(C - (0.5 * ( HHV(H,13) +  
LLV(L,13))),25,E),2,E) / (0.5*Mov( Mov( HHV(H,13) -  
LLV(L,13),25,E),2,E))
```

Stochastic Oscillator

The following formula calculates a 5-period %K Stochastic Oscillator with 3-period slowing:

```
(sum( C - llv(L,5), 3 ) / sum(hhv(H,5) - llv(L,5), 3)  
)* 100
```

This next formula calculates a 3-period %D of the %K in the preceding formula.

```
mov( stoch(5,3), 3, S )
```

Volatility, Chaikin

The Volatility formula shown below uses 10-periods in the moving average and 12-periods in the rate-of-change:

```
roc( mov( high-low, 10, E), 12, %)
```

Volume Oscillator

The following formula calculates a 10-period/20-period exponential Volume Oscillator expressed in points.

```
mov( volume, 10, E) - mov( volume, 20, E)
```

This next formula calculates a 10-period/20-period exponential Volume Oscillator expressed in percent.

```
(( mov(V,10,E) - mov(V,20,E))/mov(V,20,E)) * 100
```

Volume Rate-Of-Change

The following formula a 12-period Volume Rate-Of-Change indicator.

```
(( V - ref(V,-12)) / ref(V,-12)) * 100
```

This also can be written using the roc() function as shown below:

```
roc( volume, 12, % )
```

Weighted Close

The Weighted Close formula multiplies the closing price by two, adds the value of the high and low, and then divides by four.

```
((close * 2) + high + low ) / 4
```

Williams' Accumulation/Distribution

To simplify the explanation of this formula, we will enter it as three formulas. The first statement assigns the "true range" of the high to a variable. Similarly, the second formula assigns the "true range" of the low to a variable. The third statement calculates Williams' A/D indicator.

```
TrueRangeHigh:=max( ref(close,-1), high );  
TrueRangeLow:=min( ref(close,-1), low );  
cum(if(C > ref(C,-1),C-TrueRangeLow, if(C < ref(C,-1),C-TrueRangeHigh,0)))
```

Williams' %R

This formula calculates the Williams %R indicator. Notice that the formula is inverted by multiplying it by -100.

```
NumPeriods:= Input("Enter the number of  
periods:",3,50,14);  
((HHV(H,NumPeriods) - C)/(HHV(H,NumPeriods) -  
LLV(L,NumPeriods)) * -100;
```

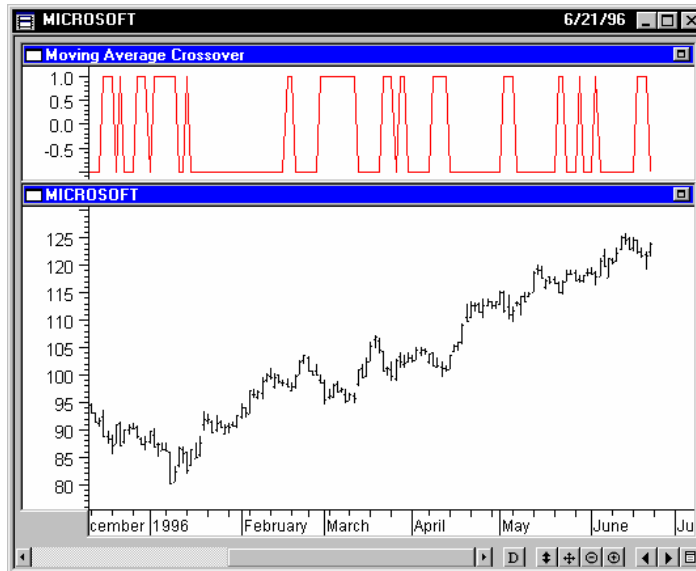
Achelis Binary Waves

This section explains how custom indicators can be used to create "Binary Wave" indicators that display your rating of a security's technical position. Steven Achelis, President of Equis International, developed this Binary Wave concept.

The Binary Wave concept is somewhat complicated. You should be very familiar with custom indicators before reading this section.

The Binary Wave

A Binary Wave plots +1 or -1, depending on whether the indicator it interprets is bullish or bearish. (The term "Binary Wave" is based on this ± 1 concept.) The real power of Binary Waves occurs when multiple Waves are combined into *composite* Binary Waves.



Binary Waves are the opposite of black box trading systems (although both are considered "expert systems"). *You don't know* the rules or indicators that are used to analyze securities in a black box. Conversely, *you specify* the rules and indicators in a Binary Wave.

Example Binary Waves

The following table shows the rules used in four Binary Wave indicators. (In an effort to keep these examples understandable, we only use four Waves and fairly simple criteria. However, you could, and probably should modify the criteria based on your own expertise.)

| Indicator | Bullish | Bearish |
|----------------|---------------------|----------------------|
| MACD | > signal line | <= signal line |
| Moving Average | close > Moving Avg. | Close <= Moving Avg. |
| Rate-Of-Change | Rate-Of-Change > 0 | Rate-Of-Change <= 0 |
| Stochastic | > 50 | <= 50 |

As shown in this table, we consider the MACD bullish when it is above its signal line and bearish when it is equal to, or falls below, its signal line. Thus, the MACD Binary Wave will plot ± 1 depending on whether the MACD is above or below its signal line. This same concept is used to develop three additional Binary Waves that plot ± 1 based on the action of the other indicators.

We will then combine the four Binary Waves into a *composite* Binary Wave. When all four Binary Waves are bullish, the value of this composite Binary Wave will be +4; when all four Binary Waves are

bearish, its value will be -4; when two are bullish and two are bearish, its value will be zero.

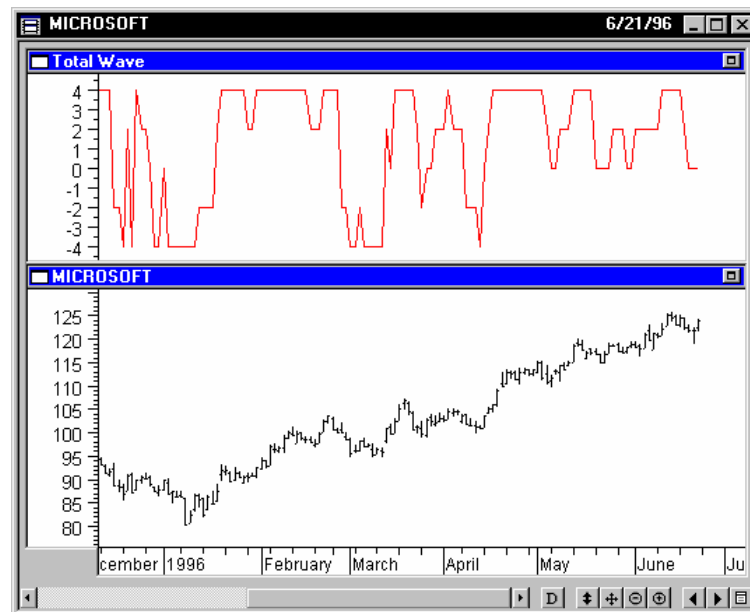
Entering the Example

The individual Binary Waves should be assigned to variables in one custom indicator (named "Total Wave") and then summed together as shown below.

```
MACDWave:=if(macd() > mov(macd(),9,E), +1, -1);  
MovWave:=if(C > mov(C,20,E), +1, -1);  
ROCWave:=if(roc(C,12,%) > 0, +1, -1);  
StochWave:=if(stoch(5,3) > 50, +1, -1);  
MACDWave + MovWave + ROCWave + StochWave
```

The first statement assigns the value "+1" if the MACD indicator is above its 9-period signal line. Otherwise, it assigns "-1". The second statement assigns "+1" if the close is above its 20-period exponential moving average. Otherwise, it assigns "-1". The third statement assigns "+1" if the 12-period percent rate-of-change of the closing prices is greater than 0. Otherwise, it assigns "-1". The fourth statement assigns "+1" if the Stochastic Oscillator is above 50. Otherwise, it assigns "-1". The fifth statement combines the preceding four Binary Wave variables into a composite Binary Wave.

The following chart shows the resulting plot:



Note that a good composite Binary Wave will yield results that are superior to the results generated by the individual Binary Waves it incorporates.

Interpreting a Binary Wave

The interpretation of a Binary Wave is fairly obvious: high values are bullish and low values are bearish. (Remember that individual Binary Waves plot as either +1 or -1; the range of composite Binary Waves depends on the number of individual Waves it combines.)

The "Total Wave" system test (shown below) enters long when the indicator rises above zero and sells short when it falls below zero. See page 320 for more information on creating system tests.

```
Name          : Total Wave
Enter Long    : fml("Total Wave") < 0
Close Long    : fml("Total Wave") > 0
Enter Short   : fml("Total Wave") > 0
Close Short   : fml("Total Wave") < 0
```

You also could create an "MACD-type" formula by plotting the difference between two moving averages of a composite Binary Wave. Such a formula could be written as follows (name the formula "Smooth Total Wave"):

```
mov(fml("Total Wave"), 12, E) - mov(fml("Total Wave"),
26, E)
```

To give you an idea of what a system test for this formula could look like, the Enter Long rule is shown below:

```
Enter Long    : fml("Smooth Total Wave") > 0
```

Enhancements

Many enhancements can be made to Binary Wave formulas. Several of these are discussed below.

- The example composite Binary Wave presented on the preceding pages combines four individual Waves. However, you may choose to include many more individual Waves to create your own expert system.
- Rather than plotting ± 1 , you could weight the Binary Waves according to their forecasting ability. For example, one component in a composite Binary Wave could plot ± 5 while another component could plot ± 0.75 .
- You can include a long-term component within a composite Binary Wave. For example, you could add the following Binary Wave to the composite "Total Wave" previously presented:

```
if(CLOSE > mov(CLOSE, 200, EXPONENTIAL), +10, -
10)
```

The above formula would add ± 10 , depending on whether the closing price was above its 200-day moving average. Thus the composite Binary Wave would range between +6 and +14 when this long-term component was bullish, and would range between -6 and -14 when it was bearish.

You could then buy long when the composite Binary Wave rose above +10, close your long positions when the composite fell below +10, sell short when the composite fell below -10, and cover your short positions when the composite rose above -10.

- You may choose to have composite Binary Wave formulas return multiple values, rather than just ± 1 . The following formula returns -2 when the Stochastic Oscillator is less than 20, -1 when it is between 20 and 40, 0 when it is between 40 and 60, +1 when it is between 60 and 80, and +2 when it is above 80.

```
if( stoch(5,3) < 20, {then} -2,  
  {else} if( stoch(5,3) < 40, {then} -1,  
    {else} if( stoch(5,3) < 60, {then} 0,  
      {else} if( stoch(5,3) < 80, {then} +1,  
        {else} +2))))
```

- You may want to smooth a binary wave using a formula similar to the "Smooth Total Wave" and then plot a moving average signal line of the result. A system test could be written to test for crossovers between the indicator and the moving average signal line.
- Composite Binary Waves provide a method of rating a security's technical health based on your criteria. For example, you might consider a composite Wave moderately bullish when it is between 0 and +2.
- You can plot the rate-of-change of a composite Binary Wave using the formula shown below:

```
roc( fml("Total Wave"), 1, $)
```

Each time this indicator spikes above zero, it signifies that at least one of the individual Binary Waves has turned bullish. Similarly, spikes below zero show that an indicator has turned bearish.

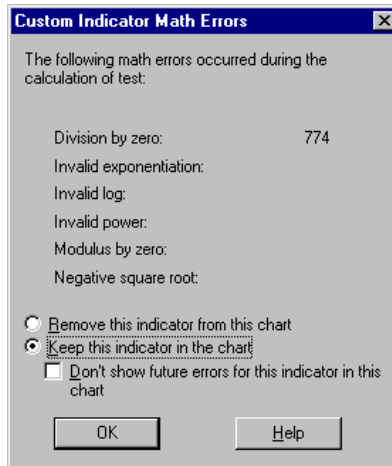
Summary

Binary Waves display your evaluation of an indicator (e.g., "it is bullish when the MACD is above its 9-period moving average") as a ± 1 indicator. Composite Binary Waves combine multiple Binary Wave indicators to illustrate your analysis of a security based on the actions of numerous indicators.

Errors

Math Errors

If you attempt to plot (or execute) a formula that contains math errors, the following dialog will appear prior to plotting the indicator. The dialog shows the number of occurrences for each error.



Division by zero. A formula is dividing a value by zero. For example, the formula `"(ref(close,-1)-open)/(high-low)"` will produce a division by zero error if the high and low are equal.

Invalid exponentiation. A formula produced a math error from the improper use of exponents.

Invalid log. A formula attempted to calculate the log of zero or the log of a negative number. For example, the formula `"log(high-low)"` will produce the error if the high and low are equal.

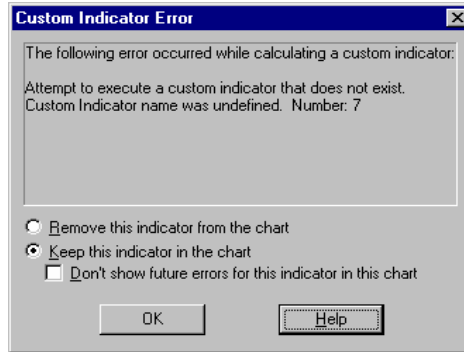
Invalid power. A formula is attempting to calculate a negative number raised to a power less than one.

Modulus by zero. The second data array of the `mod()` function results in zero. For example, the formula `"mod(close, high-low)"` will produce the error if the high and low are equal.

Negative square root. Your formula is attempting to calculate the square root of a negative number. For example, the formula `"sqrt(open-close)"` will produce an error if the close is higher than the open.

Custom Indicator Error

The Custom Indicator Error dialog will appear if a run-time error occurs while calculating a custom indicator. Any error that is not a "math" error qualifies as a run-time error.



Remove this indicator from the chart. The indicator is removed from the chart so that it will not calculate again.

Keep this indicator in the chart. The indicator will calculate again with the next data update of the chart and any errors that occur will be reported.

Don't show future errors for this indicator in this chart. The indicator will calculate again with the next data update of the chart. Any errors that occur will not be reported. Note that the errors will be suppressed only for the indicator in the current chart.

Note that this dialog may also appear if you have changed the folder listed in the File Locations page in the Application Options dialog (see page 33).

Testing Your Trading Ideas

What is a System Test?

System testing involves the development and testing of trading systems to determine the systems' historical profitability. System testing helps answer the question, "If I had traded this security using these trading rules, how much money would I have made or lost?"

You can use MetaStock Pro to:

- Write trading systems using your own trading rules.
- Test your trading systems.
- Examine the test results by plotting buy/sell arrows and equity lines, and by examining tabular reports.
- Automatically optimize parameters within your trading rules to improve the results.
- Compare trading systems to find out which trading system works best on a particular security.

It is very important that you read the System Tutorial that begins on the following page before developing your own trading systems.

Due to the inherent complexity in the design and creation of custom indicators, trading systems, explorations, and experts, Equis cannot provide free support for this process. However, support is available for a reasonable fee. Call Equis at 801-265-9998 for details or fill-out the FORMULA HELP.DOC file found in the MetaStock Pro folder. This file is viewable with Wordpad.

System trading rules use the same syntax as custom indicators. If you are unfamiliar with the MetaStock formula language, see page 235.

When developing trading systems, please keep in mind that technical analysis is a dynamic tool (possibly an art) and as such, no mechanical system is flawless. Don't let yourself get caught in the trap of "overfitting" your system to a specific set of data. For tips on system development, see page 359.

Enhanced System Tester Tutorial

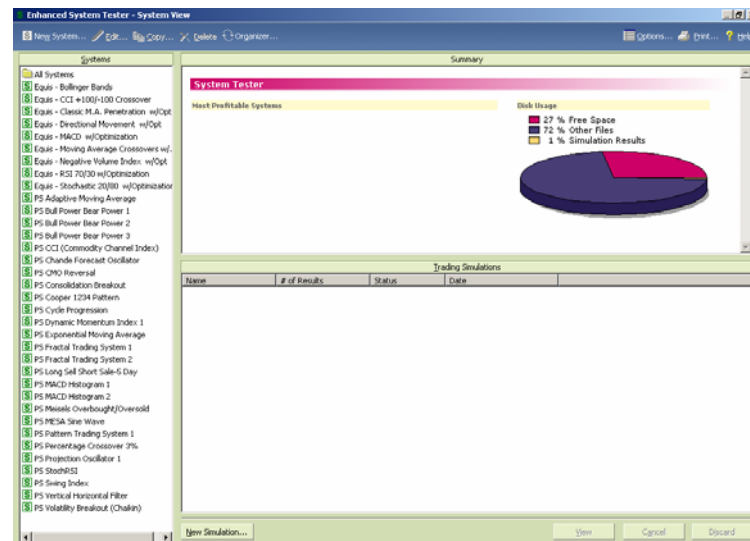
This short tutorial introduces several terms and concepts relating to system testing. It is important that you read this tutorial before you create your own trading systems. You should also be familiar with the MetaStock formula language (see page 235) and custom indicators (see page 300).



*Enhanced System Tester
button*

Step 1 - Open The Enhanced System Tester

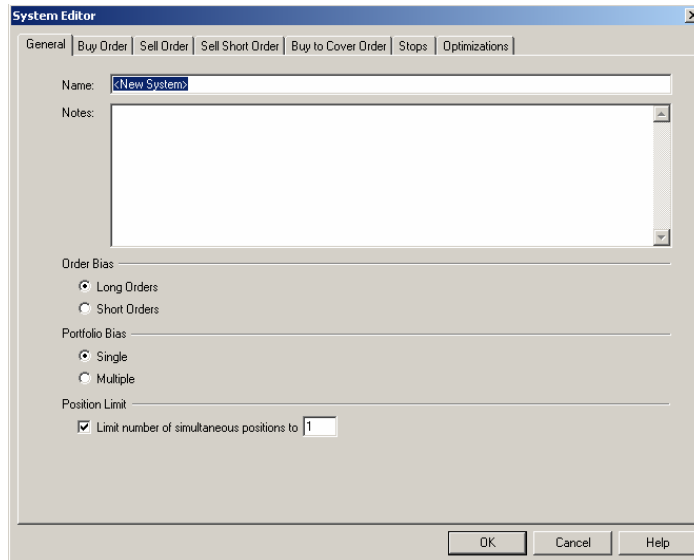
Choose **Enhanced System Tester** from the Tools menu or click the Enhanced System Tester button on the standard toolbar.



The Enhanced System Tester lets you create, test, compare, print, and report your system tests.

Step 2 - Create Two New Systems

1. With the Enhanced System Tester displayed, click the **New System** button in the upper left corner. The System Editor dialog appears.



The General page of the System Editor dialog has text entry boxes for the system's name and notes, and three options. Don't worry about the three options for now; they're explained in detail later in this chapter (page 331).

2. In the Name field, type the system name, "My First System" (do not enter the quotation marks in this or the remaining examples).
3. Click the **Buy Order** tab and enter the following trading rule for entering a long position (buy order) in the Formula text box:

```
cross(close, mov(close,25,simple))
```

The preceding rule, as with most trading rules in MetaStock Pro, can be read in English. It says, "Buy the security" when the close crosses above a 25-period simple moving average of the close." (As with custom indicators, you can abbreviate "close" to "c" and "simple" to "s".)

Trading rules (see page 365) are very similar to custom indicators (see page 299).

Just ignore the other options on the Buy Order page; they'll be explained later in this chapter.

4. Enter the following information for the next three trading rules. Remember to click on the corresponding tabs (i.e., Sell Order, Sell Short Order, and Buy to Cover Order) to enter each of the rules.

Sell Order: `cross(mov(close,25,simple),close)`

Sell Short Order: `cross(mov(close,25,simple),close)`

Buy to Cover Order: `cross(close,mov(close,25,simple))`

If a syntax error exists in your trading rules, a message explaining the error will appear. Click the OK button to acknowledge the error. The System Editor will reappear with the cursor placed at the position where the error exists. You should then correct the error and reselect OK.

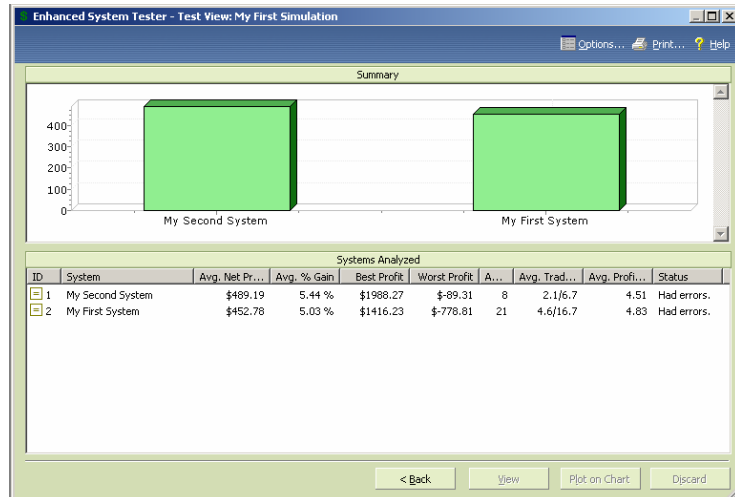
5. When the four trading rules have been entered correctly, click the **OK** button.
6. With My First System highlighted, click the Copy button at the top of the screen. A Copy of My First System appears at the top of the system list.
7. Click the Copy of My First System to highlight it, then click the Edit button.
8. In the General page, change the name to "My Second System".
9. In the trading rules (Buy Order, Sell Order, Sell Short Order, Buy to Cover Order), change the 25's to 50's.
10. Click **OK**.

Step 3 - Test the Systems

1. When the Enhanced System Tester reappears (and "My First System" is highlighted), click the **New Simulation** button. The Perform Trading Simulation wizard appears.
2. The first dialog in the wizard is the Select Systems dialog. Find "My First System" in the list and highlight it.
3. Hold the Ctrl key and click "My Second System" to select it also.
4. Click **Next**. The Select Securities dialog appears.
5. Click the **Add Securities** button. The Add Securities dialog appears, where you can select any number of local or online securities.
6. Select ten securities (using the Ctrl key), then click **Open**. You return to the Select Securities dialog.
7. Click **Next**. The System Testing Options dialog appears. We're not changing any options for this tutorial, but this dialog is described on page 341.
8. In the System Testing Options dialog, click **Next**. The Begin Trading Simulation dialog appears.
9. Type "My First Simulation" in the field under the words "The System Tester will now perform the simulation".
10. Click **Start**. The Perform System Test wizard closes, and a small window appears, showing you details about the simulation's progress. A blue bar next to a dollar sign in the lower right corner of the MetaStock workspace also indicates the test's progress.
11. When the test is complete, click **View Results**.

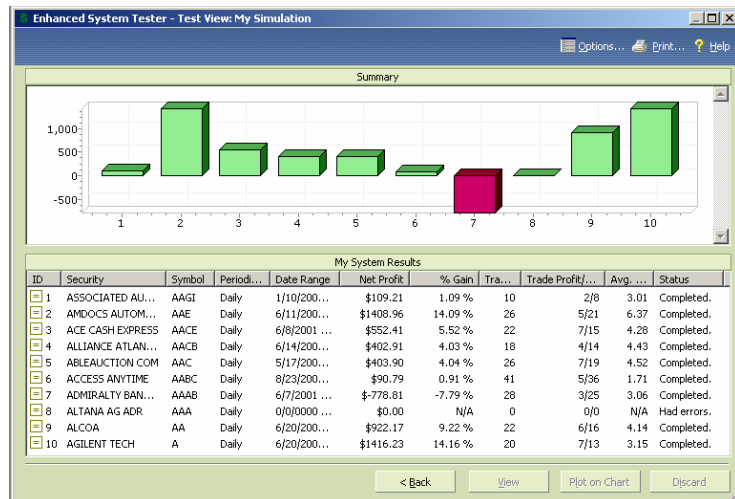
Step 4 - View the Results

1. When you click the View Results button, the Enhanced System Tester's Test View appears.



Since we tested more than one system, this screen compares the systems' performance. The graph at the top shows each system's average net profit. You can also sort the systems in the list below the graph by clicking the Avg. Net Profit column (or any other column in the list).

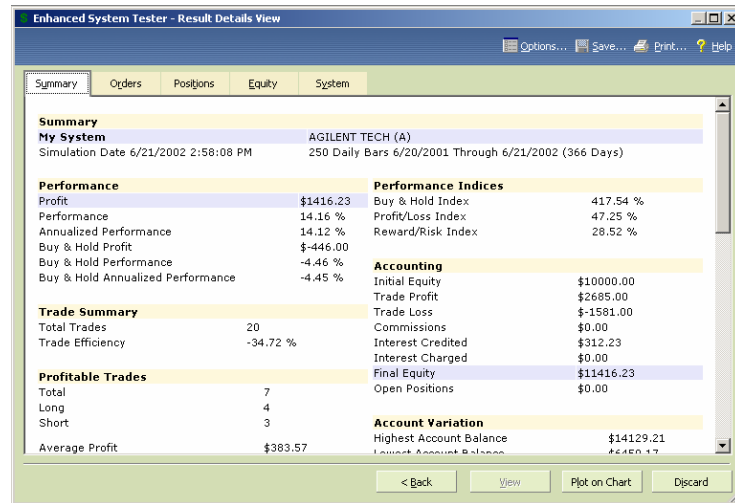
2. In this example, "My Second System" had the highest average net profit. In the lower pane, double-click on "My Second System." Another version of the Test View appears.



This screen is also divided into two main sections. The graph in the top section shows what each security's equity would have been if the

system had been followed. The bottom section shows a list of all the securities the system tested, with more detailed information about their data and their performance in the simulation. You can sort the securities in the list by clicking any of the column headings (like Net Profit).

3. In the list, click a security that performed well in the simulation (had a high net gain or profit/loss ratio) and click the **View** button to display the Result Details View. (If none of the securities were profitable, select the one that lost the least money, then click **View**.)



Five reports are available from the Details View dialog. For more information about what these reports tell you, see page 345.

Step 5 - Optimizing

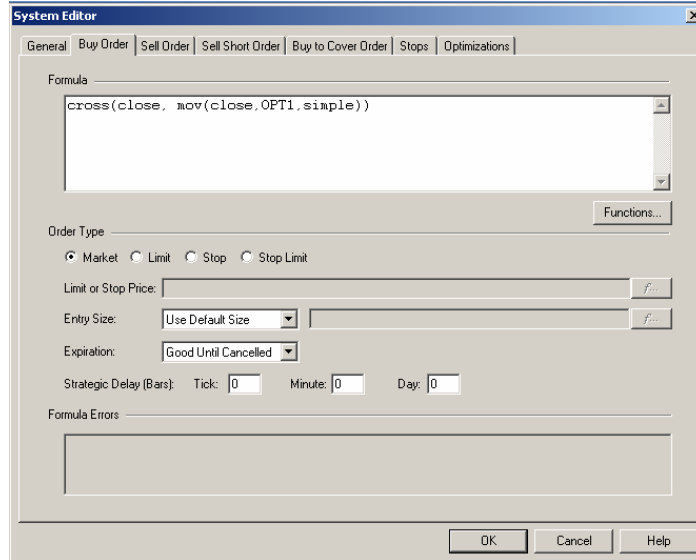
Optimizing involves replacing components of trading rules or stops with "OPT" variables and then specifying the range of values to be tested. MetaStock Pro then performs multiple tests, replacing the OPT variables with values from the range you specified.

"My First System" in this tutorial tested the buy/sell signals generated by a 25-period moving average. We will now have MetaStock Pro optimize our trading rules to determine the optimum number of periods to use for the moving average.

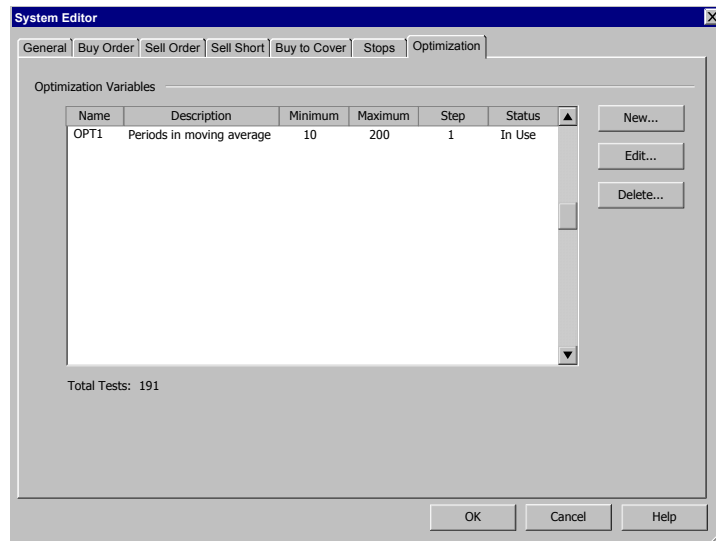
Entering The Optimization Variable

1. With the Enhanced System Tester displayed, select "My First System" and click the **Edit...** button. In the four trading rules we created in Step 2 - Create Two New Systems, replace the "25" with "OPT1" (for optimization variable number 1). This is shown for the

Buy Order rule in the following illustration:

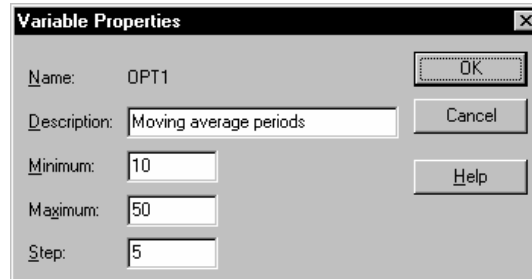


2. Click the **Optimization** tab. The Optimization page appears.



3. Click OPT1 in the list.
4. Click the **Edit** button. The Variable Properties dialog appears. We want to test the moving average from 10-periods to 50-periods, by five period increments (i.e., 10, 15, 20, etc.).

5. Enter "Moving average periods" as OPT1's description. Type a Minimum value of **10**, a Maximum value of **50**, and a Step value of **5** (as shown in the following illustration).



6. Click **OK**.
7. Look at the Total Tests value at the bottom of the Optimization Variables dialog. This value shows the total number of tests (nine in this case) that will be performed. It's always wise to check this value after editing the optimization variables, as it is very easy to create a system that will generate thousands of tests.
8. Click **OK** in the System Editor dialog to return to the Enhanced System Tester dialog.

Step 6 - Test the Optimization System

In the Enhanced System Tester, with "My First System" still highlighted, click the **New Simulation...** button. Complete the New Simulation wizard (as described on page 320). Name this simulation "My Optimized Simulation" and click **Start**.

During the optimizing, MetaStock Pro displays information regarding the number of tests to be performed, the elapsed hours of testing, and the best and worst gains/losses. When the test is complete, click **View Results**.

Note that only the five most profitable results will appear, by default. To see more results, you can change the number in the Results section of the System Testing Options dialog (see page 341).

Step 7 - Display the Optimization Reports

1. When the "System Test Completed" message appears, click the **View Results** button. The Enhanced System Tester appears.
2. Click "My Optimized Simulation" in the lower right portion of the Enhanced System Tester.
3. Click **View**. The Enhanced System Tester's Test View appears. The five most profitable results are displayed. (You can change how many results are displayed in the System Testing Options dialog.) The tests are arranged in the report by their average net profit. Click any column heading (Avg. Net Profit, Total Profit, etc.) to sort the

results according to that column's value.

Note that the optimization variable's value appears in the far right column for each result.

4. In the list, click a security that performed well in the simulation (had a high net gain or profit/loss ratio) and click the **View** button to display the Result Details View.
5. Five reports are available from the Result Details View dialog. For more information about what these reports tell you, see page 345.

Tutorial Summary

You have completed the Enhanced System Tester Tutorial. In an attempt to keep this tutorial as concise as possible, we did not fully explore MetaStock Pro's system testing capabilities. However, you should now be somewhat familiar with the process of creating a trading system. The remainder of this chapter provides detailed information on system testing.

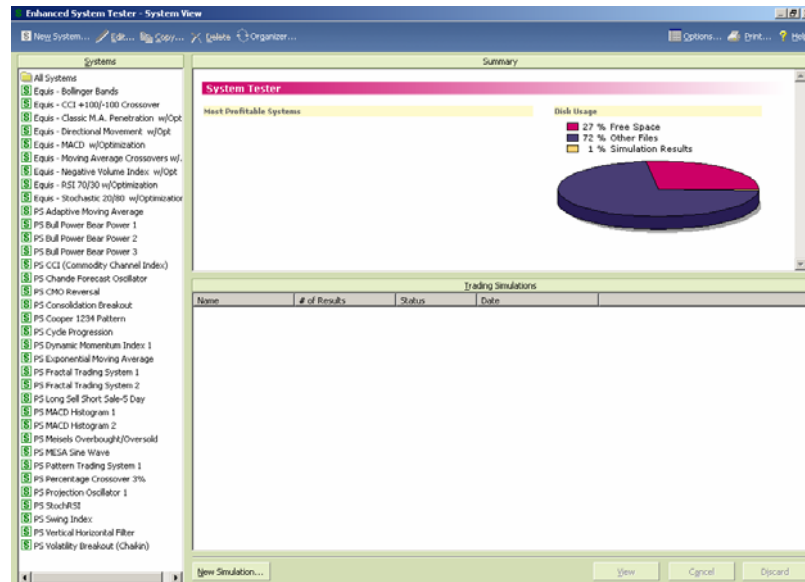
If you will be testing futures and commodities, see page 364 for special instructions.

The Enhanced System Tester

The System Test Manager is the starting screen for all Enhanced System Tester activities. From here you can:

- View all your systems
- Create, copy, edit and delete systems
- View all the tests run against any systems
- Create, perform and repeat tests
- View test details

The Systems Test Manager is divided into three sections: The Systems List (left side), the Report Summary (top right), and the Trading Simulations List (bottom right).



New System. Opens the System Editor dialog where you can create your own custom system using MetaStock's Formula Language. For more information on the System Editor dialog, see page 331.

Edit ... Opens the System Editor, where you can modify the selected system test. See page 331 for more information on the System Editor dialog.

Copy ... Makes a copy of the selected system. The copy is named "Copy of <system>" and appears alphabetically in the list.

Delete. Removes the selected system test from the list.

Organizer. Opens the Organizer wizard, where you can import or export formula files. See page 249 for more information about the Organizer wizard.

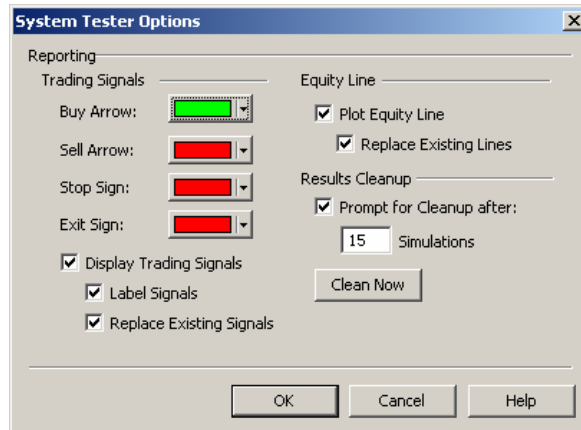
Options. Opens the Enhanced System Tester Options dialog, described below.

Print. Opens the print dialog.

Help. Opens the help system.

The System Tester Options Dialog

You can open this dialog by clicking the **Options** button in the upper right corner of the Enhanced System Tester.



Buy Arrow, Sell Arrow, Stop Sign, Exit Sign. Choose a color for each of these symbols here.

Once you've run a test and you've selected a security that worked well with that test, you can open a chart for that security. If the system generated any signals (buy, sell, stop, or exit), the chart will show when those signals were generated. By default, buy signals are represented by a green arrow; sell signals are represented by a red arrow; exit signals are represented by a red exit sign; and stops are represented by a red stop sign.

Display Trading Signals. Uncheck this box to plot the tested security's chart without the buy and sell arrows and stop and exit signs. Note that when this box is unchecked, the next two options are disabled.

Label Signals. When this box is checked, two numbers appear above each trading signal. The first number indicates how many shares were bought or sold. The second number (in parentheses) is the order number.

Replace Existing Signals. If the security you're plotting from the Enhanced System Tester already has signals, this option will replace the old signals with the test's new signals.

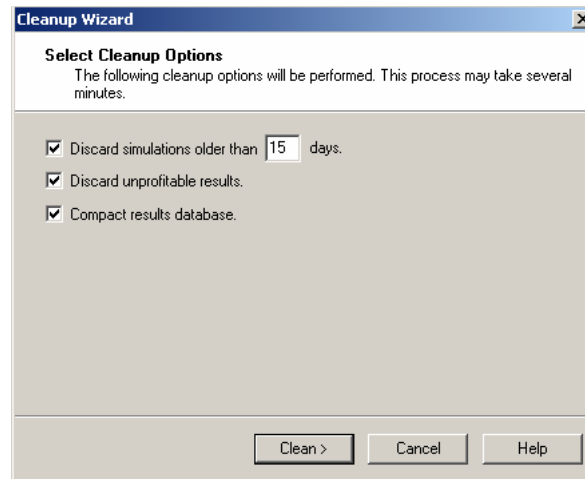
Plot Equity Line. Uncheck this box to plot the tested security without an equity line.

Replace Existing Lines. If the security you're plotting from the Enhanced System Tester already has an equity line, this option will replace the old equity line with the test's new line.

Prompt for Cleanup after ____ Simulations. Once you've run this number of simulations, MetaStock will ask you if you want to run the cleanup wizard (described below). This wizard deletes old analyses and unprofitable results.

Clean Now. Click this button to open the cleanup wizard (described below).

The Cleanup Wizard



The cleanup wizard frees up space on your hard drive by deleting old analyses and unprofitable results.

Discard simulations older than ___ days. Enter a number in the field to determine how old a simulation has to be in order to delete it.

Discard unprofitable results. When this box is checked the Cleanup Wizard deletes results that lost money or broke even.

Compact results database. Frees up some space on your hard drive by compressing the files that contain your test results.

When you're ready, click **Clean** to delete the selected analyses and/or results.

The Systems List

The Systems List (on the left side of the Enhanced System Tester) shows all the available systems. Single click on a system to see all the tests run on that system (in the Trading Simulations List section). Double click on a system to open the System Editor dialog for that system. Right click on a system to open the pop-up menu, which contains options to create a new system, create a new simulation, and to edit, copy or delete a system.

Click the All Systems folder at the top of the list to see all the results in the Trading Simulations List for all systems tested.

Note that if a system has results from a simulation, it will look like this:



Systems with no results look like this:



The Report Summary

The Report Summary (in the upper right section of the Enhanced System Tester) lists the securities that returned the most profitable results in the simulations that were run. The Report Summary also contains a pie chart

that tells you how much space on your hard drive is taken up with system test results, how much free space is available on the hard drive, and how much space is taken up by other files.

The Trading Simulations List

The Trading Simulations List shows all the tests run on the selected system or systems, as well as currently running tests. If a test has multiple results, they are summarized here.

Note that you can see all the results for all systems tested by clicking the All Systems folder in the Systems List.

Double click on a test to view its results (if it is complete) or its status (if it is running).

The Trading Simulations List has its own set of buttons, described below.

New Simulation. Opens the Perform System Test wizard, where you can create and initiate a new test. See page 322 for more information on creating a new test.

View. When a test is selected, this button opens the Test View dialog, where you can see all the simulations performed for a given test. For more information on the Test View dialog, see page 343.

Cancel. Stops the currently running test. This button is only available when a test is running.

Discard. Removes the selected test from the Trading Simulations List.

Creating a System Test

Every system test contains four trading rules. The trading rules specify when Buy/Sell positions should be opened/closed. System tests may also have optimization variables and stops.

To create a new system, click the New button in the System Tester dialog. MetaStock Pro can store up to 1,000 system tests.

After you choose New System, the System Editor dialog appears.

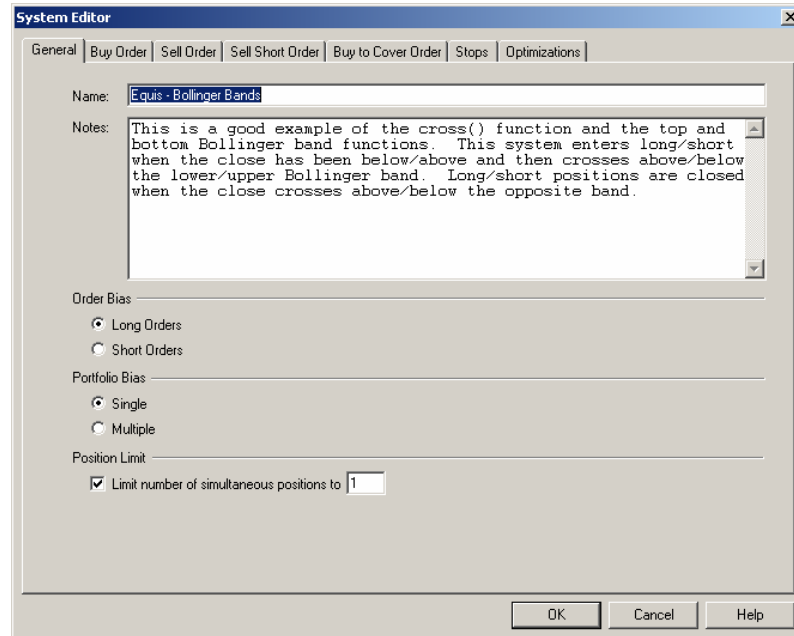
The System Editor

The System Editor Dialog lets you name the system test, store notes regarding the system, and define several trading rules.

To open the Enhanced System Tester Editor, either double-click on a system in the Systems List, or click the **Edit...** button in the upper left corner of the Enhanced System Tester.

The System Editor dialog is divided into seven pages; each page is selected by clicking its tab. The pages are described below.

General



You can edit a system's name here, as well as read and edit any notes associated with the system. You can also set three rules to govern how the system executes trades under certain circumstances:

Order Bias. Sometimes a system produces long and short signals simultaneously. This rule tells MetaStock which to choose when long and short signals appear at the same time.

Portfolio Bias. You can instruct MetaStock to close all existing positions for an existing bias (long or short) when an opposite position opening order is placed. For example, if you want MetaStock to close all short positions when it places a new long position, select the **Single** option. If you want to let MetaStock place long and short orders simultaneously, select the **Multiple** option.

Position Limit. Check this option to close any open positions before new positions are opened. You can specify that only one position can be open at a time, or you can allow up to 65,536 simultaneous open positions by unchecking this box.

Buy/Sell Signals

The System Editor offers four rules for initiating buy/sell signals:

Buy Order

This rule specifies when the system should purchase a given number of shares of the current security.

Sell Order

This rule specifies when the system should sell one or more existing long positions.

Sell short

This rule specifies when the system should borrow a given number of shares of the current security and to sell them on the market.

Buy to Cover

This rule specifies when the system should close one or more existing short positions by repurchasing and returning the borrowed shares.

The buy/sell rules use the options and fields described below:

Formula The system's formula appears here. For more information on the MetaStock formula language, see page 235.

Functions This button opens the Paste Functions dialog, where you can view all the functions (and their parameters) available in the MetaStock formula language. See page 239 for more information on the Paste Functions dialog.

Order Type If you want the test to use limit, stop, or stop limit orders, indicate that here.

Market This order executes at the Trade Price selected in System Tester Options - Trade Execution (see page 342).

Limit The order seeks the best price available above or below (depending on the Order Type) a given limit price.

Stop The order seeks the best market price available once a given limit price has been met or exceeded in a direction defined by the Order Type.

Stop Limit The order seeks the best price available above or below (depending on the Order Type) a given limit price once that limit has been met or exceeded in a direction also defined by the Order Type.

Limit or Stop Price The price used when a non-market order is generated.

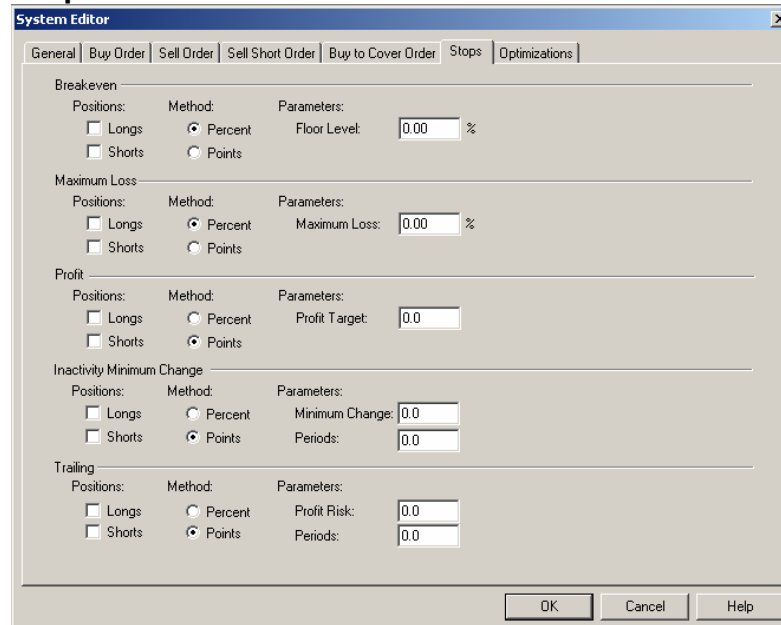
Entry Size Enter the number of shares you want the test to purchase or sell when opening a long or short position. The number can be a dollar amount, a number of units, a percentage of available equity, or a number of units defined by a formula. Note that if you're expressing this number as a percentage, the number should be a decimal value.

Expiration Tell the system to close the order at the end of the day or leave it open until another rule closes it.

Strategic Delay By default, systems test data as if it were downloaded and analyzed in real time. But some data providers

only provide data 20 minutes after it's actually updated. If this is the case, you could tell the Enhanced System Tester to delay its trades by 20 minutes to more accurately test your method of trading. Also, you may only download end of day data. In that case, you could delay all the system's trades by one day.

Stops



The screenshot shows the 'System Editor' dialog box with the 'Stops' tab selected. The dialog has a title bar with 'System Editor' and a close button. Below the title bar are tabs for 'General', 'Buy Order', 'Sell Order', 'Sell Short Order', 'Buy to Cover Order', 'Stops', and 'Optimizations'. The 'Stops' tab is active and contains several sections for configuring trading stops:

- Breakeven:** Positions: Longs, Shorts; Method: Percent, Points; Parameters: Floor Level: 0.00 %
- Maximum Loss:** Positions: Longs, Shorts; Method: Percent, Points; Parameters: Maximum Loss: 0.00 %
- Profit:** Positions: Longs, Shorts; Method: Percent, Points; Parameters: Profit Target: 0.0
- Inactivity Minimum Change:** Positions: Longs, Shorts; Method: Percent, Points; Parameters: Minimum Change: 0.0, Periods: 0.0
- Trailing:** Positions: Longs, Shorts; Method: Percent, Points; Parameters: Profit Risk: 0.0, Periods: 0.0

At the bottom of the dialog are three buttons: 'OK', 'Cancel', and 'Help'.

In addition to trading rules, each trading system can have up to five "stops." Stops are set by clicking the Stops tab in the System Editor dialog. Stops are used to close long and/or short positions based on the position's gains/losses. For example, the Maximum Loss stop will close a position if the position loses more than a specified amount.

When a stop is triggered, the position is closed regardless of the current status of your trading rules. The price at which the position is closed is the actual stop price or the specified exit price.

If the price gaps below a stop level on a long position, MetaStock Pro exits at the open price of the next bar. If no open price is available, the high price of the next bar is used. Likewise, if the price gaps above a stop level on a short position, MetaStock Pro exits at the open price of the next bar. If no open price is available, the low price of the next bar is used.

Stops automatically take entry and exit commissions into account. For example, the Maximum Loss stop knows the amount of your "exit" commission and will attempt to close the position so the maximum loss will not be exceeded after you pay the exit commission.

If two stops are triggered on the same bar, the more conservative stop takes precedence (i.e., the stop that generates the most losses). The precedence of stops is: Maximum Loss, Breakeven, Trailing, Profit Target, and Inactivity.

For information on optimizing stops, see page 356.

Breakeven

This stop closes an open position when the closed-out value of the position would fall below the current equity amount (i.e., the equity amount at the time the current trade was opened). The stop is placed at the price where the trade could be closed and the proceeds generated would equal the current equity amount.

To prevent this stop from being executed every time a position is opened (because commissions ensure there is never a profit when a trade is first opened), the Breakeven stop is enabled only after the profit for the trade meets or exceeds the user specified "floor level." The value you enter in the Floor Level box depends on the Method specified (points or percent). The floor level uses the high price for a long trade and the low price for a short trade.

This stop takes a minimum of two bars to trigger. One bar for the floor level and another bar for the breakeven amount.

Tip: If the floor level is set to zero, the Breakeven stop will become enabled only after the security's price increases to the point where the position could be closed without incurring a loss.

Maximum Loss

This stop closes an open position when the losses resulting from the trade exceed the specified Maximum Loss amount.

Example: If you set the Maximum Loss to 5%, positions will be closed when losses exceed 5% of your current equity (including commissions).

Warning: If you set the Maximum Loss to a value that is less than or equal to the Entry Commission, every trade will be closed immediately after opening the position, because all trades will have a loss the moment they are entered (due to commissions).

Profit

This stop closes an open position when a specified Profit level is reached.

Example: If you specify 10% as the profit, open positions will be closed when they generate a 10% increase in your current equity (after considering the effect of commissions).

Inactivity Minimum Change

This stop closes an open position when the security's price does not generate a minimum positive price change within a specified time period. (A "positive price change" is defined by an upward price movement while

in a long position and a downward price movement while in a short position.)

Type the Minimum Change and the number of Periods. The Method to use when calculating the Minimum Change can be specified in Percentage or Points.

Example: If you specify 1% as the Minimum Change and 20 as the number of Periods, MetaStock Pro will automatically close any long (short) positions where the security's price has not increased (decreased) by at least 1% within any 20-period time frame.

This stop analyzes changes in price, not equity, and therefore ignores commissions.

Trailing

This stop closes an open position when a specified amount (i.e., Profit Risk) of the current position's profits are lost.

Each time a position's profits reach a new high, the Trailing stop is placed at a level that allows a specified portion of the position's profits to be lost. You specify the amount of the loss in the Profit Risk box (using either Percent or Points method).

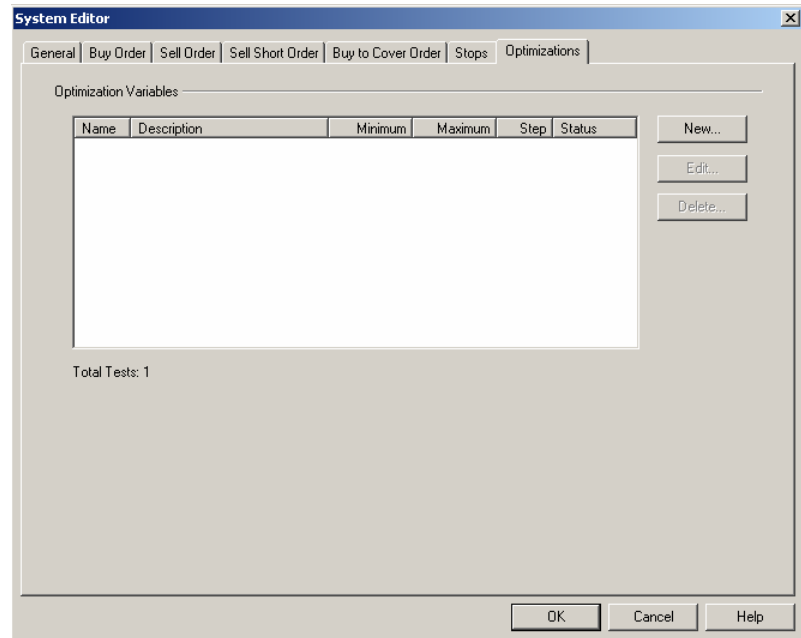
MetaStock Pro allows you to specify the number of periods to ignore. For example, if you specify "4" for the Periods, then the Trailing stop will lag by four periods. This means that the last four periods' profits or losses will be ignored when determining the current stop level. This filters out any price swings (up or down) that occur during the last four periods.

This stop is designed to lock in profits, not to limit losses. The Trailing stop only limits the amount of *profits* that can be lost. Losses are limited by the Maximum loss stop (see page 335).

Since trailing stops are determined by the profit level, not the price level, no special considerations exist for short positions.

Example: 5% is specified for the Profit Risk, 0 for the Periods, and your current position has a profit of \$100.00. The stop would be triggered if the change in the security's price caused your profits to drop to \$95.00 (or less).

Optimizations



New. Opens the Variable Properties dialog where you can create a new optimization variable.

Edit. Opens the Variable Properties dialog where you can change an existing optimization variable.

Delete. Removes the selected optimization variable.

Copying and Deleting System Tests

You can make a copy of the selected system test(s) in the Enhanced System Tester dialog using the Copy button. Just select the system you want to copy, and click the Copy button. A system named "Copy of <system name>" appears in the list (sorted alphabetically). This is useful when you want to design a new system test that is very similar to another.

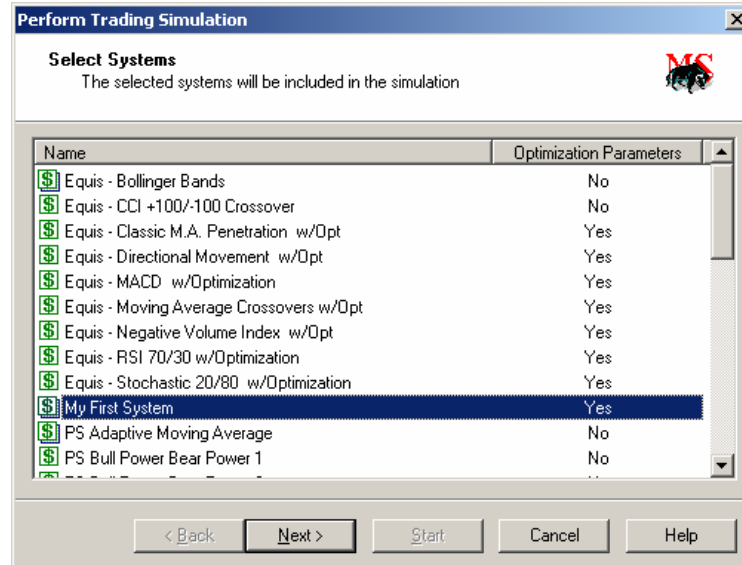
For example, if System A was very similar to a new system you want to create, you could use the Copy command in the Enhanced System Tester dialog to make a copy rather than rewriting it. You could then make the minor modifications necessary and name it System B.

You delete the selected system tests from the Enhanced System Tester dialog using the Delete button.

Testing Systems

When you click the New Simulation button in the Enhanced System Tester dialog, the Perform Trading Simulation wizard appears. This wizard takes you through four steps:

Select Systems



Select the system you want to test and click **Next**. To select multiple tests, hold down the **Ctrl** key while you click the tests you want to include. Or click a test, then hold down the **Shift** key and click another test. All the tests between the two you click will be selected.

Select Securities

Perform Trading Simulation

Select Securities
The selected securities will be included in the simulation.

| Symbol | Name | Periodicity | Date Range |
|--------|------|-------------|------------|
|--------|------|-------------|------------|

Add Securities... Remove Remove All Dates...

< Back Next > Start Cancel Help

Click **Add Securities...** to select the securities you want to include in the test and click **Next** for more options, or click **Start** to begin the simulation.

After you've added securities to the test, you can click the **Dates...** button to specify a date range or number of periods to test.

System Testing Options

Perform Trading Simulation

System Testing Options
These options will be used in each test of the simulation.

Trading

Points Only Test

Initial Equity: 10000

Default Size: Number of Units 100

Portfolio

Long Short Both Close all positions on the last bar.

Results

This simulation will be a 'Quick Test', store summarized results only.

Keep the 5 most profitable results for each optimized system. More...

< Back Next > Start Cancel Help

Set the following options here:

Trading

Points Only Test Check this box if you are trading futures or commodities and want to track the number of points gained or lost instead of the currency values. See page 364 for more information on points only system testing.

Important: When running points-only tests on more than one security, make sure the securities show similar levels of volatility. For example, if one security in a test shows 1000-point intraday swings and another security in the same test never changes more than a few points in a single day, the test's results may be skewed.

Initial Equity This is the starting balance of the account. Note that this option is unavailable when Points Only Test is selected.

Default Size You can tell the system to place each order based on a number of shares, total transaction cost, or percentage of equity available. Note that this option is unavailable when Points Only Test is selected.

Portfolio

Long/Short/Both Determine what type(s) of positions are allowed: Long, Short, or Both.

Close all positions on the last bar If this is unchecked, any open positions will remain open after the test is complete.

Results

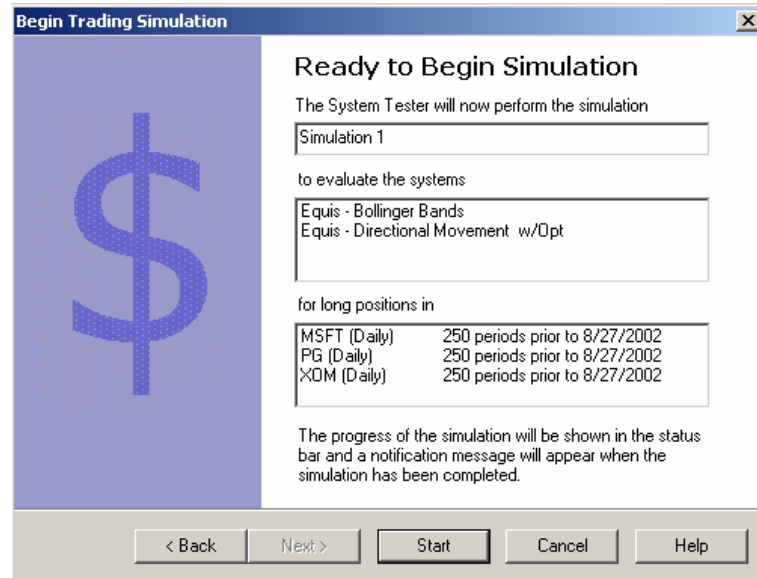
The checkbox in this section lets you run the simulation as a Quick Test. A Quick Test takes less time to run than a normal simulation, and the results take up less disk space. However, Quick Tests don't generate the Positions, Equity and Orders reports that normal simulations do. Quick Tests are highly recommended when you're running a system that generates several tests.

You can also determine how many results you want to see for systems that use optimization variables in this section.

More... This button opens the System Testing Options dialog. For more information about System Testing Options, see page 341.

When you've entered all your options, click **Next** to see a summary of the simulation, or click **Start** to begin.

Ready to Begin Test

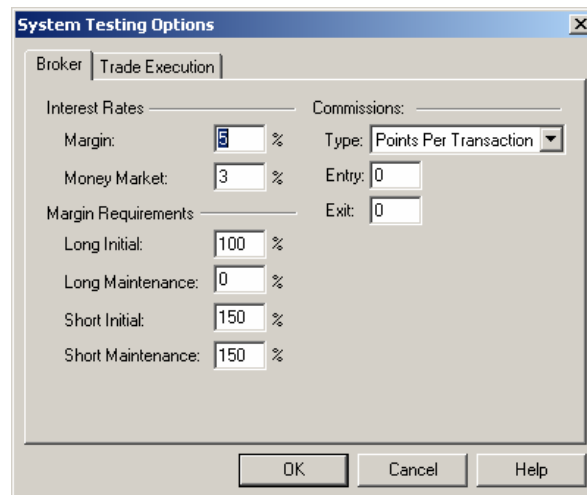


This dialog summarizes the selections you made in the previous dialogs. Click **Back** to change any options, or click **Start** if you're ready.

System Testing Options Dialog

This dialog contains several options divided into two sections: Broker and Trade Execution. Note that some options will be disabled if the Points Only option is selected.

Broker



Margin This interest rate is used to calculate the annual interest applied to all debit balances.

Money Market This interest rate is used to calculate the annual interest applied to all credit balances.

Long Initial This percentage is used to calculate the initial equity necessary to open a long position on margin.

Long Maintenance This percentage is used to calculate the initial equity necessary to maintain a long position on margin.

Short Initial This percentage is used to calculate the equity necessary to open a short position on margin. The percentage can be as low as 101% and as high as 200%. For example, if the account balance is \$5,000 and the Short Initial is set to 150%, the system would allow a short sell of \$10,000. At 110% and \$5,000, it would allow a short sell of \$50,000. At 200% and \$5,000, it would only allow a short sell of \$5,000.

Short Maintenance This percentage is used to calculate the equity necessary to maintain a short position on margin.

Type Choose how your broker's commission will be calculated here. Choose either Points per Transaction, Points per Unit, or Percentage of Transaction Value.

Entry Enter your broker's entry commission here (based on the commission type).

Exit. Enter your broker's exit commission here (based on the commission type)

Trade Execution

The screenshot shows a dialog box titled "System Testing Options" with a "Trade Execution" tab selected. The dialog contains several input fields and checkboxes. The "Realistic Market Prices" checkbox is checked. The "Slippage" section has radio buttons for "Points" (selected) and "Percentage". There are four rows of price inputs: "Buy Price", "Sell Price", "Sell Short Price", and "Buy to Cover Price", each with a dropdown menu set to "Open". To the right of these are four numeric input fields for "Buy", "Sell", "Sell Short", and "Buy to Cover", all set to "0". At the bottom, there is a "Delay order opening" field set to "1" bars. The dialog has "OK", "Cancel", and "Help" buttons at the bottom.

Realistic Market Prices When this box is checked, any triggered order executes at the open of the next bar. When it's unchecked, the Buy, Sell, Sell Short and/or Buy to Cover Prices execute at the specified values (Open, Close, High or Low).

Delay order opening ____ bars. Enter a number here to execute orders "x" bars after the trade is signaled.

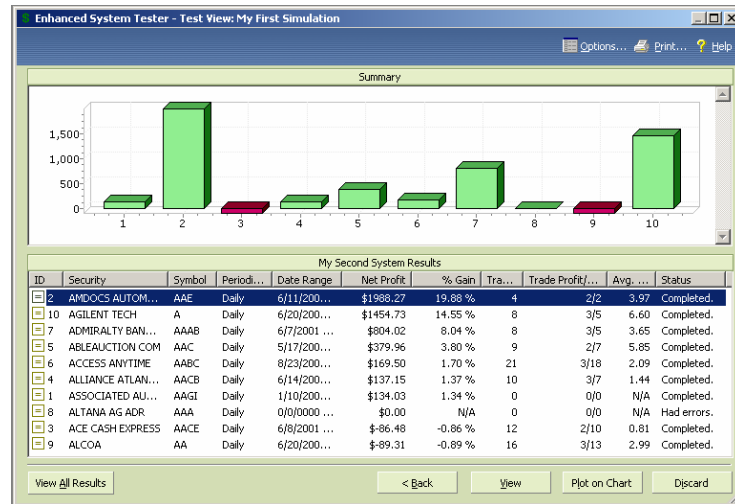
Slippage (Points, Percentage, Buy, Sell, Sell Short, Buy to Cover)

These options let you introduce a degree of loss to the system by simulating delayed executions. For example, you see your stock has reached \$20, so you call your broker and tell him to sell 100 shares. By the time the trade executes, the price may have changed. Slippage conservatively simulates this phenomenon by lowering all types of trades by a specific percentage or number of points.

The Test View Screen

There are three "versions" of the Test View screen. If you tested multiple systems, the Test View screen shows the most profitable systems based on the average net profit of all the securities each system tested. And if you tested multiple securities, the Test View Screen shows the securities that returned the highest net profit when the system was applied. Finally, if you tested multiple systems and multiple securities, you can compare one security's performance in all the systems tested (View All Results).

The Test View Screen for Multiple Systems



The top half of the above screen shows the average net profit of the most profitable systems tested. The list at the bottom of the screen shows more information about the most profitable systems in the test. You can sort the list of systems by clicking any column heading (like Avg. Net Profit).

Back Returns you to the Enhanced System Tester.

View All Results Select any single security in the list and click this button to see how the security performed in the other systems in the test (if you tested multiple systems).

Back Returns you to the Enhanced System Tester (or the Test View screen for multiple systems, if you tested multiple systems).

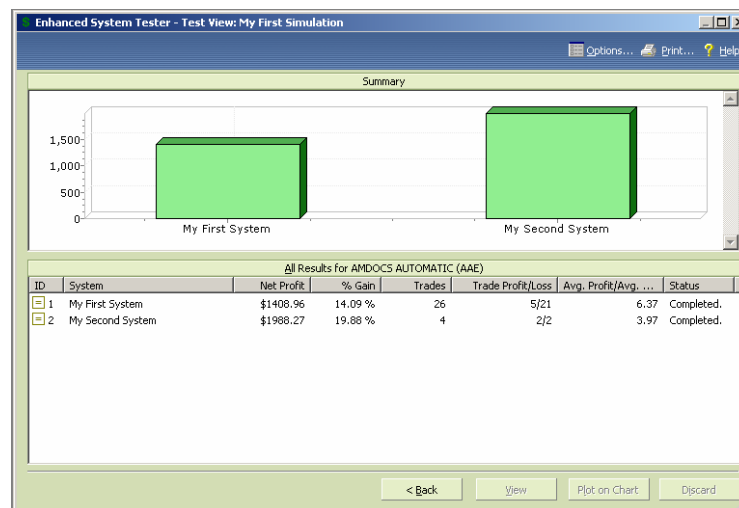
View Opens the Result Details dialog, described in the next section below.

View All This button is only available if an optimized result is selected. Clicking the View All button displays all the test results, not just the most optimal.

Plot on Chart Opens the smart chart for the security used in the selected test. (The chart appears behind the Enhanced System Tester, so you'll need to close the Enhanced System Tester to see it.) The resulting equity line and buy/sell arrows appear on the chart. You can change the color of the arrows and other details in the Enhanced System Tester Options dialog, described on page 328.

Discard Removes the selected result from the list.

The Test View Screen - View All Results



If you tested multiple systems, you can select a single security and see how it performed in each of the systems tested. The graph shows the selected security's net profit for each system tested. The list shows more information about the security's performance in each of the systems tested.

Back Returns you to the Test View for multiple securities.

View Opens the Result Details dialog, described in the next section below.

Plot on Chart Opens the smart chart for the security used in the selected test. (The chart appears behind the Enhanced System Tester, so you'll need to close the Enhanced System Tester to see it.) The resulting equity line and buy/sell arrows appear on the chart. You can change the color of the arrows and other details in the Enhanced System Tester Options dialog, described on page 328.

Discard Removes the selected result from the list.

The Results Detail View Dialog

When you test a typical system, MetaStock Pro keeps track of tens of thousands of test details. This information is stored in a series of reports. Each of the reports provides different information about the test.

- The Summary Report provides a brief summary of the system tests.
- The Orders Report lists all the potential orders that were considered and gives details about them.
- The Positions Report shows details about every position that occurred during the test.
- The Equity Report shows details about the test's account from the beginning of the test to the test's end.
- The System Report lists all the information the system used, including all the options you can change.

Summary Report

| Summary | |
|---|----------------------|
| My System | |
| Simulation Date | 6/21/2002 2:58:08 PM |
| System | AGILENT TECH (A) |
| 250 Daily Bars 6/20/2001 Through 6/21/2002 (366 Days) | |
| Performance | |
| Profit | \$1416.23 |
| Performance | 14.16 % |
| Annualized Performance | 14.12 % |
| Buy & Hold Profit | -\$446.00 |
| Buy & Hold Performance | -4.46 % |
| Buy & Hold Annualized Performance | -4.45 % |
| Performance Indices | |
| Buy & Hold Index | 417.54 % |
| Profit/Loss Index | 47.25 % |
| Reward/Risk Index | 28.52 % |
| Trade Summary | |
| Total Trades | 20 |
| Trade Efficiency | -34.72 % |
| Profitable Trades | |
| Total | 7 |
| Long | 4 |
| Short | 3 |
| Average Profit | \$383.57 |
| Accounting | |
| Initial Equity | \$10000.00 |
| Trade Profit | \$2685.00 |
| Trade Loss | -\$1581.00 |
| Commissions | \$0.00 |
| Interest Credited | \$312.23 |
| Interest Charged | \$0.00 |
| Final Equity | \$11416.23 |
| Open Positions | \$0.00 |
| Account Variation | |
| Highest Account Balance | \$14129.21 |
| Lowest Account Balance | \$4459.17 |

This report provides a detailed analysis of how a security performed with a given system. It includes several categories of information, described below.

Summary

Lists the security tested, the system used, the date and time the test was run, the number of bars included in the test and the date range tested.

Performance

- **Profit** - How much money this stock earned when traded with the selected system. If this is a negative number, it indicates a loss.
- **Performance** - A percentage measure of how much profit or loss the system generated based on its initial equity. For example, if you start with \$1000 and you end up with \$1100 performance is 10%.
- **Annualized Performance** - Calculates what the Performance described above would be if the simulation took one year. This value is reached by dividing a year (365 days) by the number of days in the simulation, then multiplying that number times and the performance.
- **Buy & Hold Profit** - The profit resulting from a buy and hold strategy. A buy and hold strategy assumes that you buy on the first day loaded in the chart and hold the position. The profit is calculated by using the price on the first day and the price on the last day. Entry commissions are taken into account.

- Buy & Hold Performance - The percentage difference between the initial equity and the final equity if you were to buy the first bar and sell the last. It's just like Buy & Hold Profit (described above), but it's expressed as a percentage.
- Buy & Hold Annualized Performance - Shows how much the system would have made or lost if they bought on the first day of the year and sold on the last day of the year.

Trade Summary

Total Trades - The total number of trades that were generated by the test.

This number only shows closed trades and does not include the open position that may have existed at the end of the test. Therefore, it is possible for this value to be zero if there was a single unclosed trade in the test.

Trade Efficiency - Your average total trade efficiency. Trade efficiency is the percent of the potential profit your trades realized, and is explained in more detail below.

Average Profit/Average Loss - Lists the test's average profit and average loss.

Profitable Trades

Shows you how many profitable trades you had, and how many were longs and how many were shorts. Also lists your profitable trades' average profit, highest profit, lowest profit and longest consecutive run.

Unprofitable Trades

Shows you how many unprofitable trades you had, and how many were longs and how many were shorts. Also lists your unprofitable trades' average loss, highest loss, lowest loss, and longest consecutive run.

Maximum Position Excursions

- Long Favorable - The most profit made by any single long position.
- Short Favorable - The most profit made by any single short position.
- Long Adverse - The most equity lost by any single long position.
- Short Adverse - The most equity lost by any single short position.

Trade Efficiency

The percentage of the total possible profit realized by the trade. There are three types of trade efficiencies: long, short, and total. All three apply to both long and short trades.

Long Trade Entry Efficiency is the highest price minus the entry price, divided by highest price minus the lowest price.

Long Trade Exit Efficiency is the exit price minus the lowest price, divided by highest price minus the lowest price.

Long Trade Total Efficiency is the exit price minus the entry price, divided by highest price minus the lowest price.

Short Trade Entry Efficiency is the entry price minus the lowest price, divided by highest price minus the lowest price.

Short Trade Exit Efficiency is the highest price minus the exit price, divided by highest price minus the lowest price.

Short Trade Total Efficiency is the entry price minus the exit price, divided by highest price minus the lowest price.

- Average Entry - The sum of the entry efficiencies for all trades divided by the number of trades.
- Average Exit - The sum of the exit efficiencies for all trades divided by the number of trades.
- Average Total - The sum of the total efficiencies for all trades divided by the number of trades.
- Average Long Entry - The sum of the long entry efficiencies for all trades divided by the number of long entries.
- Average Long Exit - The sum of the long exit efficiencies for all trades divided by the number of long exits.
- Average Long Total - The sum of the long efficiencies for all trades divided by the number of long trades.
- Average Short Entry - The sum of the short entry efficiencies for all trades divided by the number of short entries.
- Average Short Exit - The sum of the short exit efficiencies for all trades divided by the number of short exits.
- Average Short Total - The sum of the short efficiencies for all trades divided by the number of short trades.

Performance Indices

- Buy & Hold Index - This index shows the percentage of the system's profits as compared to a buy and hold strategy's profits.

A value of "-50" means that the system's profits were one-half (i.e., 50%) of the buy/hold's. A value of "25" means that the system's profits were 25% greater than the buy/hold's. A value of "0" means they were equal.

Ideally you want your system test to produce higher profits than a buy/hold strategy (i.e., Buy/Hold Index is greater than zero); otherwise the trading may not be worth the time and effort.

- Profit/Loss Index - This index compares the Amount of Winning Trades to the Amount of Losing Trades.

The Profit/Loss Index combines Winning Trades and Losing Trades into one value that ranges from -100 (worst) to +100 (best).

A negative index value indicates that the trading system produced a net loss. The higher the index value, the higher the Amount of Profitable Trades compared to the Amount of Losing Trades.

| Index | Profit/Loss |
|--------------|------------------------|
| +100 | High Profits/No Losses |
| +50 | Profits > Losses |
| 0 | Profits = Losses |
| -50 | Profits < Losses |
| -100 | No Profits/High Losses |

- Reward/Risk Index - This index compares risk to reward. In this index, risk is defined as the System Open Drawdown (i.e., the lowest point of the equity line below the initial investment). Reward is defined as the Total Net Profits (i.e., the final point on the equity line).

The Reward/Risk Index combines Reward and Risk into one value that ranges from -100 (riskiest) to +100 (safest). A Reward/Risk Index value of zero means that risk and reward exactly offset each other.

| Index | Reward | Risk |
|--------------|---------------|-------------|
| +100 | High | None |
| +50 | Medium | Medium |
| 0 | None | None |
| -50 | Low | Medium |
| -100 | Very Low | High |

Accounting

- Initial Equity - The amount of hypothetical money the system started with.
- Trade Profit - How much equity all the profitable trades earned.
- Trade Loss - How much equity all the unprofitable trades lost.
- Commissions - How much you paid to execute all the trades generated by the system.
- Interest Credited - The amount of interest the system's account earned during the test.
- Interest Charged - The amount of interest the system paid for borrowing money during the test.
- Open Positions - The dollar value for any positions still open at the end of the test.
- Final Equity - How much equity existed at the end of the test.

Account Variation

- Highest Account Balance - The most equity ever present during the test.
- Lowest Account Balance - The lowest value of the cash account.
- Highest Portfolio Value - The most your open positions were worth simultaneously during the test.
- Highest Open Drawdown - The largest equity dip (relative to the initial investment) based on open positions. This shows the maximum distance the equity line fell below the initial investment when a position was still open.
- Highest Closed Drawdown - The largest equity dip (relative to the initial investment) based on closed out positions. This shows the maximum distance a closed-out position fell below the initial investment amount.

Account Events

Shows you how many Margin Calls and Overdrafts occurred during the test.

Profitable Timing

Details, measured in bars, about the length of the profitable trades that happened during the test Average, Longest, Shortest, and Total.

Unprofitable Timing

Details, measured in bars, about the length of the unprofitable trades that happened during the test: Average, Longest, Shortest, and Total.

Out of Market Timing

The Longest and Average number of bars during which the test didn't have any open trades.

Optimization Variables

If you used any optimization variables (OPT1, OPT2, etc.), their values during this test appear here.

Orders Report

| Bar | Date | Number | Event | Type | Size | Terms | Price | Price Field | Position | Source |
|-----|-----------|--------|------------|--------------|------|--------|-----------|-------------|----------|--------|
| 45 | 6/10/2002 | 1 | Considered | Buy | 100 | Market | | | | Signal |
| 45 | 6/10/2002 | 1 | Placed | Buy | 100 | Market | | | | Signal |
| 46 | 6/11/2002 | 1 | Opened | Buy | 100 | Market | | | | Signal |
| 46 | 6/11/2002 | 1 | Executed | Buy | 100 | Market | \$32.2500 | Open | 1 | Signal |
| 59 | 6/28/2002 | 2 | Considered | Sell | 100 | Market | | | 1 | Signal |
| 59 | 6/28/2002 | 2 | Placed | Sell | 100 | Market | | | 1 | Signal |
| 60 | 7/1/2002 | 2 | Opened | Sell | 100 | Market | | | 1 | Signal |
| 60 | 7/1/2002 | 2 | Executed | Sell | 100 | Market | \$33.4000 | Open | 1 | Signal |
| 64 | 7/8/2002 | 3 | Considered | Sell Short | 100 | Market | | | | Signal |
| 64 | 7/8/2002 | 3 | Placed | Sell Short | 100 | Market | | | | Signal |
| 65 | 7/9/2002 | 3 | Opened | Sell Short | 100 | Market | | | | Signal |
| 65 | 7/9/2002 | 3 | Executed | Sell Short | 100 | Market | \$32.5000 | Open | 2 | Signal |
| 66 | 7/10/2002 | 4 | Considered | Buy to Cover | 100 | Market | | | 2 | Signal |
| 66 | 7/10/2002 | 4 | Placed | Buy to Cover | 100 | Market | | | 2 | Signal |
| 67 | 7/11/2002 | 4 | Opened | Buy to Cover | 100 | Market | | | 2 | Signal |
| 67 | 7/11/2002 | 4 | Executed | Buy to Cover | 100 | Market | \$30.5000 | Open | 2 | Signal |
| 71 | 7/17/2002 | 5 | Considered | Buy | 100 | Market | | | | Signal |
| 71 | 7/17/2002 | 5 | Placed | Buy | 100 | Market | | | | Signal |
| 72 | 7/18/2002 | 5 | Opened | Buy | 100 | Market | | | | Signal |
| 72 | 7/18/2002 | 5 | Executed | Buy | 100 | Market | \$28.9000 | Open | 3 | Signal |

The Orders Report shows details about all the trades that were considered, opened, executed or cancelled.

There are eleven columns in the Orders Report:

Bar. This number indicates on what bar the activity occurred, based on the first date of the date range used when the simulation was run. For example, if this number is 6, the corresponding activity happened on the sixth bar of the tested data.

Date. Tells you the date when the activity occurred.

Number. Tells you when this order happened, consecutively. If this number is 4, this order was the fourth order to happen in the test.

Event. Each order can involve several events. This column tells you what events occurred in each trade. Events include Considered, Opened, Placed and Executed.

Type. Lists the type of order being considered, opened or executed. Types include Buy to Cover, Buy Long, Sell Long, Buy Short, and Sell Short.

Size. Indicates how many shares the order is considering, buying or selling.

Terms. Indicates if the order is Money Market or Margin.

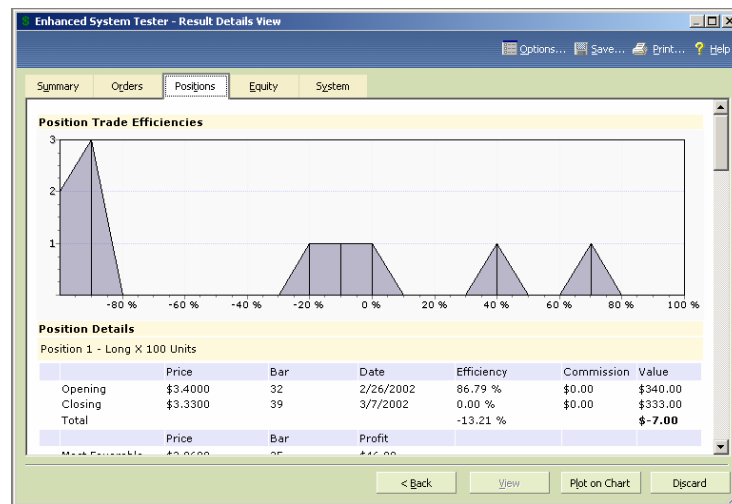
Price. Shows what the security's price was when the corresponding event occurred.

Price Field. Displays which price field the order was executed on.

Position. Displays a number that maps to the Positions Report. This is helpful when you have more than one position open at a time.

Source. What initiated the order. Possible sources are Signals, Stops, Margin Call, Last Bar, and Bias Change.

Positions Report



This report summarizes details about each position that occurred during the test, starting with whether the position was long or short and how many units it traded. The graph at the top of this report represents the distribution of trade efficiency over all of the profitable trades that occurred in this simulation. Basically, if all the peaks appear to the right of zero, the system is well tuned. If all the peaks appear to the left of zero, the system is poorly tuned.

The rest of the information is organized in categories, described below.

Opening

- **Price** - The security's price when the position was opened.
- **Bar** - The position opened on this bar.
- **Date** - The position opened on this date.
- **Efficiency** - This is the percentage of possible profit this position made. For example, say you bought a stock for \$10. If the stock fluctuates between \$20 and \$10 while the position is

open, and you sell at \$15, your efficiency is 50%. If you sell at \$20, your efficiency is 100%.

- **Commission** - How much your broker charged to place the order.
- **Value** - What the securities in the position were worth when they were bought, plus commission.

Closing

- **Price** - The security's price when the position was closed.
- **Bar** - The position closed on this bar.
- **Date** - The position closed on this date.
- **Efficiency** - This is the percentage of possible profit this position made. For example, say you bought a stock for \$10. If the stock fluctuates between \$20 and \$10 while the position is open, and you sell at \$15, your efficiency is 50%. If you sell at \$20, your efficiency is 100%.
- **Commission** - How much your broker charged to place the order.
- **Value** - What the securities in the position were worth when they were sold, plus commission.

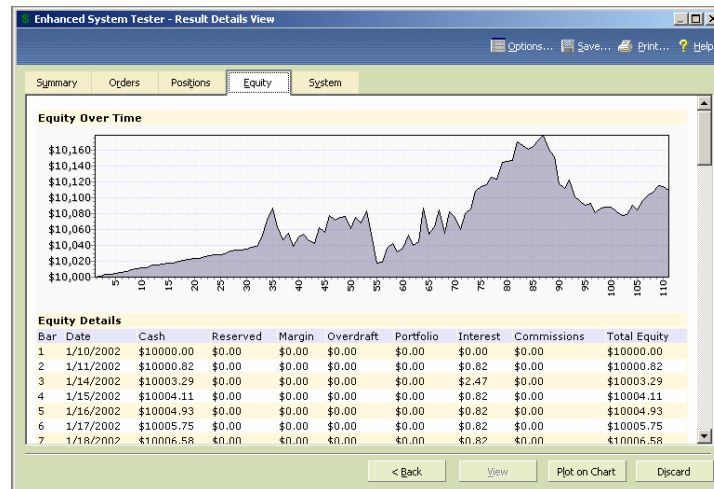
Most Favorable

- **Price** - The best price the security reached during the test (highest for long positions, lowest for short positions).
- **Bar** - The bar in which the most favorable price occurred.
- **Profit** - How much money the position would have earned if it had closed with the most favorable price.

Most Adverse

- **Price** - The worst price the security reached during the test (lowest for long positions, highest for short positions).
- **Bar** - The bar in which the most adverse price occurred.
- **Profit** - How much money the position would have lost if it had closed with the most adverse price.

Equity Report



The Equity Report includes a graph that displays the account's equity during the entire test. The numbers across the bottom of the graph indicate bars. More details about the account appear in the table below the graph. Those details are described here:

Bar. The bar in the test that corresponds to the rest of the information on that row.

Date. The date on which the bar and its equity account information occurred.

Cash. The equity account's balance.

Reserved. Money set aside for orders that aren't executed immediately, like limit, stop, and stop limit orders. The Reserved column also includes funds held in the maintenance margin.

Margin. The total amount of funds borrowed from the broker to execute margined trades.

Overdraft. If the account is overdrawn, the amount below zero appears here.

Portfolio. The value of all the securities in an open position.

Interest. How much interest the test's equity earned during this bar.

Commissions. How much money was paid in commissions for this bar.

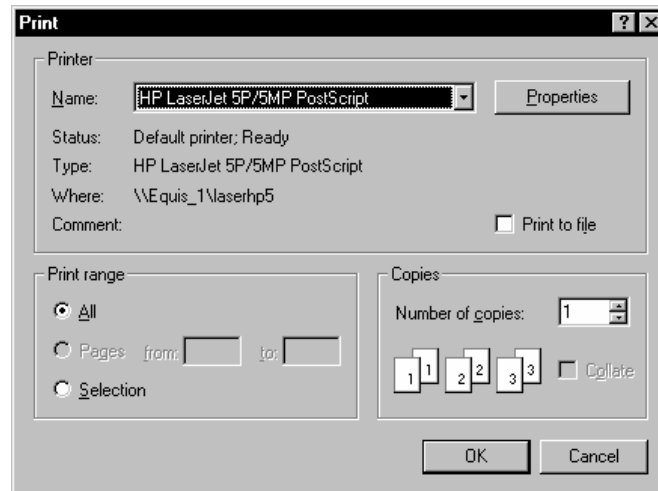
Total Equity. The value of the entire equity account during this bar.

System Report

The System Report summarizes all the details about the system that was tested, including all the options you selected during the New Simulation wizard (described on page 338).

Printing Reports

You can print the reports generated by system tests by choosing the Print button on the report.



Name. Choose the desired printer from the drop-list.

Print Range. Choose All to print the entire report. The Pages radio button is always disabled.

Print to File. Check this box to send the printer output to a specified filename. The file can be directed to the printer at a later time by right-clicking on the filename in the Microsoft Explorer and choosing Print.

Copies. Type the number of copies to print.

Collate Copies. Separate each page of the document when printing multiple copies (if the printer supports this feature).

Copying Reports to the Windows Clipboard

You can copy the contents of a system test report to the Windows Clipboard for use in other Windows applications.

To copy a report to the clipboard

1. Display a report.
2. Right click anywhere within the report and choose "Select All" from the list.
3. Right click again and select copy

Optimization

Optimizing a system involves performing multiple tests while varying one or more parameters within the trading rules or stops.

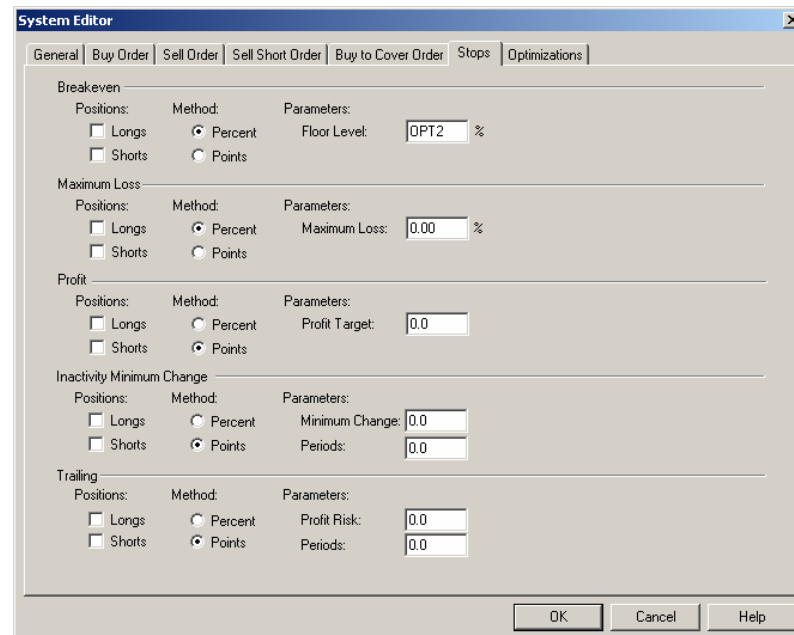
The Enhanced System Tester Tutorial (see page 320) gives an example of optimizing the number of time periods used to calculate a moving average in a simple trading system. In that example, tests are run using 10- to 50-period moving averages, by 5-period increments. We recommend that you go through this tutorial to more clearly understand the principle of optimization.

Each trading system can have up to 10 optimization variables (referred to as OPT1 through OPT10). (The OPT variables are not valid in custom indicators.) To optimize a system, you replace numeric constants within the trading rules or stops with OPT variables.

The following is an example of an OPT variable specified within a trading rule. In this rule, "opt1" replaces the time period parameter in the moving average function.

```
C > MOV(C, opt1, E)
```

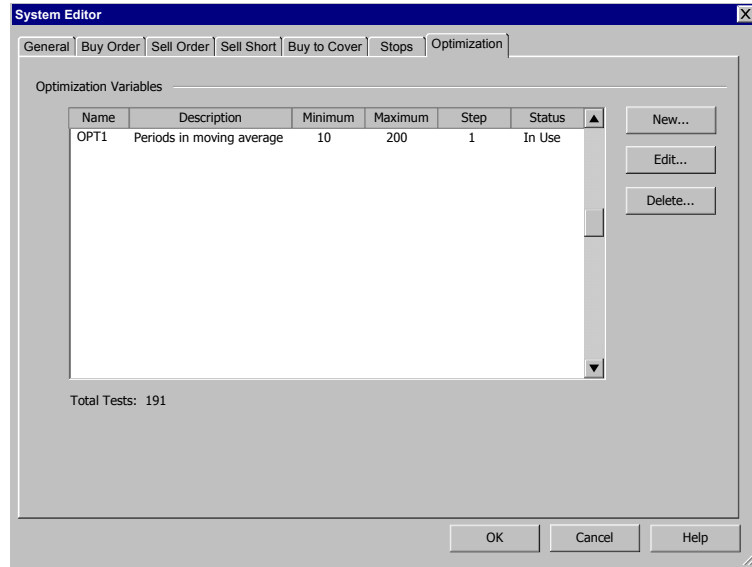
OPT variables specified for a stop are placed directly in the Parameters section of the Stops dialog.



You then specify the OPT variable's range (minimum, maximum, and step). When you test a system that contains OPT variables, MetaStock Pro will automatically perform multiple tests using each of the possible optimization combinations.

Specifying the Optimization Variables

To specify the ranges for the optimization variables in your trading rules or stops, click the Optimization tab in the System Editor dialog.



New. This lets you add a new OPT variable and edit its properties.

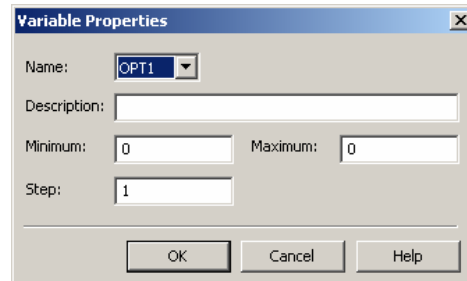
Edit. Displays the Variable Properties where you can edit the minimum, maximum, and step of the selected OPT variable.

Delete. Deletes the selected OPT variable. Note that you cannot delete an OPT variable that is in use.

Total Tests. Displays the total number of tests that the optimized system test will perform.

Variable Properties Dialog

The Variable Properties dialog is used to specify the range of the OPT variables.



Name. This shows the OPT variable you are editing.

Description. You can enter an optional description of the variable in this box.

Minimum. Type the minimum value for the OPT variable.

Maximum. Type the maximum value for the OPT variable.

Step. Type the step size by which to increment the OPT variable. For example, if the minimum/maximum range was 10 to 50 and the step size was 10, the OPT variable would be replaced with the values of 10, 20, 30, 40, and 50.

Example Optimizations

The following Buy Order trading rule buys when the close is above a 10-period moving average:

Buy Order: `CLOSE > mov(CLOSE, 10, SIMPLE)`

If you don't know the optimum number of time periods to use for the moving average, you could replace the "10" in the above rule with an optimization variable as shown below:

Buy Order: `CLOSE > mov(CLOSE, OPT1, SIMPLE)`

The range for OPT1 (e.g., 5 to 20 by steps of 5) is specified by selecting the Optimizations tab from the System Editor dialog. When you test this system, MetaStock Pro will perform multiple tests, each time replacing the OPT1 variable with the next optimization value (as shown below).

Buy Order: `CLOSE > mov(CLOSE, 5, SIMPLE){Test #1}`

Buy Order: `CLOSE > mov(CLOSE, 10, SIMPLE){Test #2}`

Buy Order: `CLOSE > mov(CLOSE, 15, SIMPLE){Test #3}`

Buy Order: `CLOSE > mov(CLOSE, 20, SIMPLE){Test #4}`

After testing this system, there will be four reports (one for each optimization value).

When optimization variables are used, the number of tests required to test every combination of optimization values can be determined by multiplying the number of tests for each OPT variable together.

The following example demonstrates the use of multiple optimization variables:

Buy Order: `rsi(14) > OPT1`

Sell Order: `rsi(14) < OPT2`

Sell Short Order: `rsi(14) < OPT2`

Buy to Cover Order: `rsi(14) > OPT1`

OPT1: minimum = 20, maximum = 40, step = 10 {3 tests}

OPT2: minimum = 70, maximum = 80, step = 10 {2 tests}

In the above example, OPT1 has three possible values (i.e., 20, 30, and 40) whereas OPT2 has two possible values (i.e., 70 and 80). This combination requires that six (three multiplied by two) tests be performed as shown below:

| Test # | OPT1 | OPT2 |
|--------|------|------|
| 1 | 20 | 70 |
| 2 | 30 | 70 |
| 3 | 40 | 70 |
| 4 | 20 | 80 |
| 5 | 30 | 80 |
| 6 | 40 | 80 |

The number of tests can quickly grow enormous. For example, consider the following moving average crossover system:

Buy Order: `cross(C, mov(C, OPT2, E))`

Sell Order: `cross(mov(C, OPT1, E), C)`

Sell Short Order: `cross(mov(C, OPT1, E), C)`

Buy to Cover Order: `cross(C, mov(C, OPT2, E))`

OPT1: minimum = 1, maximum = 100, step = 1 {100 tests}

OPT2: minimum = 1, maximum = 100, step = 1 {100 tests}

In the above example, OPT1 and OPT2 each have 100 possible values. This combination requires 10,000 (100 multiplied by 100) tests to be performed! Even on a fast computer, this relatively simple (yet heavily optimized) system may take hours to test.

A more appropriate method to optimize this system would be to decrease the ranges and/or increase the steps to reduce the number of tests.

System Development Tips

Developing *profitable* trading systems is difficult. Even after many years of experience with systems development, we still find ourselves getting sidetracked on the wrong system. Here are some of the tips we've learned.

Is Testing/Optimizing Valid?

One of the most common mistakes made in system testing and optimization is over-fitting the trading rules to a specific set of data. Before you get too excited when you think you've found the "holy grail" of trading systems, check the following.

- Check the equity line (see page 361). It should gradually slope upward. Abrupt spikes indicate inconsistent profits.

- Test the system on different time frames. The results should be similar to those on the original data tested.
- Test the system on different securities, across different industries.
- Optimize again using only half of the original data tested. Then test the remaining data using the optimum values. If the system is valid, the results of the two tests should be similar.
- Test the system on different types of markets (e.g., upward trending, downward trending, and sideways). A good system should work in all types of markets, since you won't always know when a market changes from trending to trading or vice versa.
- Remember that human expectations control the prices of securities. Therefore, it may not be realistic to expect a mechanical system to consistently predict changes in their expectations. We suggest you use trading systems in conjunction with other investment analysis techniques.

Commissions

Pay close attention to the number of trades generated by a system test. If there are a large number of trades and large profits, be sure you specified realistic commissions. The results of the test may be much different once commissions are factored in.

Winning Trades Versus Losing Trades

It is easy to be too concerned with the number of winning versus losing trades. Although this can be important, you should also pay attention to the Average Profit compared to the Average Loss (from the Summary Report, described on page 346). Some good systems generate more losing trades than winning. This can happen if the average winning trade is much higher than the average losing trade.

Interest

If your system specifies that interest is earned when you are out of a trade (see page 339), optimization may lead you to the system that is out of the market the most. This means that a system test that lost on every trade could turn out to be the best system, if it was out of the market more than the other tests.

This is easily witnessed by setting the Money Market interest rate very high (e.g., 100%) in the System Testing Options dialog and then optimizing.

The Zig Zag and Lastvalue()Trap

The Zig Zag indicator (see page 539) uses 20/20 hindsight to filter out fluctuations. It shows only price movements that are equal to or greater than the amount specified. However, the Zig Zag indicator determines

this "after the fact" (an advantage a trader doesn't have). With that said, be careful about using the Zig Zag indicator in a system test. It will produce results that are not attainable in real trading.

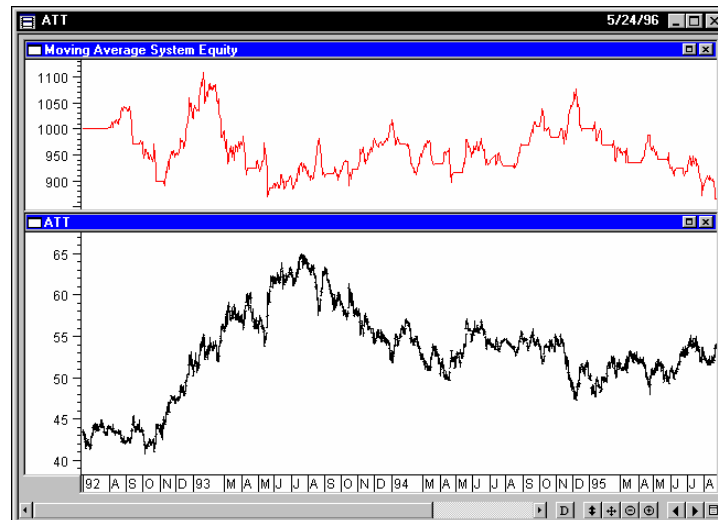
The Lastvalue() function (see page 266) can see into the future in that it returns the last value of a data array. For example, a system test could be written that bases a trade on a future price or indicator value—something unattainable in real-life. Although it has value for things like pattern recognition, it should rarely (if ever) be used in a system test, as it will provide the system test with unattainable information.

Using The Equity Line

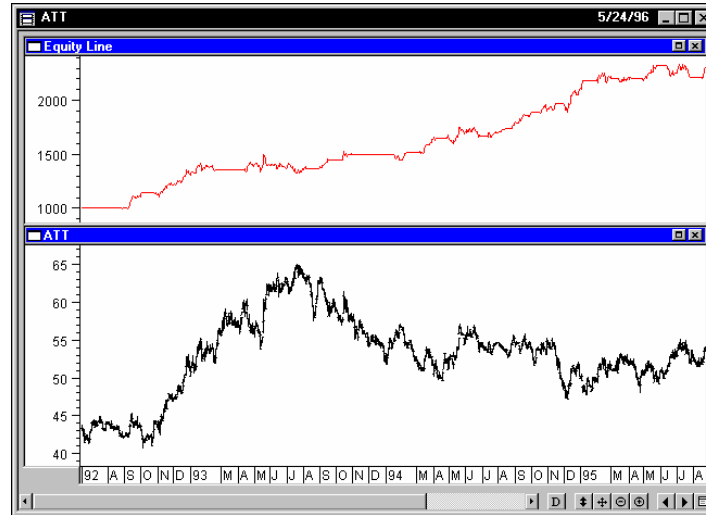
The equity line is a valuable tool. A quick glance at the equity line can show a lot about the performance of a trading system.

The ideal equity line should slope upward. Large spikes may indicate that the system is inconsistent and risky. A system that generates huge profits on one trade (e.g., it was short during the crash of 1987) is uncertain at best.

The following is an example of the effects on an equity line by a system test which generated very erratic (volatile) profits. A system that generates these results should be avoided.



The following is an example of an equity line that has a consistent upward slope. This is the type of results a good system generates.



Use the Cut/Copy/Paste Commands

To speed the writing of system tests, you may find the Cut/Copy/Paste helpful (see page 8). More often than not, trading rules within a system are very similar except for the operators. Consider the following trading rules for a simple moving average crossover.

Buy Order: `c > mov(c, 39, s)`

Sell Order: `c < mov(c, 39, s)`

Note that the only difference between the two rules is the operator (i.e., > and <).

Instead of typing both rules, you could type the Buy Order rule, block it (SHIFT+RIGHT ARROW), copy it (CTRL+C), and then paste it (CTRL+V) in the Sell Order text box. Of course, the real usefulness of cut and paste comes when you are entering much longer rules than the ones illustrated above.

Technical Reference

This section explains technical details relating to the system testing process.

General

During the testing process, a system is always in a long, short, or an out position.

The current position is determined by the system's trading rules (see page 334), the optimization values (see page 324), and stop settings (see page 334).

During the testing process, MetaStock Pro keeps track of numerous (typically tens of thousands) of pieces of information dealing with the transactions.

Commissions

When reviewing system test results, remember that commissions are deducted from your equity account when you enter a position, and from your profit when you exit a position (assuming it's profitable).

For example, if you buy 100 shares of a stock valued at \$10 per share, and your entry commission is \$20, \$1020 is deducted from your equity account. If you sell those shares when the stock reaches \$20 per share, and your exit commission is \$30, your profit is \$970 (\$1000 minus \$30).

Margin Requirement

The Margin Requirement field in the System Testing Options dialog (see page 341) specifies the percent of funds that you must deposit in order to place a trade. This allows you to leverage your transactions.

For example, if you trade a security with a 20% margin requirement (i.e., where you are required to deposit only 20% of the actual cost of the security), then a 10% move in the security's price will create a 50% gain. Consider the following example.

If the initial equity was \$1,000 when a long position was entered, and the security's price increased 10% before the long position was exited, the profit would normally be \$100 (i.e., 10% of \$1,000). However, if you place this trade using a 20% margin requirement, then you are able to buy \$5,000 worth of the security (your \$1,000 is the 20% margin requirement, plus \$4,000, or 80%, of borrowed funds). Thus, the 10% increase in the security's price would create a \$500 dollar gain (i.e., 10% of \$5,000). This \$500 gain represents a 50% gain on your \$1,000 investment.

Earning Interest

When neither a long nor a short position is open (i.e., an "out" position exists), interest is earned on the equity balance at the interest rate specified in the System Testing Options dialog (see page 341).

When a long or short position is opened following an out position, the interest earned during the out position is posted to the equity balance.

Other Accounting Issues

If the equity ever drops to, or below, zero (dropping below zero is only possible when commissions are specified using points rather than

percentages), no interest can be earned and no trades can be entered for the remainder of the test. (Note, this does not apply to "points only" system tests.)

When a Strategic Delay is specified (see page 331), all other signals and stops are ignored until the delay period has passed.

Testing Futures and Commodities

System testing on futures and commodities is done by performing a "points only" system test. A points only system test simply means to ignore any currency values and only track the number of "points" gained/lost.

To perform a points only system test, check the Points Only box in the System Testing Options dialog (see page 341) before running the test. The initial equity, margin requirement and annual interest rate are ignored when a points only test is performed.

When performing a points only test, the Enhanced System Tester will allow the equity line to drop below the zero line.

Stop parameters can still be expressed in points or percent when performing a points only system test. Percent value calculations will be based on the entry price for a trade rather than the equity level when the trade was entered.

In a points only test, commissions are calculated only under the following conditions:

- The "Points" option in the System Testing Options dialog must be selected.
- The commission value must be less than or equal to 1. The commission value should be entered in the equivalent number of points. For example, if your commission rate is \$30.00 and a one-tick move on the future you are testing is 0.03125 (or \$31.25 per contract), you would enter 0.03 (\$30.00 point equivalent) for the commission rate.

Speed

System testing involves a huge amount of processing, so obviously a faster processor in your computer will result in quicker results.

A large amount of testing time is spent writing reports to disk. Thus you can decrease the time it takes to perform tests by using a faster hard disk.

Disk Space

System tests can generate a very large amount of data, all of which gets stored on your computer's hard disk. To minimize the amount of space taken up by system test results, you should discard tests you don't need, and run the Cleanup Wizard (see page 330) periodically.

Input() Function, Variables, and Multi-plot Indicators

The Enhanced System Tester will accept assigned variables in the trading rules. For example, the following is a valid Sell Order rule:

```
myvar:=10;  
c>mov(c,myvar,s);
```

A system test cannot use the input() function directly (see page 265). This function is reserved for custom indicators only. However, if a rule uses the fml() function (see page 261) to call the results of a custom indicator, and the custom indicator uses the input() function, the fml() function will only use the assigned default input value—the Enhanced System Tester will not prompt for input.

If a system test contains or references (using the fml() function) a multi-plot indicator, only the last plot is used in the calculation of the system test.

Trading Rule Syntax

Trading rules are entered using the MetaStock formula language (see page 235). This syntax is very similar to the syntax used to enter formulas in spreadsheets. Each trading rule may contain up to 1024 characters.

A trading rule always returns a "true" or "false" signal. When the trading rule condition is true, the corresponding trade (e.g., buy, sell, etc.) is taken. When the condition is false, no action is taken.

The following example illustrates a trading rule:

```
Buy Order: cross(CLOSE, mov(CLOSE,12,Simple))
```

If this were entered as the Buy Order rule, the system would enter a long position when the close crossed above a 12-period moving average of the close.

Similarly, the following trading rule would be triggered if the MACD is greater than zero. (The "macd()" in this rule is a function, see page 269).

```
Buy Order: macd() > 0
```

All custom indicator functions (e.g., macd()) can be used in trading rules. A specific custom indicator can be referenced using the fml() formula (see page 261) as shown below:

```
Sell: fml("My Formula") > 0
```

You can combine multiple functions within a trading rule using the AND and OR operators as shown below. See page 241 for more information on using AND and OR operators.

Buy Order: `macd() > 0 AND CLOSE > mov(CLOSE,12,S)`

The above rule requires that the MACD be above zero *and* that the close be above its 12-period moving average.

The following rule uses the OR operator to generate a trade when the MACD falls below zero, *or* when the close falls below its moving average.

Sell Order: `macd() < 0 OR CLOSE < mov(CLOSE,12,S)`

Multiple ANDs and ORs can exist within a trading rule. The best way to control the precedence (i.e., the order of operation) of multiple ANDs and ORs within a trading rule is by using parentheses as shown in the following trading rule:

Buy Order: `(macd() > 0 AND C > 100) OR H-L>5`

The preceding trading rule will generate a trade when either of the following conditions are met:

- The MACD is above zero *and* the close is above 100 (i.e., both of these conditions are met).
- The high minus the low is greater than five.

You can click the Functions button (see page 305) when editing the trading rules (you must be editing the trading rules, not the name or notes). The Paste Functions dialog with a list of the available functions will then be displayed. Double-clicking on a function name will insert the function into the trading rule at the current cursor location.

Trading rules may be left blank. However, blank rules never generate trades.

Trading rules may only access the security's price data (e.g., high, low, close, etc.) and custom indicator functions (see page 252). Trading rules may not reference the trading system itself (e.g., the number of days since the last trade). However, several of the stops (page 334) perform this functionality.

A special variable called the "P" variable can be used to reference any selected price or indicator plot. See page 247 for more information on the "P" variable.

Variables can be used within the rules of a system test (see page 244). Multiple plot formulas (i.e., those that would result in multiple plots if plotted as a custom indicator) are allowable, but only the last one will be recognized by the Enhanced System Tester.

Using the Alert() Function

The alert() function is used in conjunction with other functions to extend a true signal for a specified number of periods. The signal is held true over the specified number of periods even if another trade is generated.

The following example illustrates the use of the alert() function:

Buy Order: `RSI(14) < 30 AND alert(VOLUME > 500,3)`

If this were entered as the Buy Order rule, the system would enter a long position when the RSI was less than 30 and the volume had been greater than 500 at any time *over the previous three time periods*. The "VOLUME > 500" condition holds true over the entire three time periods even if the volume drops below 500 during that three period time span.

If you removed the alert() function in the above example, both conditions (i.e., $RSI(14) < 30$ and $VOLUME > 500$) would have to be true *simultaneously* in order for the Buy Order signal to be generated. By using the alert() function, a true condition generated by the "VOLUME > 500" condition is extended over a three period time span.

Ranking and Screening Securities

What is The Explorer?

The Explorer is a powerful, multi-purpose analysis tool that can perform in-depth "explorations" on multiple securities across multiple folders. The Explorer can perform a number of unique tasks, including comparing, filtering, listing multiple indicator values for multiple securities, ranking, searching, showing securities with current "buy/sell" signals, sorting, etc.

You can use The Explorer to do such things as:

- Discover which securities have just generated a "buy" (or "sell") signal.
- Discover the securities that have just crossed above their 200-day moving average on increased volume.
- Discover which securities rank highest by Wilder's RSI.
- Discover which securities are above their 10-week moving average, with a Stochastic of 80 or higher, and are at a level of four on a customized binary wave.
- Generate a performance report of all your mutual funds.
- Generate a list of every security along with the values of your favorite six indicators for each security.
- Copy only those securities which meet your personal criteria from the MetaStock Data CD to your hard drive for updating.
- ...and more.

This is just a small sampling of what The Explorer can do for you.

Due to the inherent complexity in the design and creation of custom indicators, trading systems, explorations, and experts, Equis cannot provide free support for this process. However, support is available for a reasonable fee. Call Equis at 801-265-9998 for details or fill-out the FORMULA HELP.DOC file found in the MetaStock folder. This file is viewable with Wordpad.

The rules and criteria that define this process are called an "exploration." Up to six columns and a "filter" can be specified in an exploration. The criteria that define the columns and filter are written in MetaStock's

formula language (see page 235). A list of securities can be screened for those candidates that meet your criteria by applying a filter. A report showing the results of an exploration can be viewed on screen or printed.

The Explorer is designed to be simple and straightforward, yet extremely powerful. By combining the MetaStock formula language (see page 235) and System Tester syntax, designing an exploration is just a matter of using the skills you may already possess. You will find the MetaStock formula language section (see page 235), the Indicator Builder Tutorial (see page 300), and the Enhanced System Tester Tutorial (see page 320) helpful in getting you up to speed.

Please note that the performance of The Explorer is significantly slower when exploring intraday data while collecting real-time data. Therefore, you may want to wait until after market hours to run explorations on intraday data.

Before you attempt to write your own explorations, we encourage you to take a few minutes to go through the following short tutorial. Doing this will provide you with a solid foundation on which to build your skills.

The Explorer Tutorial

This tutorial provides a brief introduction to the process of creating an exploration and viewing the resulting reports. It is important that you follow this tutorial before you create your own explorations. You should also be familiar with the Indicator Builder (see page 299) and Enhanced System Tester (see page 327) syntax.

Quick Start (The Basics)

In its simplest form, creating an exploration involves the following steps:

1. Choose **The Explorer** from the Tools menu.
2. From The Explorer dialog choose **New**.
3. Fill out the Exploration Editor dialog by typing a Name and up to six column formulas and a filter (if desired) using the MetaStock formula language (see page 235). Note that the column criteria and the filter criteria are independent--one can exist without the other.
4. Choose **OK** at the bottom of the dialog and choose **Explore** from The Explorer dialog.
5. Select the folder and securities to explore from the Select Securities dialog, then click **OK** to start the exploration.

That's it! Although there are other features that increase the power of The Explorer, creating an exploration involves just the five steps.

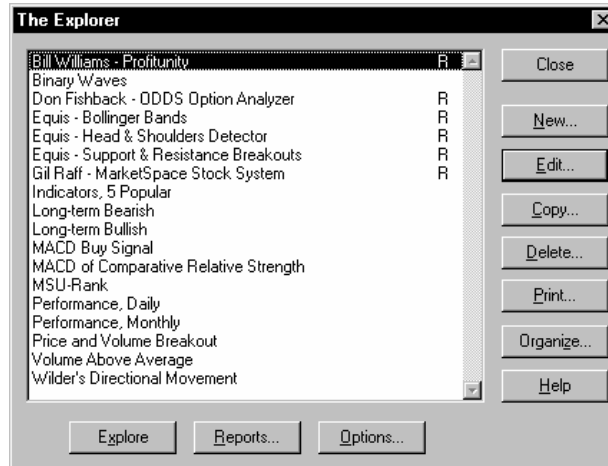
The next several sections of the tutorial provide more details on the five basic steps shown above. Please follow each step carefully, since each step is dependent on the previous one.



The Explorer button

The Explorer Dialog

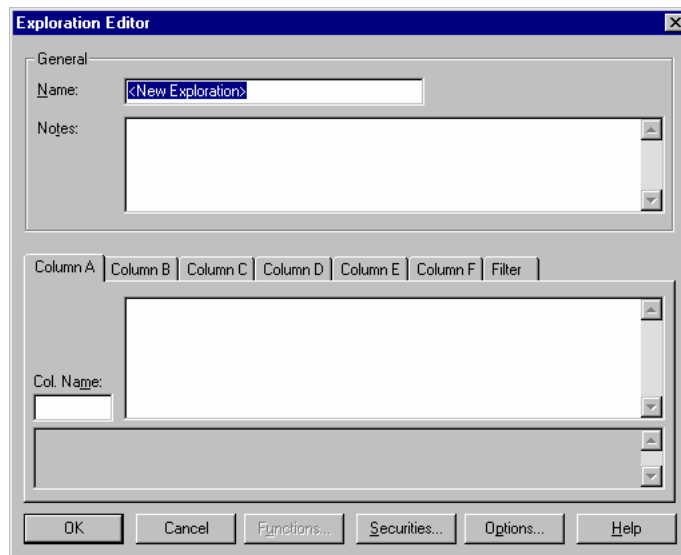
Choose The Explorer from the Tools menu or click The Explorer button on the standard toolbar to access The Explorer dialog.



You use The Explorer dialog to create, manage, and print explorations. The explorations listed in your dialog will be different than the ones shown above.

Creating a New Exploration

1. With The Explorer dialog displayed, choose **New**. The Exploration Editor dialog appears.



The Exploration Editor dialog is the heart of an exploration. You use this dialog to specify the name, column, and filter information.

2. Enter the exploration name as "My First Exploration" (do not enter the quotation marks in this, or the remaining, examples).
3. Click the **Column A** tab and type the following in the box:

CLOSE

4. Type the following into the **Column Name** box:

CLOSE

Note that you can enter anything you want for the name. For this tutorial, however, enter the name as shown above.

5. Click the **Column B** tab and type the following in the box below all the column headings:

mov(CLOSE, 20, SIMPLE)

6. Type the following into the **Col. Name** box:

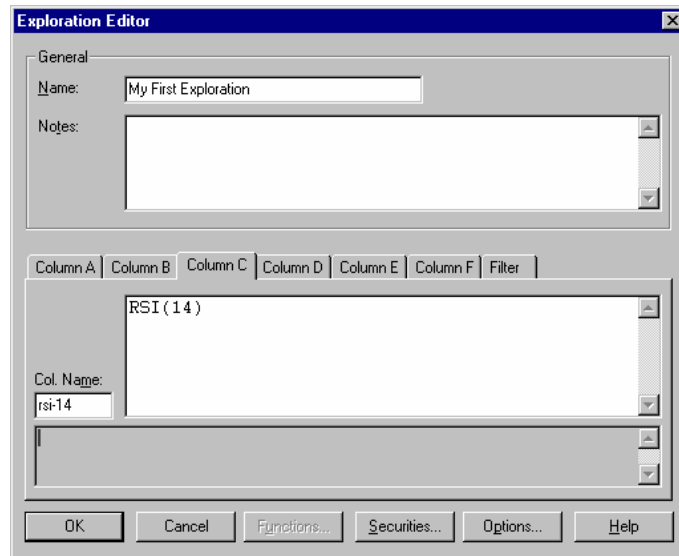
MOV-20

7. Click the **Column C** tab and type the following in the box:

rsi(14)

8. Enter the following into the **Col. Name** box:

RSI-14

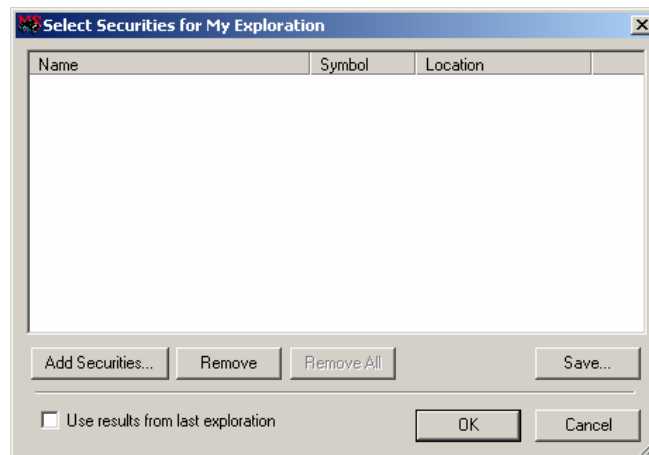


Note that the column formulas use the identical syntax as MetaStock Pro's custom indicators. You can even reference existing formulas by using the "FML" function (e.g., fml("MYMACD")). This saves you from having

to retype formulas that you have already defined in the Indicator Builder dialog.

If you want to paste in a custom indicator formula, choose the Functions button. See page 305 for information on using the Paste Functions dialog.

9. Choose **OK** to return to The Explorer dialog.
10. Choose **Explore** to begin the exploration.
11. The Select Securities dialog appears, where you choose the securities to explore.



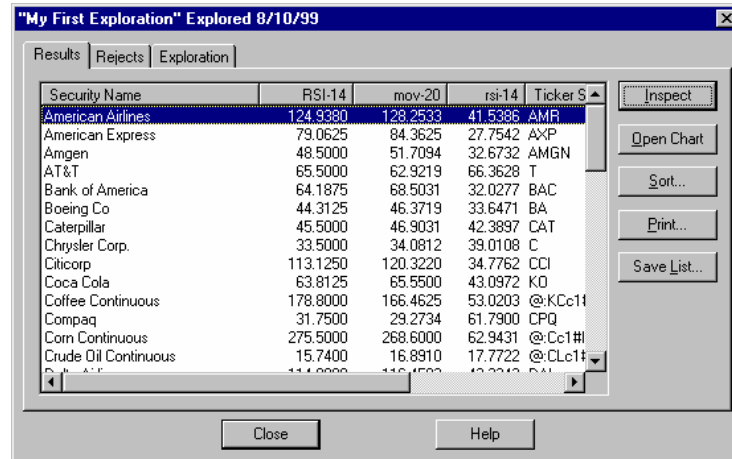
12. Click the **Add Securities...** button. The Add Securities dialog appears.
13. This dialog looks a lot like the Open dialog, and works just like it. (The Open dialog is described on page 67.) You can select one or more local or online securities.
14. Double-click the “Stocks – Common” folder.
15. For this tutorial, select all the stocks that begin with the letter A. (Select the stock at the top of the list, then hold the Shift key and select the last stock on the list that begins with “A”.)
16. Click **Open**.

For this tutorial, just choose **OK**. Every security in the selected folder will be included in the exploration. However, you could have selected specific securities and additional folders.

As the exploration is being calculated, the Exploration Status window is displayed.

17. When MetaStock Pro has completed calculating the exploration, choose **Reports** from the Exploration Completed dialog.

A report showing the results will appear.



| Security Name | RSI-14 | mov-20 | rsi-14 | Ticker S |
|----------------------|----------|----------|---------|----------|
| American Airlines | 124.9380 | 128.2533 | 41.5388 | AMR |
| American Express | 79.0625 | 84.3625 | 27.7542 | AXP |
| Amgen | 48.5000 | 51.7094 | 32.6732 | AMGN |
| AT&T | 65.5000 | 62.9219 | 66.3628 | T |
| Bank of America | 64.1875 | 68.5031 | 32.0277 | BAC |
| Boeing Co | 44.3125 | 46.3719 | 33.6471 | BA |
| Caterpillar | 45.5000 | 46.9031 | 42.3897 | CAT |
| Chrysler Corp. | 33.5000 | 34.0812 | 39.0108 | C |
| Citicorp | 113.1250 | 120.3220 | 34.7762 | CCI |
| Coca Cola | 63.8125 | 65.5500 | 43.0972 | KO |
| Coffee Continuous | 178.8000 | 166.4625 | 53.0203 | @:KCo1# |
| Compaq | 31.7500 | 29.2734 | 61.7900 | CPQ |
| Corn Continuous | 275.5000 | 268.6000 | 62.9431 | @:Co1# |
| Crude Oil Continuous | 15.7400 | 16.8910 | 17.7722 | @:CLo1# |

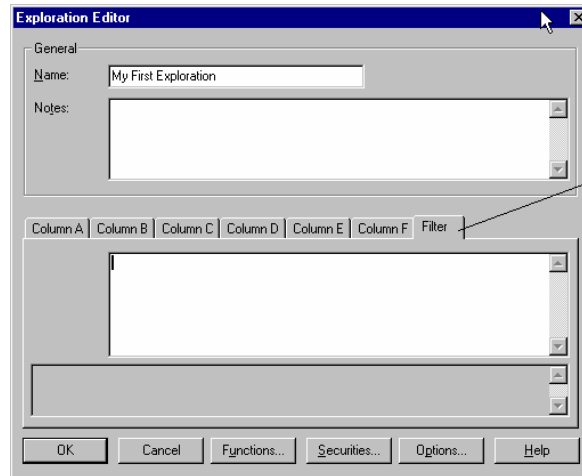
The Exploration Report shows the name of each security and the calculated results of each of the columns. The values shown in the columns represent the closing price (i.e. `close`), a 20-day moving average (i.e., `mov(close,20,simple)`), and a 14-day RSI (i.e., `rsi(14)`) for the most recent day of data. The sort order can be changed using the Sort command (see page 390).

Adding a Filter

A filter narrows your list to securities that meet specific criteria. You can write a filter based on the existing column formulas, or you can write one that is completely independent of the column formulas. In fact, you could write an exploration with the columns left empty with just a filter.

In this tutorial, we will write a filter that lists securities that are below a 20-day moving average and have a 14-day RSI below 40. Since we have already written these two indicators in columns A and B, we can save time by referencing them directly within the filter.

1. Choose **Close** to exit the report.
2. With "My First Exploration" selected, choose **Edit**.
3. Choose the **Filter** tab.



Enter the following into the Filter box:
`(colA < colB) and (colC < 40)`

Note that the filter could also be written as follows:
`(CLOSE < mov(CLOSE , 20 , SIMPLE)) and (rsi(14) < 40)`

If your filter is based on the column formulas directly (as shown above), you can save yourself some typing by simply referencing the columns using the "COL" variable (e.g., colA and colB). This is particularly handy if the column formulas are long.

The filter formulas use the identical syntax as MetaStock Pro's Enhanced System Tester. You can even reference existing custom indicators by using the "FML" function (e.g., fml("MYMACD")). This saves you from having to retype formulas that you have already defined in the Indicator Builder dialog.

4. Choose **Options** in the Exploration Editor dialog. Check the **Use Filter** box in the Exploration Options dialog to enable the filter. For the filter to take effect, this box must be checked. Choose **OK**.
5. Choose **OK** to exit the Exploration Editor dialog.
6. To perform the exploration with the newly added filter, choose **Explore**.
7. When MetaStock Pro has finished calculating the exploration, choose **Reports** from the Exploration Completed dialog. A report showing the results will appear.

| Security Name | Close | MOV-20 | RSI-14 | Ticker Sy... |
|--------------------------|-----------|-----------|---------|--------------|
| Compaq | 32.7500 | 38.8766 | 29.6009 | CPQ |
| Daimler Chrysler ADR | 88.3125 | 93.3500 | 32.5702 | DCX_w |
| Deutsche Mark Continuous | 0.5569 | 0.5657 | 33.7866 | @DMc1# |
| Japanese Yen Continuous | 8278.0000 | 8396.4502 | 39.8488 | @JYc1# |
| Soybeans Continuous | 0.6826 | 0.6942 | 35.5713 | @Sfc1# |
| US Steel | 23.5000 | 25.4906 | 37.5694 | X |
| US T-Bonds Continuous | 121.5940 | 122.3641 | 38.5965 | @USc1# |

Note that only those securities that are below their 20-day moving average and have a 14-day RSI less than 40 will appear in the Results report.

If you wanted to narrow the list down even further, you could go back to the Exploration Editor dialog and make the filter more restrictive:

8. Choose **Close** to exit the report.
9. With "My First Exploration" selected, choose **Edit**.
10. Make the filter more restrictive by editing the filter box to appear as follows:

```
(colA < colB) and (colC < 30)
```

11. Choose **OK** to return to The Explorer dialog.
12. To perform the exploration with the more restrictive filter, choose **Explore**.
13. When MetaStock Pro has finished calculating the exploration, choose **Reports** from the Exploration Completed dialog. A report showing the results will appear.

Note that the number of securities appearing in the report is probably less than the last report, since we made the RSI portion of the filter more restrictive.

14. To display a report showing the historical column values for a security, select a security in the Results report and choose **Inspect**.

Tutorial Summary

- The Explorer provides tremendous power and flexibility by giving you a multi-purpose analysis tool that lets you perform in-depth explorations of your securities.
- An exploration is comprised of columns and/or a filter. Although they are entered in the same dialog and can be combined in a single

exploration, the columns and filter are separate and distinct functions.

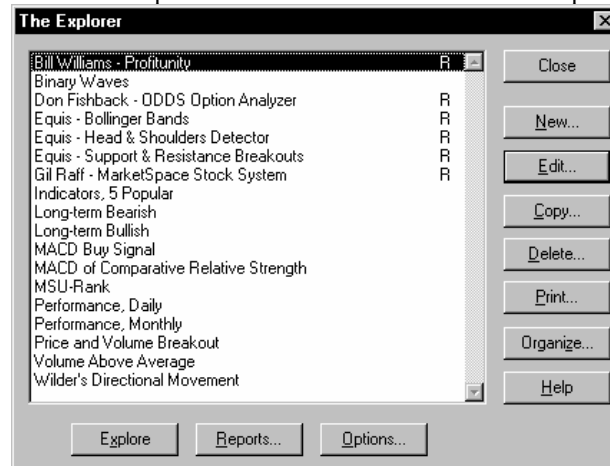
- Column formulas and filter rules are written with the MetaStock formula language (see page 235). They can reference existing custom indicators using the "FML" function (e.g., fml("My MACD")).
- A filter can reference the column formulas directly using the "COL" variable (e.g., colA).
- The results of an exploration are shown in the Results report (see page 388). Each security along with the designated column values are displayed in the specified sort order.
- Historical column values for individual securities can be displayed by choosing the Inspect button in the Results report.

The Explorer Dialog



The Explorer button

The Explorer dialog is displayed by choosing The Explorer from the Tools menu or clicking The Explorer button on the standard toolbar. The Explorer dialog lists the names of all your explorations. You can create up to 1,000 explorations. The selected exploration can be edited, copied, deleted, printed, and tested. Explorations that have an "R" next to the name have reports available from the most recent exploration.



New. Use this to display the Exploration Editor dialog in which you can specify the name, columns, and filter for a new exploration. See page 379 for more information on creating new explorations.

Edit. Use this to display the Exploration Editor dialog in which you can edit the selected exploration.

Copy. Use this to make a copy of the selected exploration. See page 384 for more information on copying explorations.

You can select multiple explorations by holding down the CTRL key as you click the mouse.

Delete. Use this to delete the selected explorations. See page 384 for more information on deleting explorations.

Print. Use this to print the selected explorations. See page 384 for more information on printing explorations.

Organize. Use this to display the Formula Organizer Wizard from which you can import and export explorations, system tests, custom indicators, and experts. This is normally used if you have purchased add-on products from Equis or a third party. See page 249 for more information on the Formula Organizer Wizard.

Explore. Use this to start the exploration process for the selected exploration(s). See page 385 for more information on exploring.

Reports. This button displays the reports for the selected exploration. This button is grayed out unless an exploration with an "R" next to it (signifying "reports available") is selected. See page 388 for more information on reports.

Options. This button displays the Explorer Options dialog from which you can control data and reporting options.

Explorer Options

The Explorer Options dialog is used to specify options that affect all explorations. To display the Explorer Option dialog, click the Options button in The Explorer dialog.

This dialog controls options that affect all explorations. To control options that affect single explorations, see page 380.



Load ___ Records. Enter the number of periods to use when calculating the exploration results. Entering a value equal to the number of periods loaded in the chart provides increased precision between cumulative type indicators (see below) calculated on your charts and those calculated in your explorations. You should also choose this if your exploration uses any of the Candlestick functions (see page 288) or the `barssince()` function (see page 254).

Some indicators are referred to as "cumulative" type indicators. The results of a cumulative type indicator depend on the amount of data loaded. For example, the results of a 10-day exponential moving average calculated with 40 days of data loaded will be slightly different than one

calculated with 500 days of data loaded. This is because an exponential moving average retains a small portion of all previous data.

Load Minimum Records. Choose this to optimize the calculation of the exploration for speed. Certain "cumulative" type indicators may not exactly match the results displayed on your charts (see above).

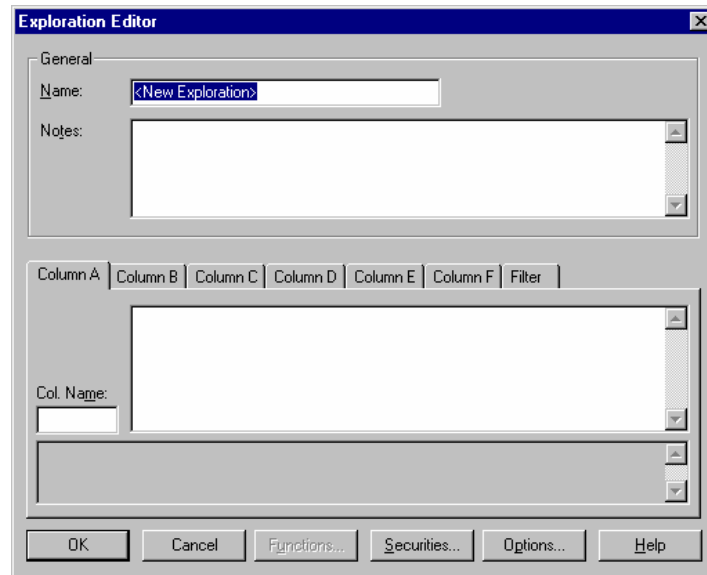
Notify When Exploration is Done. Check this box if you want the Exploration Completed dialog to appear when an exploration is done.

Creating an Exploration

An exploration performs two separate and distinct tasks. It displays your securities with up to six columns of indicator values. It can also filter your securities. You can create up to 1,000 explorations.

To run The Explorer, choose The Explorer from the Tools menu or click The Explorer button on the standard toolbar.

To create a new exploration, choose New from The Explorer dialog. The Exploration Editor dialog appears. This dialog is used to enter the criteria for the exploration. Up to six column formulas and one filter can be included in an exploration.



Name. Enter the name of the exploration in the Name box.

Notes. Enter any descriptive notes in the Notes box.

Columns. Columns A-F specify the values to display in the Results report (see page 388). A separate page is provided for each column. As you click a column's tab, a new page appears where a formula can be typed. Each of the columns represents a unique calculated value. The

column formulas are written in MetaStock's formula language (see page 235). Each column formula can be up to 2,500 characters long.

Functions. This is used to display the Paste Functions dialog. This dialog is used to select from a list of over 190 functions. The selected function can be inserted directly into your exploration. See page 305 for more detailed information on this dialog.

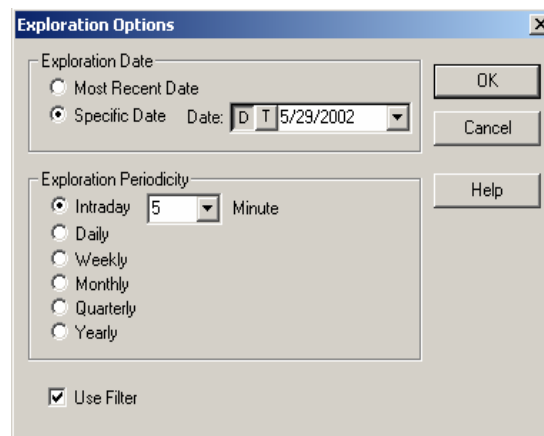
Securities. This button gives you access to the Select Securities dialog from which you can choose the securities to include in your exploration. See page 382 for more detailed information on this dialog.

Options. You use this to display the Exploration Options dialog in which you can set options for the selected exploration.

Exploration Options

The Exploration Options dialog is used to specify options that affect only the selected exploration. To display the Exploration Options dialog, click the Options button in the Exploration Editor dialog.

This dialog controls options for a specific exploration. To control options that affect all explorations, see page 378.



Most Recent Date. Click this button if you want to use the most recent date in each security file for the exploration calculations.

Specific Date. Click this button to enter the date on which you want the exploration calculated. The most recent date for each security equal to or prior to the date you enter will be used in the exploration.

Periodicity. Select the desired periodicity for the securities in the exploration. Security data will be compressed (if necessary) to match your selection. For example, daily security files can be compressed to weekly or monthly. Note that if you select "daily" periodicity, weekly, monthly, and yearly security files will be rejected since files cannot be compressed to a shorter periodicity.

Use Filter. Check this box to enable the filter. See page 381 for information on specifying a filter for your exploration.

Column Formula Syntax

Column formulas are written using MetaStock's formula language (see page 235). All custom indicator functions can be used in The Explorer's columns. This includes the "FML" function, which allows you to reference an existing custom indicator with a simple function call. For example, if you wanted to use one of your custom indicators, "Combination Wave" (a complex binary wave) in an exploration column, you could use the FML function instead of retyping it (e.g., `fml("Combination Wave")`).

The following shows an example of a column formula that will display the values of the difference between a 10- and 50-day moving average in the Exploration report:

```
mov(CLOSE,10,SIMPLE) - mov(CLOSE,50,SIMPLE)
```

The following shows an example of a column formula that displays a basic 14-day RSI in the Exploration report:

```
rsi(14)
```

The following shows an example of a column formula that will display the difference between formula "ROC1" and formula "ROC2" in the Exploration report:

```
fml("ROC1") - fml("ROC2")
```

Filter Syntax

A filter is written in the identical syntax as the rules in MetaStock Pro's Enhanced System Tester. An additional variable that is unique to the filter criteria is "COL". The COL variable references the exploration columns directly. This keeps you from having to retype the entire column formula and makes the filter more readable. For example, suppose you've defined column A as follows:

```
mov( rsi( 20 ), 9, SIMPLE)
```

Now you want to display only those securities whose moving average is less than 40. A filter could be written as follows:

```
mov( rsi( 20 ), 9, SIMPLE) < 40
```

However, to save yourself some typing and make the filter more readable, you could use the COL variable as follows:

```
colA < 40
```

Both filters accomplish the same thing, but the second filter requires less typing. This is particularly true when your filter involves long and complex formulas.

Stand-alone Filters

Although a filter can be based on the exploration columns directly, a filter can also be completely independent of the columns. In fact, the exploration columns can be left completely empty. Perhaps you simply want to list the securities that meet your filter criteria without any column values displayed in the report.

For example, your entire exploration could be a filter written as follows:

```
cci(9) < -90 and mfi(6) < 50
```

In a report, note that the columns are empty when only a filter is specified. Only the security names are displayed.

Input() Function, Variables, and Multi-plot Indicators

The Explorer will accept assigned variables (see page 244) in the column formula and filter rules. For example, the following is a valid column rule:

```
myvar:=200;  
mov(c,myvar,s);
```

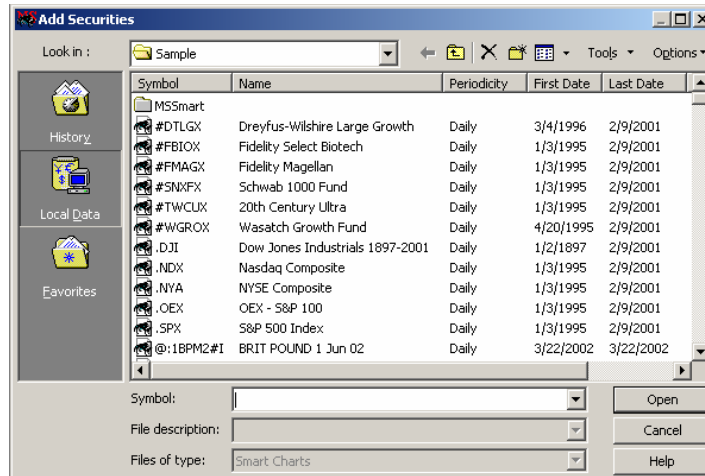
An exploration cannot use the input() function directly (see page 306). This function is reserved for custom indicators only. However, if a rule uses the fml() function (see page 261) to call the results of a custom indicator, and the custom indicator uses the input() function, the fml() function will only use the assigned default input value—the Explorer will not prompt for input.

If an exploration contains or references (using the fml() function) a multi-plot indicator, only the last plot is used in the calculation of the exploration.

Selecting Securities to Explore

MetaStock Pro can explore virtually unlimited **local** securities across multiple folders, **as well as online securities**, using the Add Securities dialog. This dialog is accessed by choosing Securities from the Exploration Editor dialog, or by clicking Add Securities in the Select Securities dialog. If no securities have been specified for an exploration, The Explorer displays the Select Securities dialog automatically, prompting you to make your selections.

The Add Securities dialog is **almost identical to the Open dialog**.



History. Choose the History shortcut from the Shortcut Bar to select from the list of securities you have most recently accessed. You can adjust the size of the history by choosing Limit History Items from the Tools menu.

Local Data. Choose the Local Data shortcut from the Shortcut Bar to open an existing Smart Chart located on a local disk drive. The local data folder from which you last viewed a security is displayed.

Favorites. Choose the Favorites shortcut from the Shortcut Bar to choose from your list of pre-defined favorite securities, and charts. To add an item to Favorites, choose Add to Favorites from the Tools menu.

<Online Data Vendor>. If you are using an online data vendor, you may select from a list of securities available from your vendor by choosing this shortcut from the Shortcut Bar.

Look in. Use the drop-list to select the folder that contains the desired Smart Chart, or chart. Traverse the folders until the desired folder is listed.

Security name / Symbol / File Name. The chart you select from the underlying list appears in this box. This is the chart that will be opened. You can select multiple charts to open by holding down the SHIFT or CTRL key as you make your selections. See page 68 for information on filtering securities in the Open dialog.

Maintaining Lists of Securities with Favorites

The Favorites feature lets you load and save predefined lists of securities to perform explorations on. To add a list of securities to your Favorites, click the **Save...** button in the Select Securities dialog. To load a list of securities from your Favorites, click the **Favorites** button in the Add Securities dialog.

Perhaps you want to divide your securities into specific categories. To do this, you could create a list that includes only computer stocks, another that contains only commodities, another that contains only automobile stocks. Instead of having to select these individually each time for different explorations, you can group them into easily accessible folders. You can also save the list of securities generated by an Exploration as a list (see page 388).

NOTE: Explorations and system tests can be run on a list that has been created in The DownLoader, but the lists that are saved to the favorites folder after running a system test or exploration can't be used in The DownLoader.

The list "Results of Last Exploration" is automatically generated by MetaStock Pro. This includes only the securities from the last exploration that were not rejected. This list can be used, but it cannot be deleted or modified.

Copying and Deleting Explorations

You can make a copy of a selected exploration from The Explorer dialog using the Copy button. This is useful when you need to design a new exploration that is very similar to an existing one.

For example, if Exploration A was similar to a new exploration you want to create, you could use the Copy command in the Explorer dialog to make a duplicate rather than rewriting it. You could then make the minor modifications necessary and name it Exploration B.

You can select multiple explorations by holding down the CTRL or SHIFT key as you click the mouse.

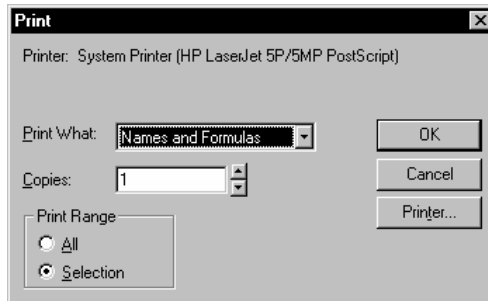
You can delete the selected explorations from The Explorer dialog using the Delete button. The Delete button displays the Delete Exploration dialog.



Choose whether you want to delete the explorations or the explorations' reports. If you delete the explorations, the reports are also deleted.

Printing Explorations

You can print the names and/or formulas of your explorations with the Print dialog. To access the Print dialog, choose Print from The Explorer dialog.



Print What. Choose Names Only if you want to print only the names of the explorations. Choose Names and Formulas if you want to print the names and formulas.

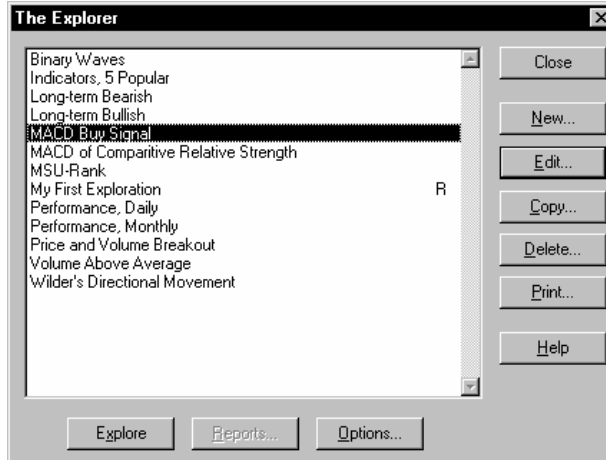
Copies. Enter the number of copies to print.

All. Choose this button if you want to print all explorations.

Selection. Choose this button if you want to print only the selected explorations.

Running the Exploration

To run an exploration, highlight the exploration name and choose the Explore button from The Explorer dialog.

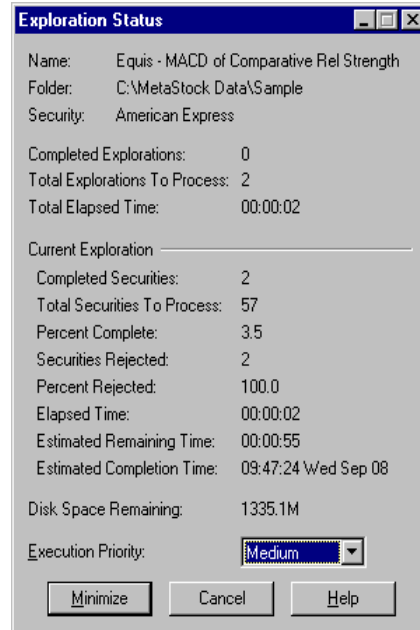


The time required to complete an exploration depends on the complexity of the exploration and if you've chosen to use the minimum or maximum amount of data for the calculations (see page 378). Your computer hardware (i.e., processor, hard disk, etc.) also has a big impact on speed.

Exploration Status Dialog

During the execution of an exploration, the Exploration Status dialog appears. This dialog keeps you informed on the progress of the

exploration. You can also use it to run the exploration in the background, allowing you to perform other tasks while the exploration is executing.



Most of the information in this window is self-explanatory. Several of the items are explained below.

Estimated Completion Time. This is based on the average time to explore each security. The estimated completion time is adjusted after each security.

Execution Priority. This drop-list allows you to control the amount of processor time devoted to the computation of the exploration. You will normally leave this set to "Medium." Set this to "Low" if the program seems "jerky" or unresponsive while an exploration is running in the background (i.e., the exploration is minimized).

Minimize. Use this button to minimize the Exploration Status dialog. When an exploration is minimized, you are free to use any other feature in the program. You can even perform a system test, which can also be minimized (see page 319).

When minimized, double-click the exploration icon to redisplay the Exploration Status dialog.

Cancel. You can cancel the exploration process by pressing the Cancel button. There may be a slight delay after you choose Cancel. A window appears asking you to confirm the Cancel. Reports for the securities that were completed before pressing Cancel will be available for your inspection.

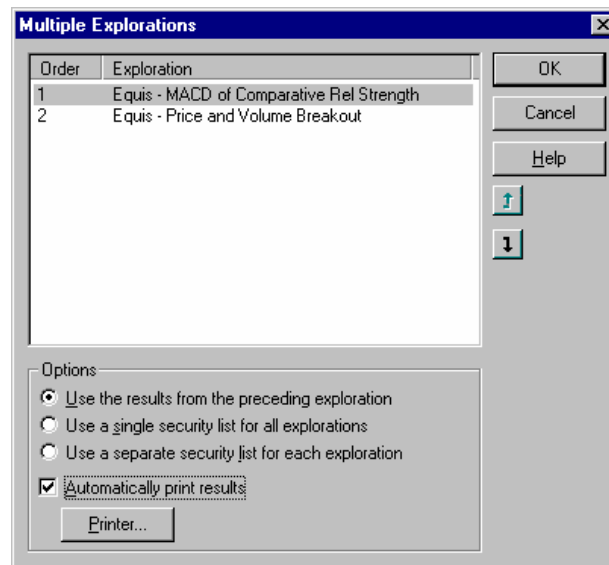
To run an exploration in the background

1. Start an exploration.
2. When the Exploration Status dialog appears, click the **Execution Priority** drop-list to choose the desired execution priority. If you are planning on using other calculation intensive features in this or other programs while the exploration runs in the background, choose **Medium** or **Low**.
3. Click the **Minimize** button.

Running Multiple Explorations

There may be times when you wish to run more than one exploration on the same list of securities, run an exploration on the results of another exploration, or run several explorations on separate lists of securities without having to start each exploration separately. Each of these scenarios is possible using the Multiple Explorations dialog.

To run more than one exploration, hold down the CTRL or SHIFT key while selecting the explorations, then choose the Explore button from The Explorer dialog. The Multiple Explorations dialog will appear allowing you to specify how each exploration is run.



The explorations are listed in numerical order. Use the arrows to the right of the list to change the order of the explorations.

Use the results from the preceding exploration. Choose this option to run each subsequent exploration on the results of the previous exploration. The first exploration uses the list of securities selected in the Select Securities dialog (see page 382).

Use a single security list for all Explorations. Choose this option to run all explorations on the same list of securities.

Use a separate security list for each Exploration. This option allows you to choose a separate list of securities for each exploration.

Automatically print results. Check this box to send the exploration results directly to your printer as each exploration is completed.

Print. Click this button to select a printer.

Speed of Calculation

The speed of the exploration can be increased by:

- Decreasing the number of periods used in the formulas.
- Selecting "Load Minimum Records" in the Explorer Options dialog (see page 378).
- Reducing the number of references to formulas (i.e., the FML() function).
- Adding a faster CPU.
- Adding a faster disk drive.
- Using local data instead of data stored in the online cache folder (see page 38).

Viewing the Reports

Exploration reports can be accessed two ways. You can choose the Reports button from the Exploration Completed dialog. This dialog appears immediately after an exploration has completed (the "Notify When Exploration is Done" box must be checked in Explorer Options, see page 378). You can also view a report by selecting an exploration in The Explorer dialog and choosing Reports. An "R" must be displayed next to the selected exploration.

There are three reports available for an exploration; each is available by choosing the corresponding tab from the Reports dialog.

The Results report displays every security (that was not rejected) in the exploration and its accompanying column values. The folder from which each security came is displayed in the last column.

The Rejects report shows every security that was rejected and the reason (see page 392).

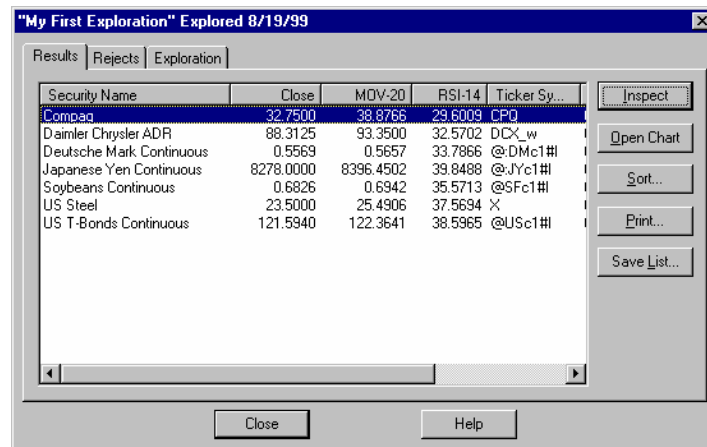
The Exploration Security Column Data report shows the historical column values for the selected security (see page 391).

Results Report

The Results report displays the results of the exploration. Every security that passed the filter (if enabled), along with all of the defined columns

will appear. The name assigned to the exploration along with the calculation date is displayed at the top of the report.

The width of a column in the Results report can be adjusted by dragging the vertical separator between the column headings with the mouse until the column is the desired width.



Inspect. This displays the Exploration Security Column Data report for the selected security. This report displays historical values required to calculate each column for the highlighted security. See page 391 for more information on this report.

Open Chart. Click this button to display a chart of the selected security.

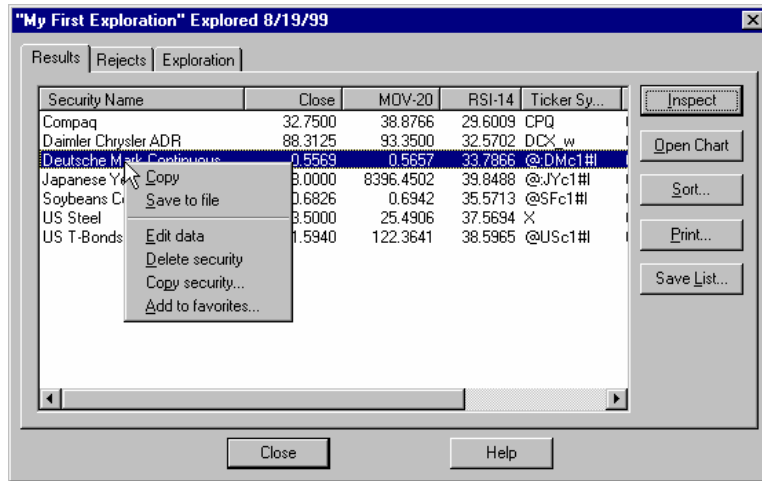
Sort. Use this to sort the report on any of the columns. Note that you can also click directly on the column headings to sort. Click repeatedly to change between ascending and descending order. See page 390 for more information on sorting.

Print. Choose this to print the contents of the Results report. See page 355 for information on printing reports.

Save List. Choose this option to save the results as a list that you can use in The Explorer and The DownLoader.

Using the Shortcut Menu

You can also add to favorites, copy, delete, or edit the securities in the results report. First, select the desired securities, then right click on one of the highlighted securities. A menu appears for you to choose from.



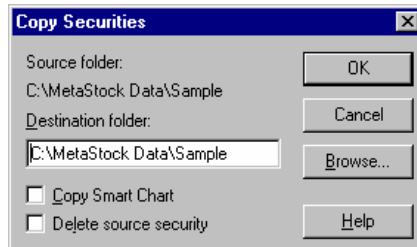
Copy. Choose this to copy the entire report onto the Windows clipboard so it can be pasted into another Windows document.

Save to file. Choose this to save the list as a text file.

Edit data. Choose this to open the selected security(s) in a datasheet in The DownLoader where the data may be edited.

Delete security. Choose this to delete the selected security(s).

Copy security. Choose this to copy the selected security(s) to another folder on a local drive. The Copy Securities dialog will appear. Enter the new folder in the Destination folder box, or click the Browse button to find the folder you want to copy to. If you want the Smart Chart for that security to be copied also, check the Copy Smart Chart box. If you want to delete the security from the current folder, check the Delete source security box.

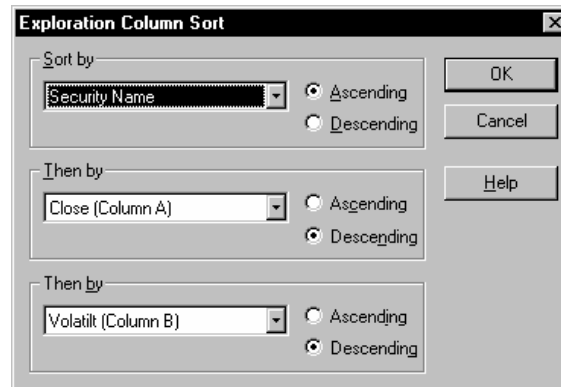


Add to favorites. Choose this to add the selected security(s) to your favorites. See page 71 for more information about favorites.

Sorting the Results Report

You can sort the Results report on any of the columns (including the Security name column) in either ascending or descending order. Simply click the column heading on which you want to sort. Click repeatedly to toggle between ascending and descending order. When you sort on the security name column, the report is sorted alphabetically.

To control the primary, secondary, and tertiary sort columns, use the Exploration Column Sort dialog. This dialog is accessed by clicking the Sort button in the Results report.



Sort by. Choose the primary column on which the report is sorted from the drop-list.

Then by. Choose the column on which duplicates from the previous "sort" should be sorted. For example, if the security named "IBM" appeared five times in the report, these five occurrences of IBM would then be sorted by the column you choose here.

The sort order of the report is affected the most by the sort column specified in the "Sort by" box. The sort columns specified in the "Then by" boxes only take effect when there are duplicates.

Ascending. Choose this to change the sort order of the column to ascending (i.e., the values increase as you go down the report).

Descending. Choose this to change the sort order of the column to descending (i.e., the values decrease as you go down the report).

Exploration Security Column Data Report

This report is accessed by selecting a security in the Results report and choosing Inspect. This report lets you view the column values for every time period used in the calculation of the exploration.

The amount of data displayed in this report is determined by the Data Loading option setting in the Explorer Options dialog (see page 378).

The width of a column in this report can be adjusted by dragging the vertical separator between the column headings with the mouse until the column is the desired width.

| Date | Column A - Close | Column B - MOV-20 | Column C - RSI-14 |
|---------|------------------|-------------------|-------------------|
| 5/10/96 | 52.8750 | N/A | 39.5308 |
| 5/13/96 | 54.5000 | N/A | 48.3296 |
| 5/14/96 | 54.5000 | N/A | 48.3296 |
| 5/15/96 | 54.3750 | N/A | 47.7103 |
| 5/16/96 | 53.7500 | 55.7687 | 44.6306 |
| 5/17/96 | 54.1250 | 55.7188 | 46.8475 |
| 5/20/96 | 53.6250 | 55.6312 | 44.3006 |
| 5/21/96 | 53.2500 | 55.4250 | 42.4372 |
| 5/22/96 | 52.6250 | 55.1125 | 39.4581 |
| 5/23/96 | 51.7500 | 54.7562 | 35.6816 |
| 5/24/96 | 51.2500 | 54.4375 | 33.6970 |

Print. Choose this to print the contents of the report. See page 355 for information on printing reports.

Rejects Report

This report displays the securities that were not included in the Results report. Each security that was rejected from the report will be listed, with a brief description of why it was rejected.

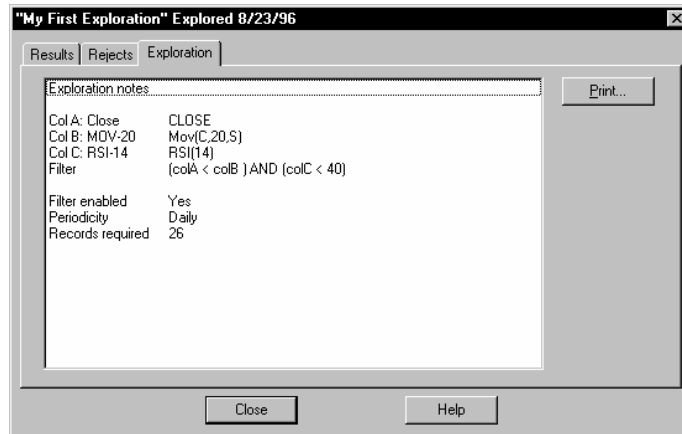
If your exploration contains a filter, this report will list all securities that were filtered out. Securities that were rejected due to an error are also listed. For example, if your exploration calculates a 200-period moving average and your IBM data file only contains 100 days of data, IBM would appear in the Reject report.

Print. Choose this to print the contents of the Rejects report. See page 355 for information on printing reports.

Save List. Choose this option to save the results as a list that you can use in The Explorer and The DownLoader.

Exploration Page

The Exploration page displays the column formulas, the filter rule, periodicity and other information used for the exploration. Having this information available with the reports lets you view this information without having to close the reports.



Copying Reports to the Windows Clipboard

You can copy the contents of an exploration report to the Windows Clipboard for use in other Windows applications.

To copy a report to the clipboard

1. Display a report.
2. Right-click anywhere within the report's page.
3. Choose **Copy** to copy the contents of the report to the clipboard. You can then paste the contents into another Windows application.

Sample Explorations

This section shows the column and filter formulas for six example explorations. Several pre-defined explorations are also included with MetaStock Pro.

Long-term Bearish

This exploration shows securities that are below their 200-day moving average.

Column A: `close`
 Column B: `mov(close,200,exponential)`
 Column C: `((close-mov(close,200,exponential)) / Abs(Mov(close,200,exponential))) * 100`
 Filter: `colA < colB`

This exploration requires only a filter to produce the desired list of securities. However, the exploration also includes columns for the closing price, the 200-day moving average value, and the percent the close is below its 200-day moving average.

Long-term Bullish

This exploration shows securities that are above their 200-day moving average.

```
Column A: close
Column B: mov(close,200,exponential)
Column C: ((close-mov(close,200,exponential)) /
Abs(Mov(close,200,exponential))) * 100
Filter: colA > colB
```

This exploration requires only a filter to produce the desired list of securities. However, the exploration includes columns for the closing price, the 200-day moving average value, and the percent the close is above its 200-day moving average.

Note that the only difference between this exploration and the Long-term Bearish exploration is the "greater than" sign (i.e., ">") in the filter.

MACD Buy Signal

This exploration shows securities that have produced a classic MACD "buy" signal (i.e., when the MACD rises above its signal line).

```
Column A: close
Column B: macd()
Column C: mov(macd(),9,exponential)
Filter: cross(macd(),mov(macd(),9,exponential))
```

This exploration only requires a filter to produce the desired list of securities. However, the exploration also includes columns for the closing price, the MACD value, and the 9-day signal line value.

Indicators, 5 popular

This exploration shows the column formulas that will show each security's close along with five popular indicators.

```
Column A: close
Column B: macd()
Column C: Stoch(5,3)
Column D: cci(14)
Column E: obv()
Column F: rsi(14)
```

This exploration does not require a filter. This exploration could be easily modified to include your favorite indicators.

Performance, Daily

This exploration shows the short-term performance of each security.

```
Column A: close
Column B: roc(close,1, percent)
Column C: roc(close,5, percent)
```

Column D: `roc(close,10, percent)`
Column E: `roc(close,30, percent)`
Column F: `roc(close,60, percent)`

This exploration does not require a filter since we want to see every security's performance ranking. The Exploration Report has been written to include columns for five performance criteria including a one-day, five-day, 10-day, 30-day, and 60-day percentage rate-of-change.

You may want to use the Sort button in the Results report to sort on one of the performance columns. For example, you could sort the report so that securities with the highest 60-day performance appear at the top of the column.

Price and Volume Breakout

The following exploration produces a report listing all securities that have risen more than 5% in the last day on at least 50% greater than average volume.

Column A: `close`
Column B: `ref(close,-1)`
Column C: `roc(close,1,percent)`
Column D: `volume`
Column E: `mov(volume,50,exponential)`
Column F: `((volume - mov(volume,50,exponential)) / mov(volume, 50, exponential)) * 100`
Filter: `(colC >= 5) and (colD >= (colE*1.5))`

This exploration requires only a filter to produce the desired list of securities. However, the exploration also includes columns for the closing price, the previous day's closing price, the percent rate-of-change, volume, average volume, and the percent the volume is above its average.

Exploration Tips

- Due to the way the Performance indicator is calculated, you may notice that the column values displayed on the Results report for the Performance indicator are not consistent. We recommend that you avoid using the Per() function in explorations.
- The Explorer will not include composite securities in an exploration. If an exploration folder contains composite securities, they will be ignored.
- Exploring data stored in the online cache folder is very slow. If you plan to run explorations regularly, you should consider using local data instead.
- Remember to use the COL variable within your filter to directly reference the columns. Using the COL variable is especially beneficial when the column formulas are long.

- For your explorations to be valid, it is important that your data be accurate and date-aligned. Date-aligned means that the dates for each of the securities included in the exploration match. If data is missing for a security (even a single day), the values shown in the reports may not be accurate.
- You may want to include a broad-based market index in your exploration to see how it compares to your other securities. Including an index is especially helpful when you are using The Explorer to rank your securities by performance. Several pre-defined performance explorations are included with MetaStock Pro.
- You can reference an indicator in a chart by selecting the indicator (i.e., clicking on it so handles appear) and then substituting the "P" variable in place of a formula's data array. For example, the formula "mov(p,10,s)" would calculate a 10-period moving average of the selected indicator.
- You should avoid using the "ref()" function to reference column formulas (e.g., ref(colA, -1)). The Explorer only calculates values for the "calculation date." The ref() function returns the value for this date only.
- You should avoid using the "cross()" function to reference column formulas (e.g., cross(colB, colC)). The cross() function requires data for two days in order to determine if the "cross" actually occurred. The Explorer only calculates the column values for the specified "calculation date."
- When doing an exploration with the Exploration Periodicity set to "weekly," you may receive a "period value out of range" error message due to there not being enough data. For example, there may be enough data to calculate a 200-day moving average, but not enough for a 200-week moving average.

Getting Expert Advice on Your Securities

What is the Expert Advisor?

The Expert Advisor is a collection of powerful tools that keep you informed of the current technical state of a chart. When attached to a chart, an Expert can inform you on the state of these conditions by various methods:

- descriptive text (called Commentaries)
- colored bars (called Highlights)
- a symbol in the bottom corner of the chart (called the Expert Corner)
- a special inner window (called a Ribbon)
- symbols on the chart (called Symbols)
- pop-up messages, sound or video (with Alerts)
- e-mail and pager messages (with Alerts)

Most people will simply use experts that are pre-packaged with MetaStock Pro, or purchased from Equis or a third party. For example, if you want to see Bill William's expert commentary on any chart you display, simply right-click on the chart, choose Expert Advisor, Attach, then choose Bill William's pre-packaged expert.

Due to the inherent complexity in the design and creation of custom indicators, trading systems, explorations, and experts, Equis cannot provide free support for this process. However, support is available for a reasonable fee. Call Equis at 801-265-9998 for details or fill-out the FORMULA HELP.DOC file found in the MetaStock folder. This file is viewable with Wordpad.

For information on the Equis Solution Provider program and the MetaStock Developer's Kit, go to www.equis.com.

If you are willing to invest a little time, you can create your own experts. For example, you could create your own customized commentary. You could create alerts that will sound and display a message when certain conditions are met. Perhaps you would like to have your price bars

colored red when the RSI is above 50 and black when they're below 50. The possibilities are endless.

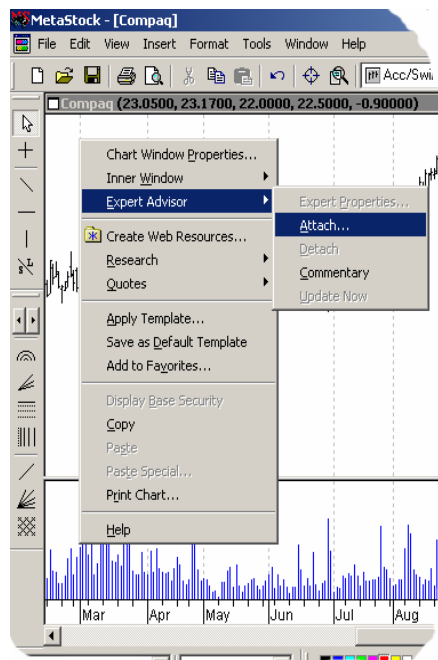
If you want to create your own experts, you must be familiar with the MetaStock formula language. Please see page 235 for more information on the MetaStock formula language.

Equis International is not a Registered Investment Advisory service. The experts included with MetaStock Pro are for educational purposes and are to be used at your own risk. Equis International (or its partners) is not liable for the investment decisions you make based on information obtained from the Expert Advisor.

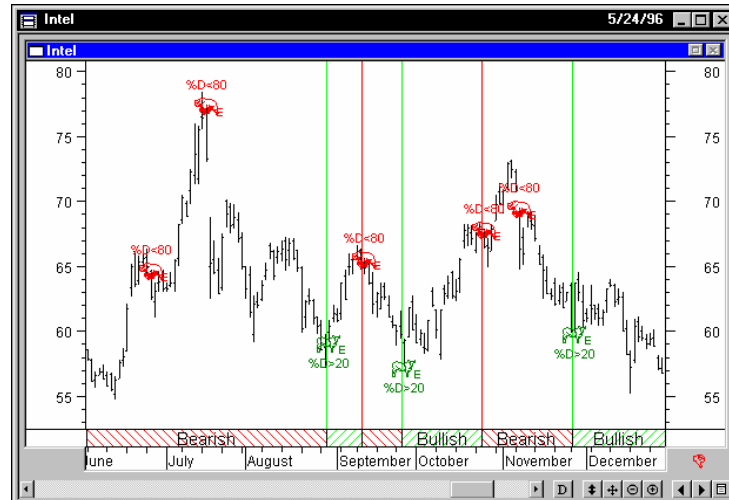
Using Pre-packaged Experts

Most people will never create their own experts. That's fine! We designed the Expert Advisor as a tool to provide information on the technical status of a security. Not only is MetaStock Pro shipped with many pre-packaged experts that you should find useful, other pre-packaged offerings will be available directly from Equis and third parties. Therefore, if you just want to use the experts that are pre-packaged with MetaStock Pro (or purchased separately), this section is all you really need to read.

1. Display a chart to which you would like to attach an expert.
2. Right-click anywhere within the chart's inner window. The chart's shortcut menu appears.



3. Choose **Expert Advisor** and then **Attach**.
4. For this example, choose **Equis – Stochastic Oscillator** from the Attach Expert dialog. Click the **OK** button.
5. The appearance of your chart will now change to reflect the newly attached expert. The illustration below shows some of the components that you may see.



6. To quickly display the commentary for the attached Expert, right-click on the chart, choose **Expert Advisor** and then **Commentary**. That's it. This simple procedure is all that is required to reap the power of the Expert Advisor.

Equis International is not a Registered Investment Advisory service. The experts included with MetaStock Pro are for educational purposes and are to be used at your own risk. Equis International (or its partners) is not liable for the investment decisions you make based on information obtained from the Expert Advisor.

Expert Advisor Dialog



Expert Advisor button

The Expert Advisor dialog is displayed by choosing Expert Advisor from the Tools menu or clicking the Expert Advisor button on the standard toolbar. The Expert Advisor dialog lists the names of all your experts (both those you have created and those pre-packaged with the software). The Expert Advisor dialog can hold up to 1,000 experts. The selected expert can be edited, copied, deleted, printed, and attached. You can also create new experts from this dialog. A small triangle appears next to the expert that is currently attached to the selected chart.

New. Use this to display the Expert Editor dialog in which you can specify the components of a new expert.

You can select multiple experts by holding down the CTRL key as you click the mouse.

Edit. Use this to display the Expert Editor dialog in which you can edit the selected expert.

Copy. Use this to make a copy of the selected expert. See page 436 for more information on copying experts.

Delete. Use this to delete the selected expert. See page 436 for more information on deleting experts.

Print. Use this to print the selected expert. See page 436 for more information on printing experts.

Organize. Use this to display the Formula Organizer Wizard from which you can import and export explorations, system tests, custom indicators, and experts. This is normally used if you have purchased add-on products from Equis or a third party. See page 249 for more information on the Formula Organizer Wizard.

Attach/Detach. Use this to attach the selected expert to the current chart. This button changes to Detach if the selected expert is already attached to your chart. A small triangle appears next to the attached expert. The Attach button is disabled if no chart is displayed. See page 435 for more information on attaching experts.

Commentary. Use this to view the corresponding commentary (if available) for the selected expert. The Commentary button is disabled if no chart is displayed. See page 406 for more information on commentaries.

Creating an Expert

Perhaps the most important thing to remember when creating an expert is that it can be as simple or complex as you like. For example, you can create a very simple expert that simply sounds an alert whenever the close crosses above its moving average. Another expert could be written to display a ribbon at the bottom of the chart showing the bullish and bearish zones as defined by an RSI. Or you could write an expert that generates a commentary explaining the current state of the security as defined by five of your favorite indicators. The possibilities are many.



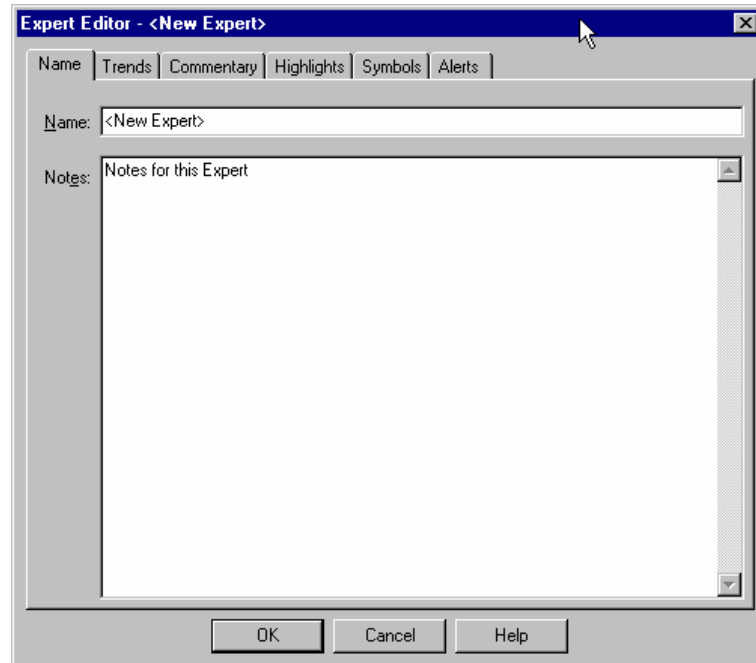
Expert Advisor button

To run the Expert Advisor, choose Expert Advisor from the Tools menu or click the Expert Advisor button on the standard toolbar.

To create a new expert, choose New from the Expert Advisor dialog. The Expert Editor dialog appears. You use this dialog to create the various components of an expert. **Again it is important to remember that an expert need not contain every component. In fact most experts you create will probably only contain one or two components.** The only components required are the Name and *one* of the other five components (i.e., Trend, Commentary, Highlights, Symbols, or Alerts).

This dialog is different from most in that you can resize it. Position the mouse over the border of the dialog and click and drag the mouse until the

dialog is the desired size. This is very convenient when writing commentaries.



Name. Enter the name of the expert in the Name box. Type any unique information about the expert in the Notes box.

You may want to use a consistent naming convention that describes the components used in the expert. For example, if the only component of the expert is a commentary, you may want to name it “MyExpert (commentary)”. If the only component was an alert, you may name it “MyExpert (alert). The more descriptive the name, the easier it will be for you to remember what the expert does.

Trend. Enter the Bullish and Bearish trend rules. The rules are written using MetaStock’s formula language (see page 235). The rules are interpreted as either true or false. The results of the trend rules are displayed in a ribbon, the expert corner, or in the Data Window. See page 403 for more information on writing and viewing trend rules.

Commentary. Enter the commentary to display. Commentaries are used to tell you, in English (or German, Spanish, etc.), the technical state of the security. There are two special functions and five constants available specifically for writing commentaries. The built-in editor also has a basic word-processing like toolbar that allows you to control fonts and formatting. The results of the commentary are displayed in the Expert Commentary dialog. See page 406 for more information on writing and viewing commentaries.

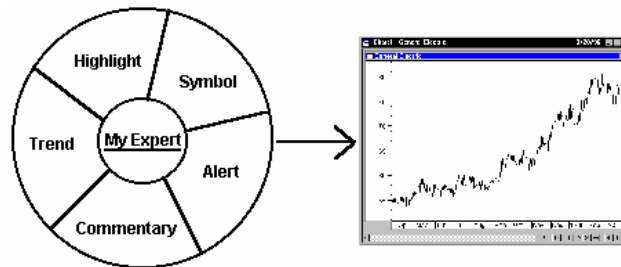
Highlights. The Highlight page is used to create and edit highlights. A highlight colors a chart's price bars to indicate specific conditions. An unlimited number of highlights can be defined for an expert. See page 422 for more information on creating highlights.

Symbols. The Symbol page is used to create and edit symbols. A symbol can be placed above or below price bars to indicate specific conditions. An unlimited number of symbols can be defined for an expert. See page 426 for more information on creating symbols.

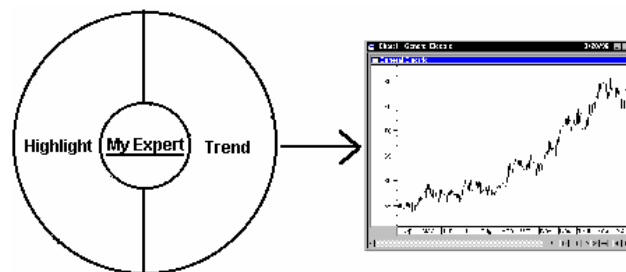
Alerts. The Alert page is used to create and edit alerts. When the defined conditions of the alert are met, a specified message will appear, an audible sound file or video will play, or an e-mail or pager notification will be sent. An unlimited number of alerts can be defined for an expert. See page 430 for more information on using alerts.

Components of an Expert

An expert can be as simple or complex as you want. The following illustration shows an expert that contains all five components. In order for an expert to produce results, it must be attached to a chart as illustrated by the arrow.

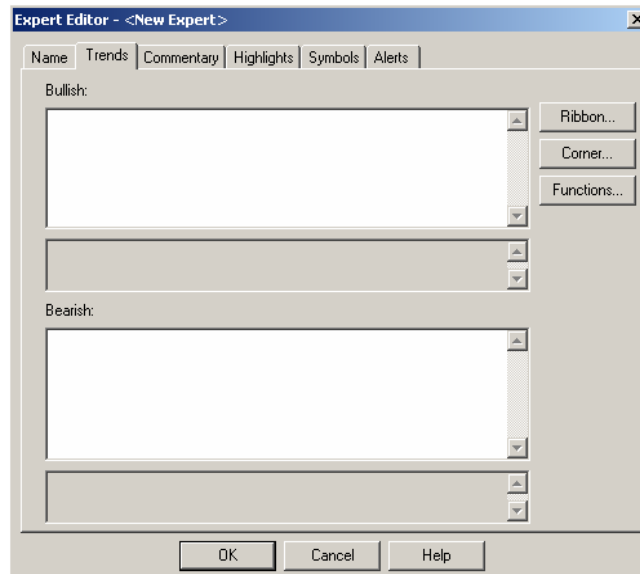


In most cases, an expert will only contain one or two components. In fact an expert containing just one of the components will likely be the most common. The illustration below shows an expert containing just two components being attached to a chart.



Defining Bullish and Bearish Trends

Bullish and bearish trends are defined in the Trends page in the Expert Editor dialog. The rules for the bullish and bearish conditions are written using MetaStock's formula language (see page 235). Each rule can contain up to 2,500 characters.



There are three states that a trend normally falls within:

Bullish. The trend is considered *bullish* if and only if the bullish trend rule is true.

Bearish. The trend is considered *bearish* if and only if the bearish trend rule is true.

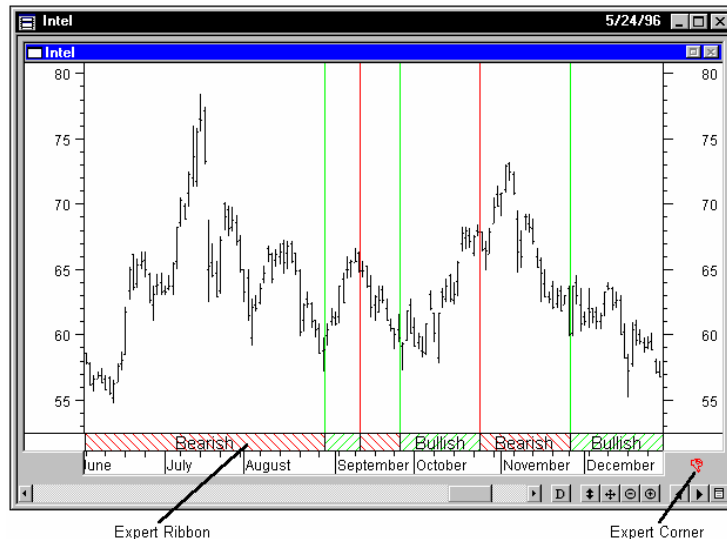
Neutral. The trend is considered *neutral* if neither the bullish nor bearish trend rules are true.

A trend can also be in one of the following states:

Confused. The trend is considered *confused* if both the bullish and bearish trend rules are true simultaneously. This usually indicates an error in the logic of the trend rules. You should double-check your formulas to make sure they define the conditions properly.

Undefined. The trend is considered *undefined* if the formula is not up to speed (e.g., during the first 49 periods of a 50-period moving average). The first few days displayed in the ribbon are usually undefined since most indicators take a while to get up to speed.

The results of a trend are displayed in an expert ribbon, the expert corner or in the Data Window. The following chart shows both an expert ribbon and the expert corner.



The expert ribbon is a small, narrow window located in the chart. The color, patterns, and labels for the bullish, bearish, and neutral zones can be defined within the Expert Ribbon dialog. The ribbon can be moved within the chart using the same drag and drop techniques as with inner windows (see page 114).

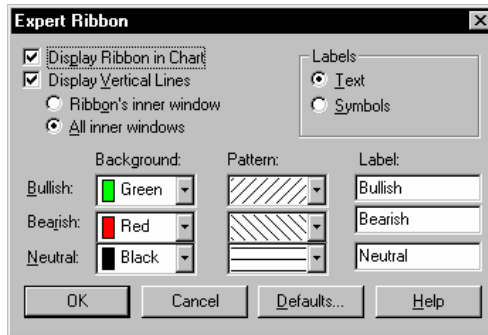
The expert corner is located in the bottom corner of the chart where the x-and y-axes meet. This is where a user-specified symbol is displayed. This symbol denotes the current condition of the security as defined by the trend rules (i.e., bullish, bearish, or neutral). See page 405 for more information on the expert corner.

Displaying the Trend in a Ribbon

The ribbon is displayed at the bottom of the chart. It shows the bullish, bearish, and neutral zones in the chart.

The expert ribbon provides a convenient way to view the historical bullish, bearish, and neutral zones of a security. The rules that define these zones on a ribbon are created in the Trends page of the Expert Editor dialog (see page 404).

You can control the color, patterns and labels used in the expert ribbon from the Expert Ribbon dialog. This dialog is displayed by choosing the Ribbon button on the Trend page of the Expert Editor dialog.



Display Ribbon in Chart. Check this box if you want the ribbon displayed in the chart.

Display Vertical Lines. Check this box if you want vertical lines displayed when the trend changes. Choose the Ribbon's Inner Window radio button if you only want the lines displayed in the inner window in which the ribbon is located. Choose All Inner Windows if you want the lines to extend through every inner window in the chart.

Background. Choose the background color to use for bullish, bearish, and neutral zones of the ribbon.

Pattern. Choose the pattern to use for bullish, bearish, and neutral zones of the ribbon.

Label. Type a label or choose a symbol (depending on whether you chose the Text or Symbols radio button) to use for the bullish, bearish, and neutral zones in the ribbon. Note that text labels will not display if the zone is not wide enough to hold the entire label. Therefore you may want to limit the number of characters used in your text labels. If your zones are very narrow, you may want to use symbols rather than text-based labels, since they occupy less space.

Text. Choose this radio button if you want the labels displayed using the specified text.

Symbols. Choose this button if you want the labels displayed using the specified symbols.

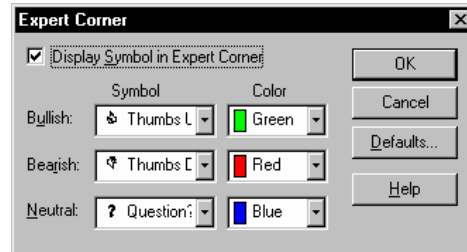
Displaying the Trend in the Expert Corner

The expert corner is displayed beneath the right y-axis if both axes are displayed.

The expert corner is a small area located in the bottom corner of the chart where the x-and y-axes meet. This area is reserved for the display of a symbol. The symbol indicates the current trend (i.e., for the last bar loaded in the chart) of the security. The rules that define expert corner symbol are created in the Trend page of the Expert Editor dialog (see page 403).

A user defined symbol will appear if the current state is bullish, bearish, or neutral. If the state is confused (403), the symbol for neutral will appear. If the state is undefined, no symbol will appear.

The color and style of the symbol is controlled from the Expert Corner dialog. This dialog is displayed by choosing the Corner button on the Trend page of the Expert Editor dialog.



Display Symbol in Expert Corner. Check this box if you want symbols displayed in the Expert Corner area of the chart.

Symbol. Choose the symbol to use for the bullish, bearish, and neutral state of the security.

Color. Choose the color to use for the symbol. Be sure to choose a color that is different from the background color of the expert. Otherwise, the symbol will not be visible.

Tips for Using Trends

- If you find the vertical lines obstructive to your charts, but you'd still like to pinpoint the beginning and ends of trends, use highlights (see page 422). Create two highlights, one that matches the bullish trend, and another that matches the bearish trend. The color of the price bars will coincide with the ribbon.
- If most of the labels on your ribbons aren't showing up due to the narrowness of the zones, change the label to display a symbol rather than text. Symbols generally take up much less space. This is done from the Expert Ribbon dialog (see page 404).
- The 200-day moving average is considered sacred to many technical analysts. It is a good indicator of the long-term trend of the security. You may want to create an expert corner that shows a bullish symbol when the price is above its 200-day moving average and a bearish sign when it's below.

Writing Commentaries to Summarize and Instruct

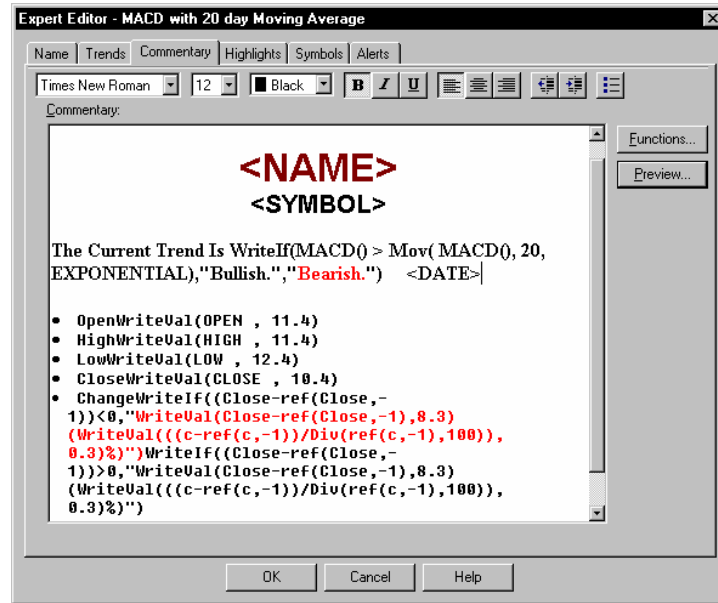
A commentary is perhaps the most versatile and powerful component of the Expert Advisor. Although many people will use pre-packaged expert commentaries, you may want to create your own.

Briefly stated, a commentary allows you to write text and then control what text is displayed based on logical conditions. In other words, some text can be displayed at all times and the display of other text can be dependent on whether a specified condition is true or false. The `writeif()`

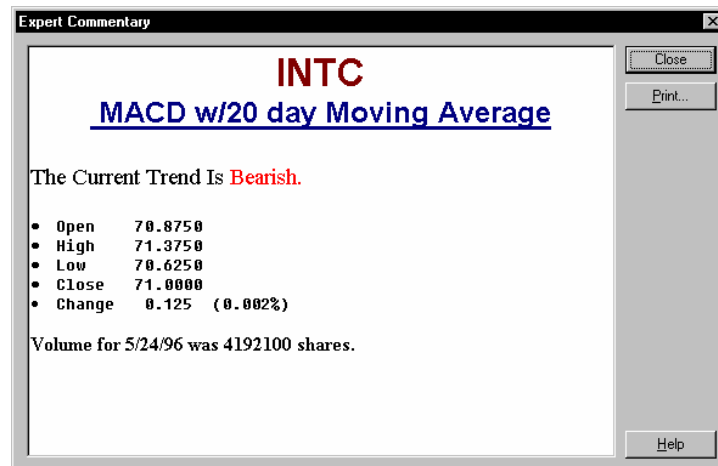
and writeval() functions are the key functions used when writing commentaries. These two functions are unique to the commentary syntax.

As is the case with the other components in the Expert Advisor, commentaries can take full advantage of MetaStock Pro's powerful formula language (see page 235). Therefore, you should be familiar with custom indicators to take full advantage of commentaries.

The following illustration shows a commentary in its native format:



The following illustration shows the same commentary as it would be viewed:



A great way to learn the power and flexibility of commentaries is by viewing the pre-packaged expert named "Equis - Instructional Commentary" written by Steve Achelis, founder of Equis International.

To view Steve Achelis' pre-packaged instructional commentary

1. Display a chart.
2. Choose **Expert Advisor** from the Tools menu.
3. Choose the expert named "Equis - Instructional Commentary" from the dialog and click the **Edit** button.
4. Click the **Commentary** tab.

Displaying Conditional Text with Writeif()

The writeif() function displays the specified text if the condition is true. Optionally, you can have the function display the specified text if the condition is false. If the condition is true, the first text string is displayed. If the condition is false, the second text string is displayed.

The following is the syntax of the writeif() function.

```
writeif(logical formula, "true text string", "false text string")
```

Each text string must be contained within double quotes (" "). If you need the text itself to contain quotes, they can be written as \" as shown below.

```
writeif(c>mov(c,200,s),"The trend is up and remember  
\"the trend is your friend.\", "The trend is down.")
```

The length of a text string is virtually unlimited (64K or about 20 pages). This means that your text can wrap across multiple lines if needed. It can even contain line feeds.

The following example writes "The market is bullish" if the closing price is above its 200-day moving average. It writes "The market is bearish" if the closing price is equal to or below its 200-day moving average.

```
writeif(c > mov(c,200,s),"The market is bullish","The market is bearish")
```

The writeif() function can display numerical values using the writeval() function (see page 409). For example, the following example displays the value of the RSI if the close crosses above a 50-day moving average.

```
writeif(cross(c,mov(c,50,s)),"writeval(rsi(14))")
```

Note that in the above example, there was no text specified for a false condition. You don't have to specify the text for when the condition is false.

Just like the standard if() function in the MetaStock formula language (see page 235), you can also nest writeif() statements as shown in the following example.

```
writeif(v>ref(v,-1),"writeif(c>mov(c,10,s),  
"bullish","bearish)","volume down")
```

Note that the second writeif() function is completely contained within quotes because it is the true text string for the first writeif() function.

In English, the previous statement says, "If the volume is greater than the previous day's volume (i.e., $v > \text{ref}(v,-1)$), then check the close to see if it is above its 10-day moving average (i.e., $c > \text{mov}(c,10,s)$). If both of these are true, the word "bullish" is displayed. If volume is greater than the previous day's, but the close isn't greater than the 10-day moving average, "bearish" is displayed. Otherwise, if the volume is not greater than the previous day's volume, "volume down" is displayed."

Clarifying with Comments

You may want to strategically place comments within your commentaries to clarify and explain what is happening. Comments can be very helpful when you need to debug or modify the syntax at a later time.

Comments can be inserted into conditional statements by surrounding the statement in braces. The text inside the braces will *not* appear when the commentary is viewed. In the formula below, "{This is bullish output}" and "{This is neutral/bearish output}" are the comments inside the conditional statement.

```
writeif(cross(c,mov(c,50,s)),
{This is bullish output}"RSI is writeval(rsi(14))",
{This is neutral/bearish output}"RSI neutral/bearish")
```

If a comment is entered on its own line, you will probably want to place a backslash (see page 413) after the comment so that an extra line feed does not show up in your commentary.

```
{The following defines a support line}\
support:=(If(Abs((Trough(1,L,1)-
Trough(2,L,1))/Trough(2,L,1))<.015 AND
Abs((Trough(2,L,1)-
Trough(3,L,1))/Trough(3,L,1))<.015,{then}
(Trough(1,L,1)+Trough(2,L,1)+Trough(3,L,1))/3,0));
```

Using Variables in Commentaries

Variables can be used within commentaries. However, they must be assigned within a writeif() or writeval() function. See page 437 for more information on using variables in commentaries.

Displaying Numeric Values with Writeval()

The writeval() function is used to display the value of a formula. The formula contained in the writeval() function must be written using MetaStock's formula language. The following shows the syntax of the writeval() function.

```
writeval( DATA ARRAY )
```

The following example displays the value of the stochastic oscillator.

```
writeval(stoch(14,3))
```

The writeval() function can be nested within a writeif() function as shown in the following example.

```
writeif(rsi(14) > 80, "writeval(rsi(14))", "not above
80")
```

You can also use the standard `if()` function to control what value the `writeval()` function displays. The following formula displays the value of the 10-period moving average if the RSI is greater than 80, otherwise the value of the 20-period moving average is displayed.

```
writeval(if(rsi(14)>80,mov(c,10,s),mov(c,20,s)))
```

Of course the same results would be generated by the following formula using the `writeif()` function. However, the previous example is more concise.

```
writeif(rsi(14)>80,"writeval(mov(c,10,s))","writeval(mov(c,20,s))")
```

The above method is required however, if your true/false text needs to combine formula values and text as shown below.

```
writeif(rsi(14)>80,"The 10-period moving average is writeval(mov(c,10,s)).","The 20-period moving average is writeval(mov(c,20,s)).")
```

Controlling the Width and Decimal Placement

There may be times when you would like to control the width and decimal placement of numbers generated by the `writeval()` function. The most obvious use is when aligning values in columns.

An additional parameter can be attached to the end of the `writeval()` function to control width and decimal positions. The value to the left of the period controls the width and the value to the right of the period controls the number of places to display to the right of the decimal. Here are some examples.

10 characters wide and 3 decimal places: `writeval(macd(),10.3)`

5 characters wide and 2 decimal places: `writeval(rsi(14),5.2)`

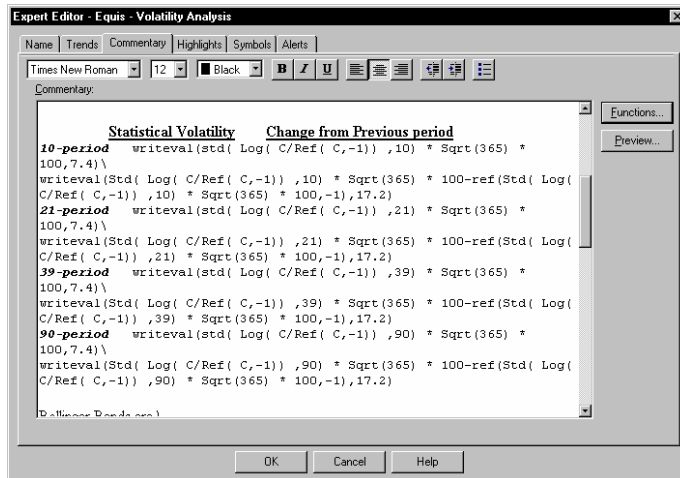
Left-justified with 3 decimal places: `writeval(rsi(21),0.3)`

8 characters wide with no decimal places: `writeval(rsi(34),8.0)`

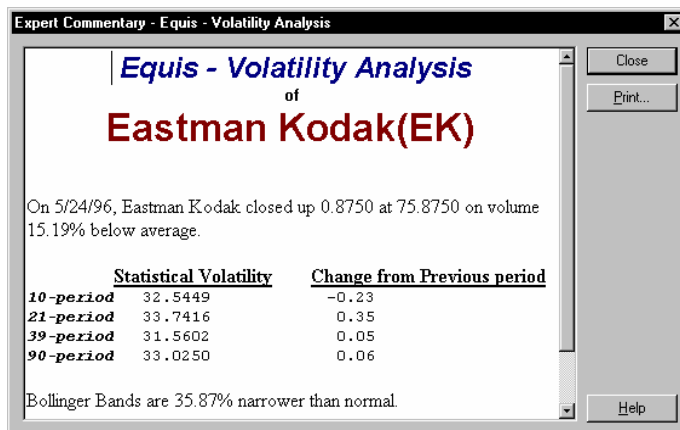
If the width specified is too small to display all of the digits required, the actual number of digits displayed will be the minimum number required to hold the entire value.

If the decimals field is too small to display the total number of decimal digits in the value, the number of decimal digits displayed is truncated (not rounded) to the number requested.

The following illustration shows the commentary to generate a table of indicator values.



The following shows the resulting commentary.



Using Constants in Commentaries

There are five constants that are used to display information about the security the commentary is attached to.

<NAME>. This displays the name of the security.

<SYMBOL>. This displays the ticker symbol of the security.

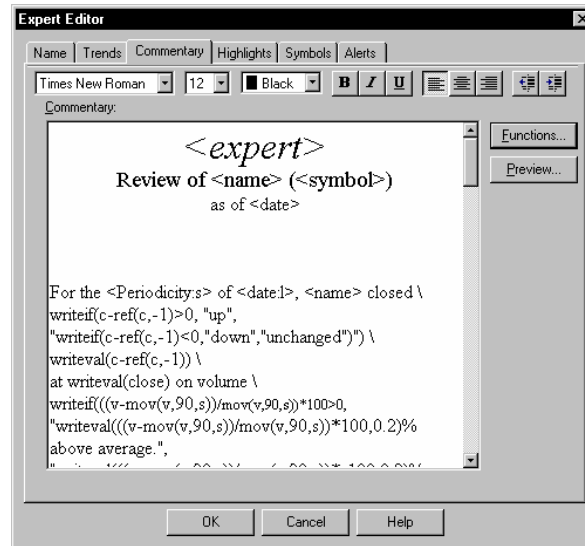
<PERIODICITY>. This displays the periodicity of the security in the default long format (i.e., daily, weekly, etc.). To display the periodicity in the short format (i.e., day, week, etc.) append a ":S" (e.g., <PERIODICITY:S>). Note that appending a ":L" or nothing at all, displays the default long format.

You can also control whether or not the first letter of the periodicity is capitalized. <Periodicity> capitalizes the first letter (i.e., Daily); whereas <periodicity> keeps the first letter in lower-case (i.e., weekly).

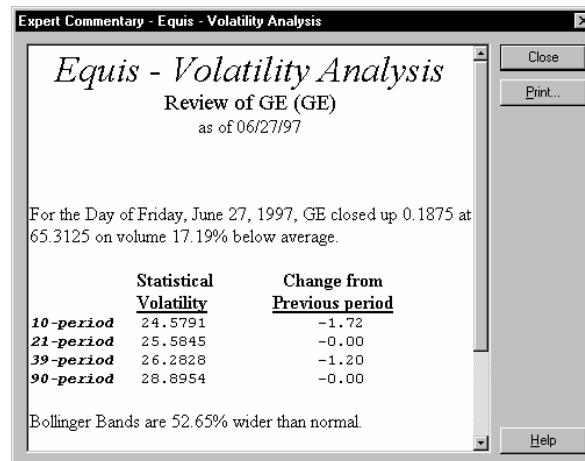
<DATE>. This displays the date (and time for intraday charts) for which the commentary is generated (i.e., the last date and time loaded in the chart). To display the date in the long format (e.g., "Friday, September 20, 1998") append an ":L" (e.g., "<DATE:L>"). Note that appending an ":S" or nothing at all, displays the default short format. The format of your date (both long and short) is controlled from the Regional Settings Properties dialog in the Windows Control Panel.

<EXPERT>. This displays the name of the expert.

The following commentary makes use of these constants.



The following is the resulting commentary.



Controlling the Look of Commentaries

You can control the way a commentary appears by using fonts, colors, formatting, bullets, and special control characters.

The Backslash

The backslash character (i.e., \) tells MetaStock Pro to suppress the start of a new line. This prevents a lot of blank lines when the conditional text isn't displayed. For example, the following text will appear on five lines:

```
This \
appears
on
five
lines.
```

Whereas, due to the backslashes, the following text appears on one line.

```
This \
appears \
on \
one \
line.
```

Note that a backslash must be followed by a carriage return.

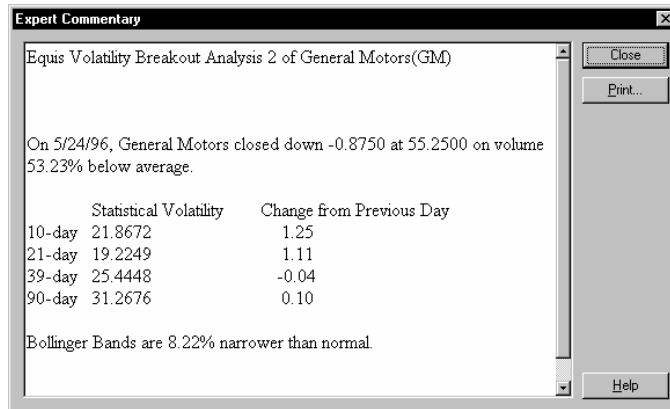
To prevent blank lines from appearing when the nested conditional statements are not displayed, backslashes are used in the following example.

```
writeif(Highest(high)=high,"<Name> is making new
highs.")\
writeif(Lowest(low)=low,"<Name> is making new lows.",
" ")\
writeif(cross(macd(),mov(macd(),9,e)),"The MACD is
giving a new buy signal today (<Date>).", "")\
```

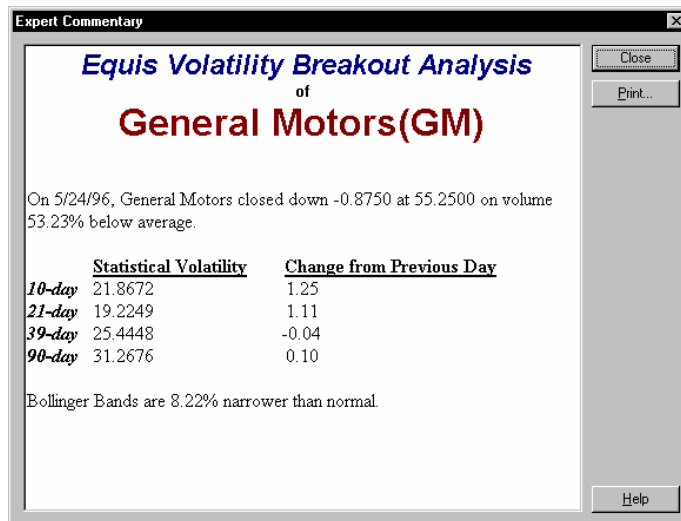
Using Colors, Fonts, and Formatting

To make your commentaries more readable, you should take advantage of the word-processing tools on the commentary toolbar. You have a choice of multiple fonts, point sizes, colors, formatting, text alignment, and even bullets.

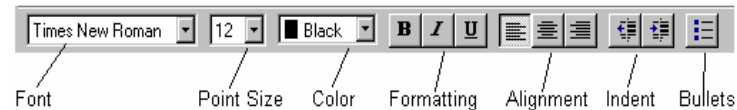
A rather boring commentary that looks like this...



... can be brought to life by using the tools creatively.



To change the fonts, colors, and formatting of text within the expert commentary editor, use the toolbar at the top of the dialog.



Accelerator Keys

In addition to the buttons on the commentary toolbar, the following accelerators are also available when editing a commentary:

| Action | Accelerator Key |
|---------------------------|-----------------|
| Bold toggle | CTRL+B |
| Underline toggle | CTRL+U |
| Italics toggle | CTRL+I |
| Center align paragraph | CTRL+E |
| Left align paragraph | CTRL+L |
| Right align paragraph | CTRL+R |
| Increase paragraph indent | CTRL+M |
| Decrease paragraph indent | CTRL+SHIFT+M |
| Find text | CTRL+F |
| Find next | F3 |
| Replace text | CTRL+H |

The standard Windows Edit controls also work within a commentary.

| Action | Accelerator Key |
|----------------------|-----------------|
| Cut to clipboard | CTRL+X |
| Copy to clipboard | CTRL+C |
| Paste from clipboard | CTRL+V |
| Select All text | CTRL+A |
| Undo last action | CTRL+Z |
| Redo last Undo | CTRL+Y |

Embedding Video, Sound, and Other Files in Commentaries

A great way to enhance an expert is to add multimedia and/or links to additional files (e.g., spreadsheets, docs, etc.) within a commentary. Video files, sound files, and other files (e.g., an Excel spreadsheet, WordPerfect document, etc.) can be pasted directly in an expert commentary. Several of the pre-packaged experts that are shipped with MetaStock Pro include linked video clips.

Files that are linked within a commentary are usually displayed as icons. When a commentary window for a specific chart is displayed, you can double-click on the icon to view the file. The necessary application to view (or run) the file is automatically launched.

You can link a file within a writeif() function in a commentary, thereby making the display of the file's icon dependent on the condition as shown below.



```
Writeif(cross(c,mov(c,21,s),"Video Clip"))
```

In the above example, the video clip icon will only display in the commentary if the close has crossed above a 21-period moving average. Note that the video clip icon is contained within quotes, just as regular text would be.

The following example shows an Excel spreadsheet linked within a writeif() function.

```
Writeif(rsi(14)>80 and fml("Volatility  
Breakout")=1,"View this Excel spreadsheet for
```



```
additional analysis, Worksheet")
```

Of course, if you want the file's icon to always display in the commentary (several pre-packaged experts have these), simply paste link it directly in the commentary editor box, outside of any writeif() functions. You can paste link a file by right-clicking on the file in the Windows Explorer and choosing Copy and then right-clicking on the commentary window in MetaStock Pro and choosing Paste Special.

If the linked file represented by the icon has been moved, renamed, deleted, etc., and you double-click the icon to view it, nothing will happen since MetaStock Pro does not know where the original file is located. Note that this will always occur if you purchased MetaStockPro on the floppy disks (rather than on CD-ROM) and you attempt to run any of the pre-packaged linked video clips (see page 417 for instructions on overcoming this problem). The pre-packaged video clips are not shipped on floppy disks due to their large size.

To paste a video, sound or other files into a commentary

1. Open the Windows Explorer.
2. Right-click on the file to copy and choose **Copy** from the shortcut menu.
3. In MetaStock Pro, open the expert in which you want to copy the file and click the **Commentary** tab.
4. In the Commentary editor box, right-click where you want the file to be inserted.
5. Choose **Paste Special** from the shortcut menu.
6. From the Paste Special dialog, choose the **Paste Link** radio button.
7. If you want the file displayed as an icon in your commentary, check the **Display As Icon** box.

Accessing the Videos on the MetaStock Pro CD

If you chose not to install the multimedia files on your hard disk during the installation of MetaStock Pro, you can still view the video clips from the MetaStock Pro CD by manually editing the link within the commentary.

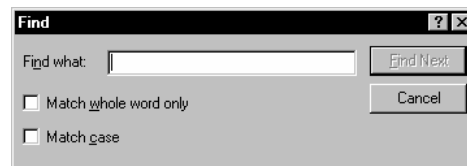
To access video directly from the MetaStock Pro CD

1. In MetaStock Pro, edit the expert that you want to view the video in and click the **Commentary** tab.
2. Right-click anywhere within the Commentary editor box. You can do this even if it says "Formula is password protected or read-only."
3. Choose **Links** from the shortcut menu.
4. Click the **Change Source** button from the Links dialog and locate the correct AVI file from the \experts folder on the MetaStock Pro CD.
5. Click the **Update Now** button in the Links dialog and then click the **Close** button.

Note that the MetaStock Pro CD-ROM must be in the CD-ROM drive if you want to view the videos. In addition, an operating system quirk prevents the path name shown with a video's icon from updating to reflect the new linked source.

Finding and Replacing Text in Commentaries

You can quickly locate text within a commentary by using the Find dialog. When editing a commentary press the CTRL+F key to display the Find dialog. You can press the F3 key to find the next occurrence of the text.

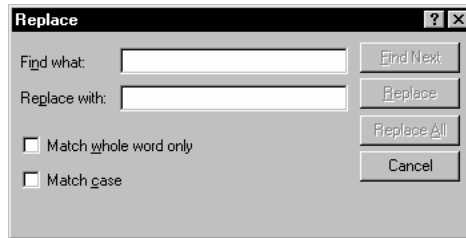


Find What. Type the text to search for.

Match Whole Word Only. Check this box to search for occurrences that are whole words and not part of a larger word.

Match Case. Check this box to distinguish between uppercase and lowercase characters.

You can find text and replace with alternate text by using the Replace command. When editing a commentary press the CTRL+H key to display the Replace dialog.



Find What. Type the text to search for.

Replace With. Type the text to replace the text in the Find What box.

Match Whole Word Only. Check this box to search for occurrences that are whole words and not part of a larger word.

Match Case. Check this box to distinguish between uppercase and lowercase characters.

Replace. Click this button to replace the text in the Find What box with the text in the Replace With box.

Replace All. Click this button to replace *all* text in the commentary matching the text in the Find What box with the text in the Replace With box.

Different Ways to View Commentaries

The Preview button allows you to view the output of the commentary.

There are several ways to view a commentary. When writing your commentaries, you'll want to use the Preview button in the Expert Editor dialog to see how things are turning out. Clicking this button shows you exactly how your commentary will appear when viewed in the Expert Commentary Preview Window. If there are errors in your commentary, you will be notified after clicking the Preview button. Note that the Preview button is disabled if no chart is open.

A chart must be open in order to view a commentary, otherwise the Commentary button will be disabled.

After the expert to which the commentary belongs has been attached to a chart, you can view the commentary by using one of the following methods:

- Right-click the chart and choose Expert Advisor, then Commentary from the short-cut menu. The Commentary Window appears.
- Choose Expert Commentary from the View menu. The Commentary Window appears.
- Click the Expert Advisor button on the standard toolbar. Select the commentary to view and then click the Commentary button. The Commentary Preview Window appears. Use the Commentary Preview Window if you want to quickly scan through multiple commentaries. If no chart is displayed, the Commentary button is disabled.

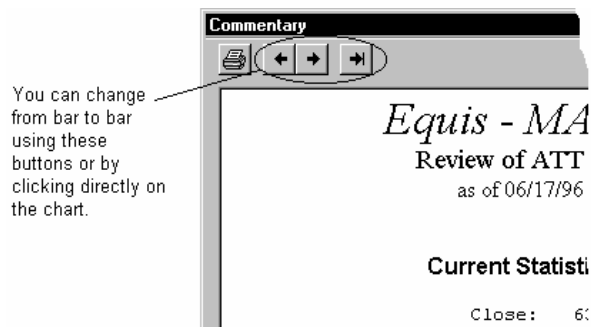
Docking the Commentary Window

The Commentary Window (not the Commentary Preview Window) can be docked on the top, bottom or sides of the screen. Drag the Commentary Window so that it overlaps the side of the screen by which you want to dock and release the mouse button. Double-click just to the right of the Commentary Window's toolbar to undock.

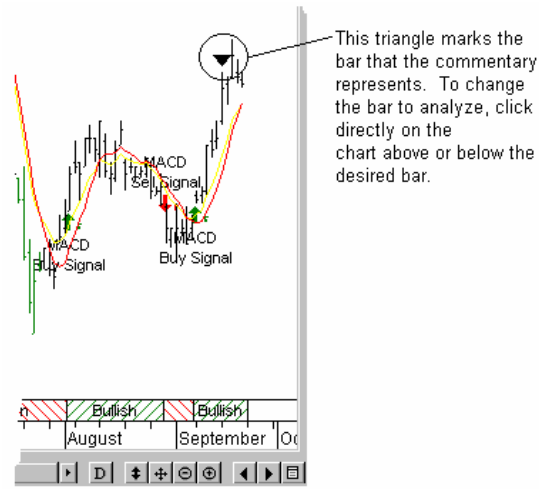
To change the size of a docked Commentary Window, you must change the size prior to docking. If you dock the window on the left or right side of the screen, the width of the window (prior to docking) is retained. Likewise, if you dock the window on the top or bottom of the screen, the height of the window (prior to docking) is retained.

Changing Analysis Dates with the Commentary Window Displayed

By default the Commentary Window analyzes the last bar in the chart. However, you are not limited to just the last bar. Perhaps, you'd like to read what the commentary said just prior to the last market selloff. You can use the toolbar buttons in the Commentary Window to change from bar to bar, or you can click directly on the chart above or below the bar to analyze. Note that this functionality is not available from the Commentary Preview Window which is displayed from within the Expert Advisor dialog.



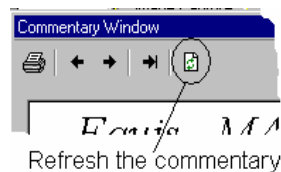
The bar that the commentary is analyzing is labeled with a small black triangle directly above the bar.



Changing from bar to bar as described above is a quick and convenient way to test the output of your commentaries for different market conditions.

Commentaries Updating in Real-time

An option in the Application Options dialog (see page 36) controls when a commentary attached to a real-time chart is updated. You can choose whether the commentary should be updated with every tick, at the completion of each bar, or only when the Refresh button is pressed.



Complex commentaries attached to active real-time charts can be a significant drain on system resources. Therefore, you should be careful about choosing the "Update Commentary on each tick" option in the Application Options dialog.

Tips for Writing Commentaries

- Take advantage of the font, color, formatting, bullets, etc. to enliven your commentaries (see page 413).
- Create columns of indicator values by using the writeval() function in combination with width and decimal parameters (see page 410).
- Use the backslash at the end of nested writeif() functions to avoid blank lines (see page 413).

- Use constants to inform the reader about the security being analyzed (see page 411). You may even make a standard header to appear at the top of every commentary.
- When writing a commentary and you want to preview the true text string of the logical formula in a writeif() statement, you can force the condition to true by placing the words "or true" after the logical formula. Likewise, the words "or false" after a logical formula will force the condition to false and allow you to preview the false text string.
- Instead of using generic words like "bars" or "periods" in commentaries, use the <periodicity> constant with the letter "s" immediately following it (e.g., <periodicity>s). This will return a much more descriptive "days", "weeks", etc., matching the periodicity of the chart.
- If you need to place quotes around a word in the true/false text of a writeif() statement, precede the quote with a backslash (i.e., \"bearish\").
- Comments can be inserted within a commentary by placing the text in braces (i.e., {}). You may want to use comments to clarify complex functions. The text inside the braces will not display when the commentary is viewed.
- If a comment is entered on its own line, you will probably want to place a backslash (see page 413) after the comment so that an extra carriage return does not show up in your commentary.
- See the pre-packaged commentary named "Equis - Instructional Commentary."
- You can jump directly from a chart to its commentary by right-clicking on the chart, choosing Expert Advisor and then choosing Commentary.
- You can increase the size of the Expert Editor dialog by clicking on the border of the dialog and dragging. You may find this especially helpful when writing commentaries.
- When creating columns of text or numbers, use a fixed width font such as Courier or Courier New to help align columns neatly.

Using Highlights to Emphasize Specified Conditions

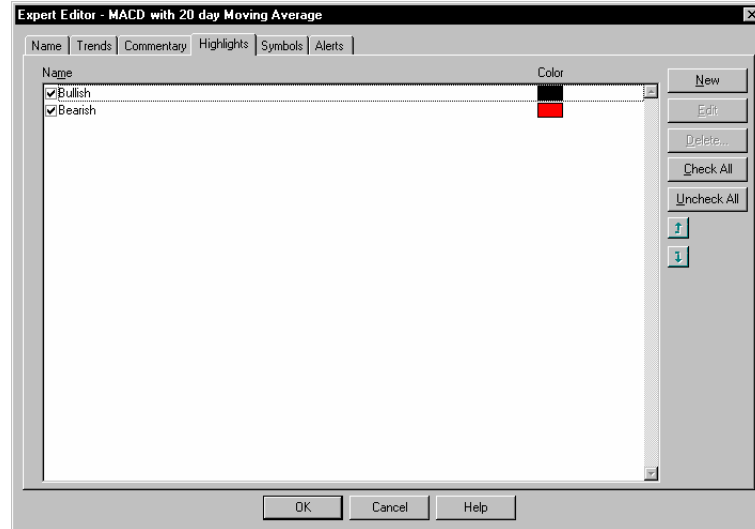
Highlights are a great visual tool for analyzing a chart. Since the focal-point of a chart is the price bars, it only makes sense to have the display of the bars convey information about the technical status of the security. This is done with the use of color.

The Expert Advisor allows you to define an unlimited number of conditions that will cause the bars to change colors. For example, the bars could be colored red when the RSI is above 80, blue when its below

20, and black when its between 20 and 80. A simple concept, yet amazingly convenient and powerful.

Creating and Editing Highlights

Highlights are created and edited from the Highlights page of the Expert Advisor dialog. Highlights are enabled by checking the box to the left of the highlight's name.



New. Choose this to create a new highlight. The Expert Highlight Editor appears from which you can specify the name, conditions, and color for a highlight.

Edit. Choose this to edit the selected highlight. The Expert Highlight Editor dialog appears.

Delete. Choose this to delete the selected highlights.

Check All. Click this button to enable (check) all highlights. If you select only a portion of the highlights, only those selected are enabled.

Uncheck All. Click this button to disable (uncheck) all highlights. If you select only a portion of the highlights, only those selected are disabled.



Move Up button



Move Down button

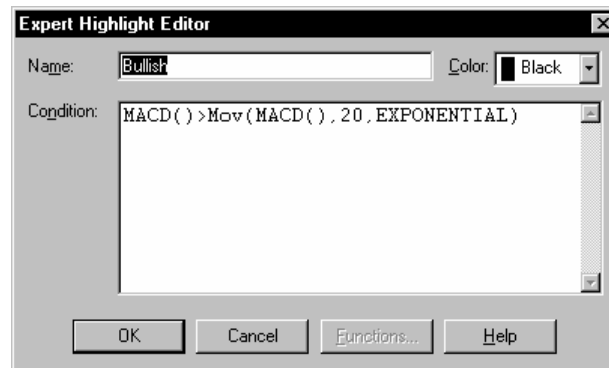
Move Up. Click the Move Up button to move the selected highlight up the list. The higher a highlight is on the list, the higher the priority it is given. See page 430 for information on priority.

Move Down. Click the Move Down button to move the selected highlight down the list. The higher a highlight is on the list, the higher the priority it is given. See page 430 for information on priority.

Specifying the Condition for a Highlight

As with the other components in the Expert Advisor, the conditions for the highlights are written in the MetaStock formula language. They are evaluated as either true or false. A true condition will cause the price plot to be drawn (highlighted) in the specified color. If the condition is false, prices are displayed in the colors specified in the Price Properties dialog (see page 151).

You use the Expert Highlight Editor dialog to specify the condition and the color to use for a highlight. This dialog is accessed by choosing New or Edit from the Highlights page of the Expert Editor dialog.



Name. Enter the name for the highlight. You should use a name that is descriptive of the highlight (e.g., "RSI/Moving Average Bullish"). The maximum length of the name is 40 characters.

Condition. Enter the formula to use for the highlight. If the formula is true for a given time period (i.e., day, week, month, etc.), the price plot will be highlighted with the selected color. Click the Functions button if you need help with the MetaStock formula language. Formulas must be written in the MetaStock formula language (see page 235).

Color. Choose the color from the drop list box. This is the color that will be used when the highlight's condition is true.

Functions. Click this button to display the Paste Functions dialog (see page 305). Note that this button is enabled only when the cursor is located within the Condition box.

Viewing the Results of Highlights

As with all components of an expert, you must attach the expert containing the highlight to a chart in order to see the results.

To view the results of a highlight

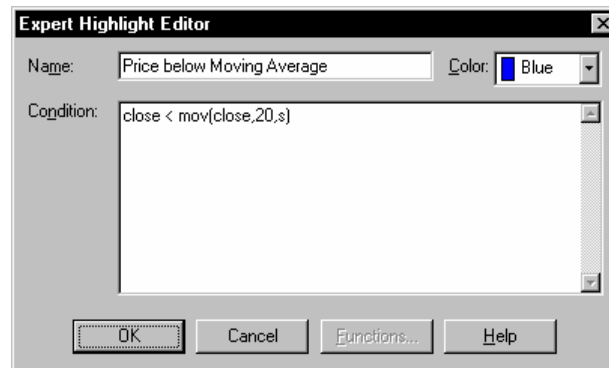
1. Open a chart.
2. Choose **Expert Advisor** from the Tools menu.
3. Choose the expert that contains the highlights and choose **Edit**.

4. Click the **Highlights** tab.
5. Check the box next to the desired highlight(s). Click the **OK** button.
6. Choose **Attach** from the Expert Advisor dialog. The price plot on the chart should now redraw to reflect the highlight contained within the attached expert.
7. Click the **Close** button in the Expert Advisor dialog.

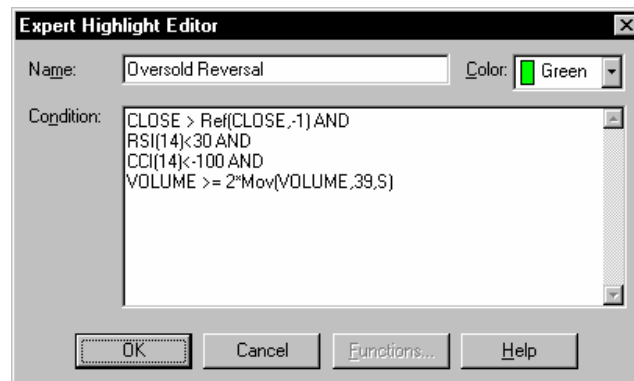
Sample Highlights

The following illustrations show some examples of highlights.

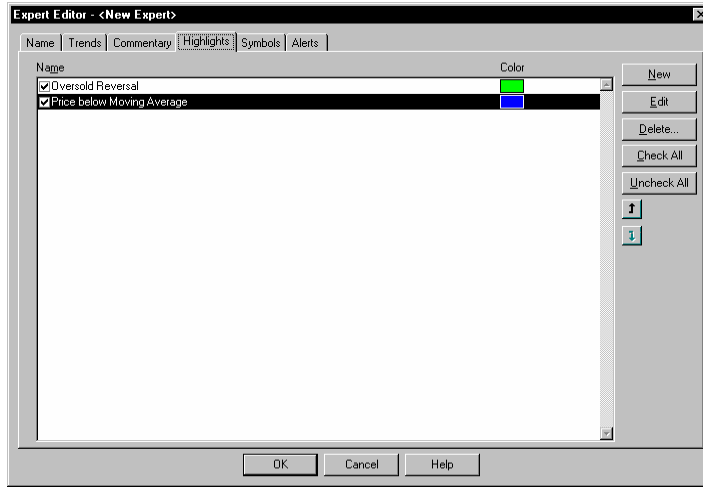
This highlight colors the bars blue when the close is below its 20-period moving average.



This highlight colors the bars green when the closing price is up, the RSI is below 30, the CCI is below -100, and volume is twice its average.



You can also combine multiple highlights. For example, the previous two highlights could both be enabled simultaneously from the Highlights page as shown below. Note that the checked box indicates both are enabled.



Move Up/Dn buttons

When the conditions for these highlights are evaluated, the highlight that appears at the top of the list is given highest priority. Use the Move Up and Move Down buttons to change the priority. In this case, the highlight named “Oversold Reversal” is given the highest priority since it is listed first. This means that if the conditions for both the Oversold Reversal and the RSI/CCI are true on the same day, the Oversold Reversal highlight will take precedence. The bar would be colored green.

Tips for Using Highlights

- Highlights and Trend ribbons (see page 404) are very similar. Both are used to place emphasis on zones of prices when a specified condition is true.
- Highlights are best used for conditions that remain true over a period of time. Symbols are best to mark conditions that are triggered momentarily (i.e., moving average crossovers).

Using Symbols to Identify Key Points on Charts

Expert Symbols can be distinguished from other symbols by the small "e" that appears next to them.

Symbols provide a great way to mark points on your chart where specified conditions are met.

Conceptually, symbols are almost identical to highlights. In fact, the only difference is the way the results are displayed on the chart.

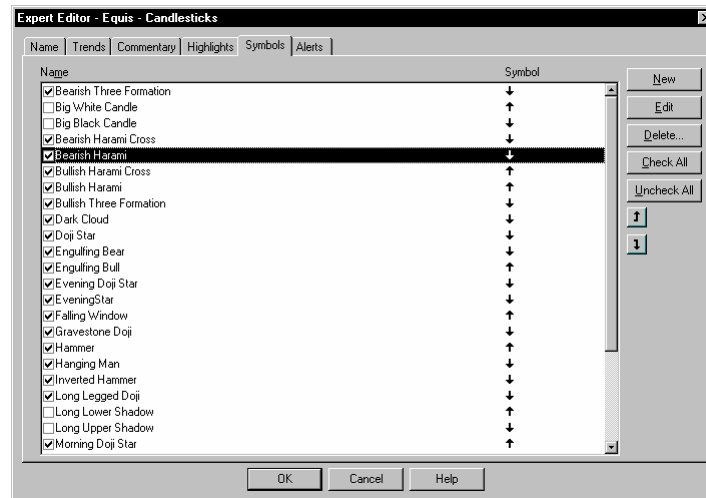
The Expert Advisor allows you to define an unlimited number of conditions that will cause the specified graphic or text to appear above or below the price bar that triggered the condition “true.” For example, a bull graphic could be placed below the price bar on the day when the RSI crosses above 20--a bear graphic when the RSI crosses below 80.

If you use the System Tester, this may be just the tool you’ve been looking for. It’s like having your chart constantly being monitored by a

system test. Much like the results of the buy/sell signals of a system test are displayed with arrows on your chart, the Expert Advisor's symbols feature can keep you up-to-date on conditions in your chart.

Creating and Editing Symbols

Symbols are created and edited from the Symbols page of the Expert Advisor dialog. Symbols are enabled by checking the box to the left of the symbol's name.



New. Choose this to create a new symbol. The Expert Symbol Editor appears from which you can specify the name, conditions, and graphic/text for a symbol. See 428 for more information on this dialog.

Edit. Choose this to edit the selected symbol. The Expert Symbol Editor dialog appears (see page 426).

Delete. Choose this to delete the selected symbol.

Check All. Click this button to enable (check) all symbols. If you select only a portion of the symbols, only those selected are enabled.

Uncheck All. Click this button to disable (uncheck) all symbols. If you select only a portion of the symbols, only those selected are disabled.



Move Up button



Move Down button

Move Up. Click the Move Up button to move the selected symbol up in the list. The higher a symbol is on the list, the higher the priority it is given. See page 430 for information on priority.

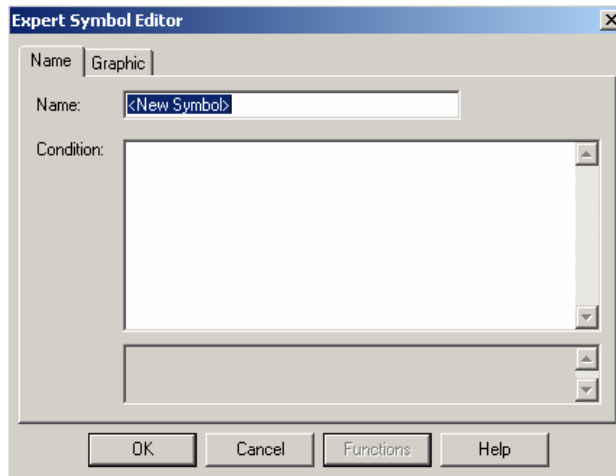
Move Down. Click the Move Down button to move the selected symbol down in the list. The higher a symbol is on the list, the higher the priority it is given. See page 430 for information on priority.

Specifying the Condition for a Symbol

As with the other components in the Expert Advisor, the conditions for symbols are written in the MetaStock formula language. They are

evaluated as either true or false. A true condition will cause the symbol to be drawn near the price plot using the specified graphic and/or text.

You use the Expert Symbol Editor dialog to specify the formula condition and the graphic/text to use for a symbol. This dialog is accessed by choosing New or Edit from the Symbol page of the Expert Editor dialog.



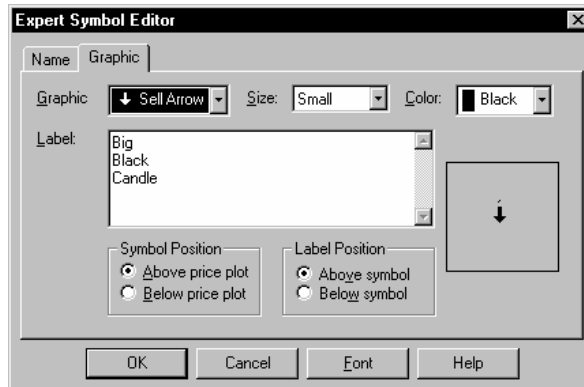
Name. Enter the name for the symbol. You should use a name that is descriptive of the symbol's condition (e.g., "RSI/Moving Average Bullish"). The maximum length of the name is 40 characters.

Condition. Enter the formula to use for the symbol. If the formula is true for a given time period (i.e., day, week, month, etc.), the price bar will be marked with the selected graphic and/or text. You may want to click the Functions button if you need help with the MetaStock formula language. Formulas must be written in the MetaStock formula language (see page 235).

Functions. Click this button to display the Paste Functions dialog (see page 305). Note that this button is enabled only when the cursor is located within the Condition box.

Defining the Symbols to Display

The Symbols page of the Expert Symbol Editor dialog is used to define the graphic and label to use for the symbols. Note that a symbol does *not* have to contain both a graphic and a label.



Graphic. Choose the graphic to display for the symbol from the drop-list. If you prefer not to have a graphic attached to the symbol, choose “(None)” from the drop-list.

Size. Choose the size of the graphic (but not the label), from the drop-list. Use the **Font** button to change the size of the label.

Color. Choose the color for the graphic (but not the label) from the drop-list. Use the **Font** button to change the color of the label.

Label. Enter the label to display for the symbol. A label can contain up to 40 characters, including line feeds. If you prefer not to display a label, simply leave the box blank.

Symbol Position. Choose the location for the graphic.

Label Position. Choose the location for the label.

Font. Click this button to display the standard Windows Font dialog. This dialog is used to change the font, color, and style of the label.

Viewing the Results of Symbols

As with all components of an expert, you must attach the expert containing the symbol to a chart in order to see the results.

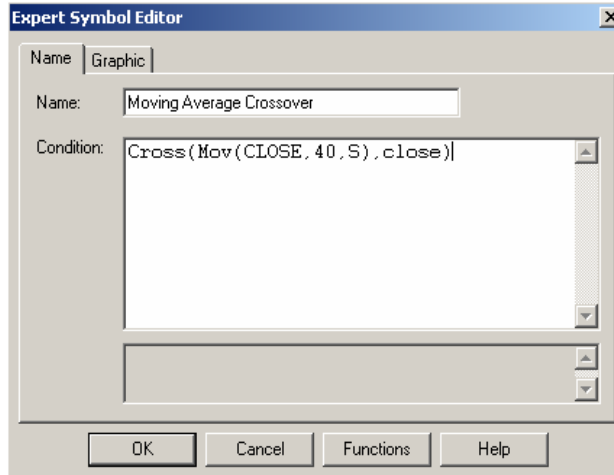
To view the results of a symbol

1. Open a chart.
2. Choose **Expert Advisor** from the Tools menu.
3. Choose the expert that contains the symbol(s) and choose **Edit**.
4. Click the **Symbols** tab.
5. Check the box next to the desired symbol(s). Click the **OK** button.
6. Choose **Attach** from the Expert Advisor dialog. The chart will now redraw to reflect the symbol contained within the attached expert.
7. Click the **Close** button in the Expert Advisor dialog.

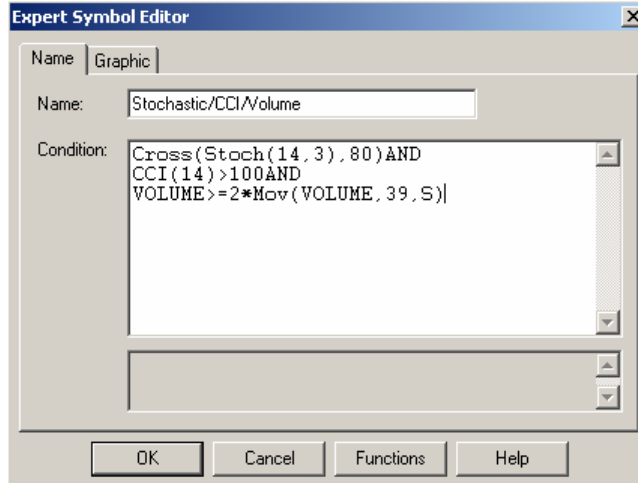
Sample Symbols

The following illustrations show some examples of symbols.

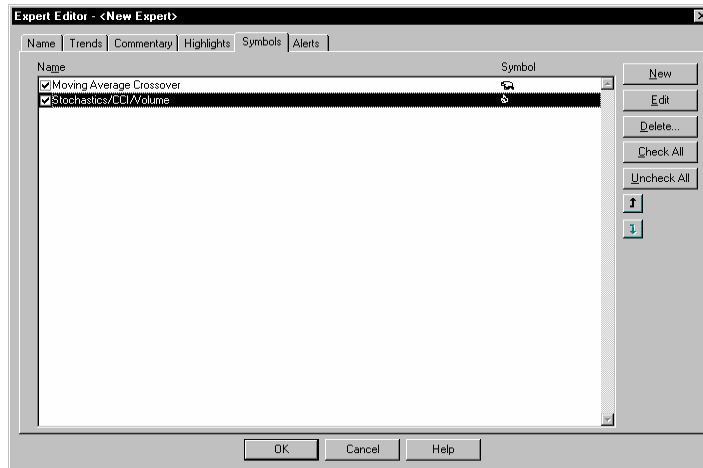
This symbol draws a graphic of a bear below the price bar when the close crosses below its 40-period moving average.



This symbol places the label “Overbought” if the Stochastic crosses above 80, the CCI is above 100, and volume is twice its average.



You can also combine multiple symbols. For example, the previous two symbols could both be enabled simultaneously from the Symbols page as shown below. Note that the checked boxes indicate both are enabled.



Move Up/Dn buttons

When the conditions for these symbols are evaluated, the symbol that appears at the top of the list is given highest priority. Use the Move Up and Move Down buttons to change the order. In this case, the symbol named “Moving Average Crossover” is given the highest priority since it is listed first. This means that if the conditions for both Moving Average Crossover and the Stochastic/CCI/Volume are true on the same day, only the Moving Average Crossover symbol will be displayed.

Tips for Using Symbols

- Highlights are best used for conditions that remain true over a period of time. Symbols are best to mark conditions that are triggered momentarily (i.e., moving average crossovers).
- Symbols in combination with Alerts provide a great way to keep abreast of the signals generated by your favorite system test. In fact, you may want to copy the system test rules into the Expert Symbol Editor dialog and the Expert Alert Editor dialog so that they are constantly monitored.

Using Alerts to Grab Your Attention

Alerts give you the ability to ensure that you stay in touch with current conditions in your chart, even when you’re away from the office. An alert is defined just like highlights and symbols. However, where highlights and symbols are activated on all the data loaded in the chart, alerts are displayed only if the condition is “true” for any new bars since the chart was last opened. (When you first attach an expert to a chart, alerts will be triggered only for the last bar in the chart.)

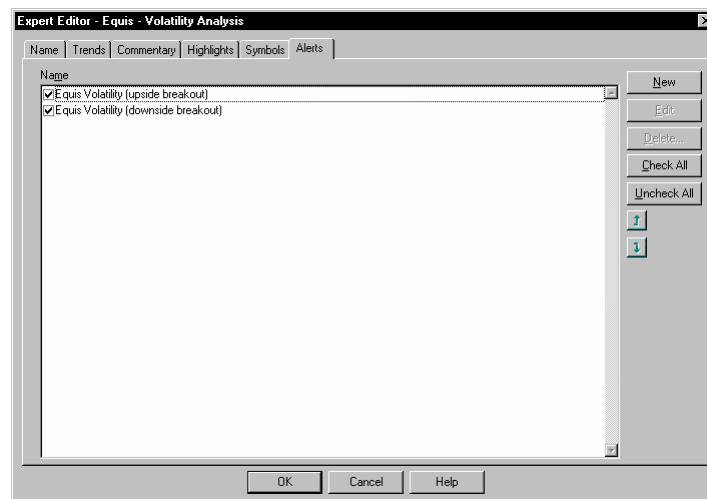
The Expert Advisor allows you to define an unlimited number of alerts. When the alerts are triggered, you can be notified by a message box on your screen, play a sound or video file, or send notification to an e-mail

address or pager. For example, you could define an alert that would pop-up and play a sound file of the *Star Spangled Banner* whenever your U.S. Treasury Bond prices fall below the lower Bollinger Band. Or maybe you'd like a video clip of fireworks displayed whenever IBM's 14-day RSI falls below 70 on twice the average volume. There's nothing wrong with being a little creative and having some fun with these tools.

For those that use the System Tester, this may be just the tool you've been looking for. It's like having your chart constantly being monitored by a system test. Much like the results of the buy/sell signals of a system test are displayed with arrows on your chart--the Expert Advisor's Alert feature can be used to keep you up-to-date on conditions in your chart.

Creating and Editing Alerts

Alerts are created and edited from the Alerts page in the Expert Advisor dialog. Alerts are enabled by checking the box to the left of the alert's name.



New. Choose this button to create a new alert. The Expert Alert Editor appears from which you can specify the name, conditions, and define the pop-up message and WAV or AVI file to play. See page 433 for more information on this dialog.

Edit. Choose this button to edit the selected alert. The Expert Alert Editor dialog appears.

Delete. Choose this button to delete the selected alert.

Check All. Click this button to enable (check) all alerts. If you select only a portion of the alerts, only those selected are enabled.

Uncheck All. Click this button to disable (uncheck) all alerts. If you select only a portion of the alerts, only those selected are disabled.



Move Up button



Move Down button

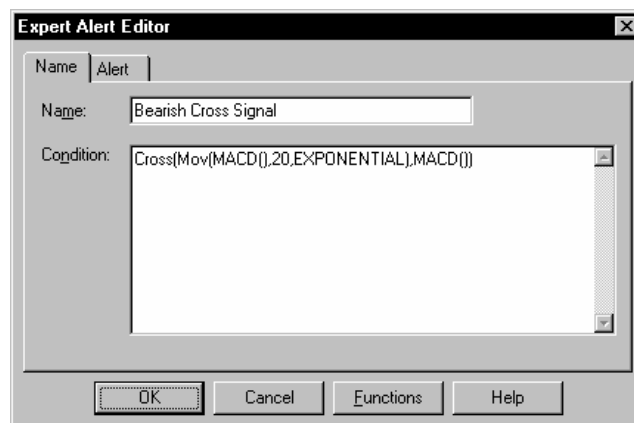
Move Up. Click the Move Up button to move the selected alert up in the list. This has no effect on the priority given to an alert. All alerts are given equal priority.

Move Down. Click the Move Down button to move the selected alert down in the list. This has no effect on the priority given to an alert. All alerts are given equal priority.

Specifying the Conditions for an Alert

As with the other components in the Expert Advisor, the conditions for alerts are written in the MetaStock formula language. They are evaluated as either true or false. A true condition on any bar more current than the last time the chart was opened will cause the alert to trigger and display the specified pop-up message, or play the accompanying sound or video file (if available), and send notification via e-mail or a pager. (When you first attach an expert to a chart, alerts will be triggered only for the last bar in the chart.)

You use the Expert Alert Editor dialog to specify the formula conditions and how you want to be notified that the alert has been triggered. This dialog is accessed by choosing New or Edit from the Alert page in the Expert Editor dialog.



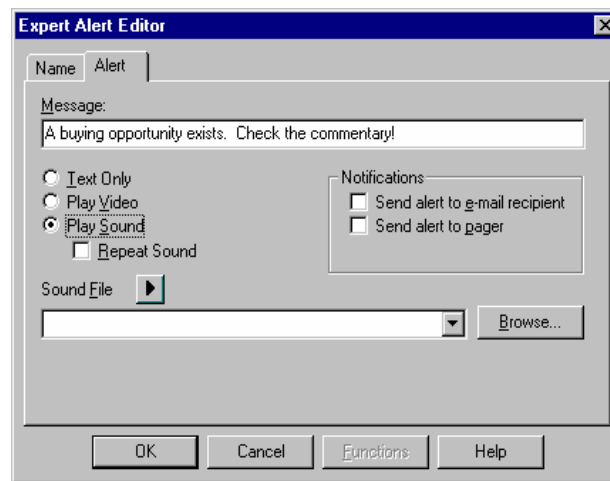
Name. Enter the name for the symbol. You should use a name that is descriptive of the alert's condition (e.g., RSI/Moving Average Bullish). The maximum length of the name is 40 characters.

Condition. Enter the formula to use for the alert. When first attaching the expert, the alert will trigger if the formula is true for the most recent period loaded in the chart. When opening the chart after the expert is attached, the alert will trigger if the formula is true for any bars that are more current than the last time you opened the chart. You may want to click the Functions button if you need help with the MetaStock formula language. Formulas must be written using the MetaStock formula language (see page 235).

Function. Click this button to display the Paste Functions dialog (see page 305). You may want to click the Functions button if you need help with the MetaStock formula language (see page 235). Note that this button is enabled only when the cursor is located within the Condition box.

Defining the Alert

The Alerts page of the Expert Alert Editor dialog is used to define the pop-up message, WAV or AVI file to play, and whether or not to send notification by e-mail or pager when the alert is triggered. Note that a alert does *not* have to contain both a message and a multimedia file.



Message. Enter the message to display when the alert triggers. You can enter up to 40 characters.

Text Only. Choose this button if you want only the specified text message shown in the Message box to display when an alert is triggered.

Play Video. Choose this button if you want the specified video file shown in the Video File box to play when an alert is triggered.

Play Sound. Choose this button if you want the specified sound file shown in the Sound File box to play when an alert is triggered. Check the accompanying "Repeat Sound" box if you want the sound file to repeat playing once it is triggered. You can stop the sound from playing by clicking the OK button in the pop-up Expert Alert dialog.



Play button

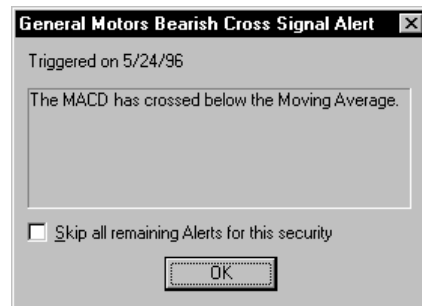
Sound/Video File. Enter the folder and file name of the sound or video file to play. Sound files have a WAV file extension. Video files have an AVI file extension. There is no limit to the size of the sound or video file you can play. Use the Browse button if you need to search your disk. Once the path and file name are entered, you can click the play button to test the playback.

Send alert to e-mail recipient. Check this box to send an e-mail message to the recipient listed in Application Properties (see page 37) when this alert is triggered.

Send alert to pager. Check this box to send a notification of the triggered alert to the pager specified in Application Properties (see page 37).

Viewing Triggered Alerts

Each time a chart is opened after an alert has been attached to the chart, the alert conditions are checked to see if any alerts have triggered. If an alert is triggered for any period that is more current than the last time the chart was opened, the Expert Alert dialog will pop-up.



This dialog shows the date on which the alert triggered, and displays the message specified in the Expert Alert Editor. E-mail and pager notifications associated with the alert are also sent. If a sound or video file was attached to the alert, it will begin playing. Click the OK button to remove the dialog and stop the sound or video.

If other alerts remain to be displayed, you can click the “Skip all remaining alerts for this security” box to keep them from popping up. Any e-mail and pager alerts will be sent, however.

Alerts can also be triggered if you change the periodicity (see page 120). For example, an alert that was not triggered on daily data may be triggered if the periodicity is changed to weekly.

Tips for Using Alerts

- When you open a chart with an expert attached, any e-mail or pager alerts that are triggered for any bar more current than the last time you opened the chart will be sent. If you do not want these notifications to be sent, you can edit the Expert Advisor, or go into Application Properties (see page 37) and disable e-mail and pager alerts before opening the charts.
- For those that have the ability to record their own sound or video files, you may find it useful (and even fun) to attach a multimedia file to your alerts. When the alert is triggered, the sound or video file

will begin playing—informing you in plain English (or Spanish, German, etc.) what has occurred.

- You can use the Sound Recorder located in the Windows Multimedia folder to record your own sound files.



- Symbols in combination with Alerts provide a great way to keep abreast of the signals generated by your favorite system test. In fact, you may want to copy the system test rules into the Expert Symbol Editor dialog and the Expert Alert Editor dialog so that they are constantly monitored.

Attaching an Expert to a Chart

After you have created an expert, you must attach the expert to a chart in order for it to function. As mentioned earlier, an expert can contain just one or all five of the components. Most of your experts will probably contain just one or two components.

MetaStock Pro's Smart Chart feature automatically saves the expert that is attached to a chart. So the next time you open the chart, the expert will automatically reevaluate your chart and display the updated results.

The Attach button in the Expert Advisor dialog is a toggle button. If an expert that is not already attached is selected, the button toggles to Attach. If the selected expert is already attached (i.e., a small triangle appears next to it), the button toggles to Detach. If no chart is open, the button is disabled.

A chart can only have one expert attached to it at a time. However, you can create multiple charts of the same security using the New Window command in the Window menu (see page 86). After creating a “clone” of the selected chart, you could then attach another expert to it.

To attach an expert to a chart

1. Open the chart to which you want to attach the expert.
2. Display the Expert Advisor dialog by doing one of the following:
 - Choose **Expert Advisor** from the Tools menu.
 - Click the Expert Advisor button on the standard toolbar.



Expert Advisor button

3. Choose the desired expert from the Expert Advisor dialog and click the **Attach** button.
or
Right-click on the chart.
4. Choose **Expert Advisor** from the shortcut menu, then choose **Attach**.
5. Choose the desired expert from the Attach Expert dialog.

To detach an expert from a chart

1. Open the chart that has the attached expert.
2. Display the Expert Advisor dialog by doing one of the following:
 - Choose **Expert Advisor** from the Tools menu.
 - Click the Expert Advisor button on the standard toolbar.
3. Select the attached expert from the Expert Advisor dialog (i.e., the one with the small triangle next to it) and click the **Detach** button.
or
Right-click on the chart's inner window.
4. Choose **Expert Advisor** from the shortcut menu, then choose **Detach**.



Expert Advisor button

Copying and Deleting Experts

You can make a copy of a selected expert from the Expert Advisor dialog using the Copy button. This is useful when you need to design a new expert that is similar to an existing one.

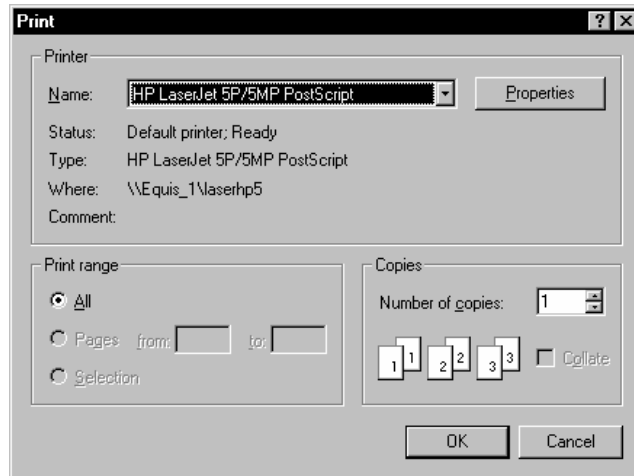
For example, if Expert A was similar to a new expert you want to create, you could use the Copy command in the Expert Advisor dialog to make a duplicate rather than rewriting it. You could then make the minor modifications necessary and name it Expert B (or whatever).

You delete the selected experts from the Expert Advisor dialog using the Delete button.

You can select multiple experts by holding down the CTRL key as you click the mouse.

Printing Experts

You can print the names and/or formulas of your experts with the Print dialog. To access the Print dialog, choose Print from Expert Advisor dialog.



Printer. Choose the desired printer from the drop-list.

Print Range. The All option is always enabled. All selected experts will be printed.

Copies. Enter the number of copies to print.

Pre-packaged Experts

Many pre-packaged experts are included with MetaStock Pro. The experts written by Equis and shipped with MetaStock Pro begin with “Equis” (i.e., Equis - Volatility Analysis). The experts written by industry experts (e.g., Pring, Raff, Fishback, etc.) begin with their name (e.g., Don Fishback – ODDSTTM Option Analyst).

Equis International is not a Registered Investment Advisory service. The experts included with MetaStock Pro are for educational purposes and are to be used at your own risk. Equis International (or its partners) is not liable for the investment decisions you make based on information obtained from the Expert Advisor.

Input() Function, Variables, and Multi-plot Indicators

The Expert Advisor will accept assigned variables (see page 244) in trends, commentaries, highlights, symbols, and alerts.

In commentaries, however, variables must always be assigned within a writeif() or writeval() formula. In other words, you cannot write a commentary that appears as follows:

```
myvar:=mov(c,200,s);
writeif(c>myvar,"The close is above it's 200-period
moving average");
writeif(myvar>ref(myvar,-10),"The 200-period moving
average is trending up.");
```

The syntax above is invalid because the assignment of the "myvar" variable is made outside of the writeif() functions. However, this could be correctly rewritten as follows:

```
writeif(myvar:=mov(c,200,s);c>myvar,"The close is  
above it's 200-period moving average. ")\  
writeif(myvar:=mov(c,200,s);myvar>ref(myvar,-10),"The  
200-period moving average is trending up.")
```

Note that the assignment of the variable "myvar" is made inside each of the writeif() functions. As is always the case when assigning variables, the variable assignment must be followed by a semi-colon. Although the use of variables in the example above does not seem very beneficial, you will find that assigning variables to long, complex formulas can make the commentary much easier to read.

An expert cannot use the input() function directly (see page 306). This function is reserved for custom indicators only. However, if an expert uses the fml() function (see page 261) to call the results of a custom indicator, and the custom indicator uses the input() function, the fml() function will only return the assigned default input value—the expert will not prompt for input.

If an expert contains or references (using the fml() function) a multi-plot indicator, only the last plot is used in the calculation of the exploration.

Expert Advisor Tips

- Due to the way the Performance indicator is calculated (its values are dependent on the amount of data loaded in the chart), you may experience inconsistent results if you use it. Therefore, we recommend that you avoid using the Per() function in experts.
- You can reference an indicator in a chart by selecting the indicator (i.e., clicking on it so handles appear) and then substitute the "P" variable in place of a formula's data array. For example, the formula "mov(p,10,s)" would calculate a 10-period moving average of the selected indicator. Note that "P" will represent the plot selected at the time the expert is attached to the chart. See page 247 for more information on the "P" variable.
- If you aren't familiar with the MetaStock formula language, you really should learn how to use the Indicator Builder and System Tester. The Indicator Builder and System Tester are the key building blocks for the Expert Advisor.
- You can jump directly from a chart to its commentary by right-clicking on the chart, choosing Expert Advisor and then choosing Commentary.
- You can increase the size of the Expert Editor dialog by clicking on the border of the dialog and dragging. You may find this especially helpful when writing commentaries.

- Experts are saved with templates and smart charts.

Equis International is not a Registered Investment Advisory service. The experts included with MetaStock Pro are for educational purposes and are to be used at your own risk. Equis International (or its partners) is not liable for the investment decisions you make based on information obtained from the Expert Advisor.

Execution Errors in an Expert

The Error Executing Expert dialog will appear if a run-time error occurs while calculating an expert. Any error that is not a "math" error qualifies as a run-time error.



Remove this Expert from the chart. The expert is removed from the chart so that it will not calculate again.

Keep this Expert in the chart. The expert will calculate again with the next data update of the chart and any errors that occur will be reported.

Don't show future errors for this Expert in this chart. The expert will calculate again with the next data update of the chart. Any errors that occur will not be reported. Note that the errors will be suppressed only for the expert in the current chart.

Note that this dialog may also appear if you changed the folder listed in the File Locations page in the Application Options dialog (see page 33).

Interpretation of Indicators and Line Studies

Indicator Guide

The indicators and line studies found in MetaStock Pro can be divided into six categories. The intent of this guide is to help you develop better trading systems. A robust technical trading system should probably incorporate indicators from several of these categories. Note that some indicators fall into more than one category.

Trend Indicators

The following indicators and line studies can be used to measure trend. Trend is a term used to describe the persistence of prices to move in one direction.

| Indicator | Creator | Page Reference |
|-------------------------------|---------|----------------|
| Aroon | Chande | 449 |
| Commodity Selection Index | Wilder | 458 |
| DEMA | Mulloy | 461 |
| Directional Movement | Wilder | 463 |
| Forecast Oscillator | Chande | 469 |
| Linear Regression Indicator | | 478 |
| Linear Regression Slope | | 478 |
| Linear Regression Trendline | | 480 |
| MACD | Appel | 480 |
| Moving Averages (all methods) | | 486 |
| Parabolic SAR | Wilder | 499 |
| Performance | | 499 |
| Polarized Fractal Efficiency | Hannula | 501 |
| Price Oscillator | | 503 |

| | | |
|----------------------------|------------------|-----|
| Qstick Indicator | Chande | 508 |
| r-squared | | 509 |
| Raff Regression Channel | Raff | 511 |
| Standard Deviation Channel | Equis | 520 |
| Standard Error | | 521 |
| Standard Error Bands | Equis (Andersen) | 521 |
| Standard Error Channel | Equis | 523 |
| TEMA | Mulloy | 528 |
| Time Series Forecast | | 530 |
| Trendlines | | 532 |
| Vertical Horizontal Filter | White | 536 |
| Zig Zag | Merril | 542 |

Volatility Indicators

The following indicators can be used to measure volatility. Volatility is a general term used to describe the magnitude of day-to-day fluctuations in prices (independent of direction). Generally, changes in volatility tend to lead changes in prices.

| Indicator | Creator | Page Reference |
|---------------------------|------------------|----------------|
| Average True Range | Wilder | 450 |
| Bollinger Bands | Bollinger | 451 |
| Commodity Selection Index | Wilder | 458 |
| Moving Average (variable) | Chande | 488 |
| ODDS™ Probability Cones | Fishback | 492 |
| Relative Volatility Index | Dorsey | 516 |
| Standard Deviation | | 519 |
| Standard Error Bands | Equis (Andersen) | 521 |
| Volatility, Chaikin's | Chaikin | 537 |
| Volatility, Option | Bookstaber | 498 |

Momentum Indicators

The following indicators can be used to measure momentum. Momentum is a general term used to describe the speed at which prices move over a given time period. Generally, changes in momentum tend to lead changes in prices.

| Indicator | Creator | Page Reference |
|-------------------------------------|----------|----------------|
| Accumulation Swing Index | Wilder | 448 |
| Chande Momentum Oscillator | Chande | 456 |
| Commodity Channel Index | Lambert | 458 |
| Dynamic Momentum Index | Chande | 464 |
| Intraday Momentum Index | Chande | 474 |
| Linear Regression Slope | | 478 |
| MACD | Appel | 480 |
| Mass Index | Dorsey | 483 |
| Momentum Indicator | | 485 |
| Price Oscillator | | 503 |
| Price Rate-Of-Change | Appel | 504 |
| Random Walk Index | Poulus | 511 |
| Range Indicator | Weinberg | 512 |
| Relative Momentum Index | Altman | 513 |
| Relative Strength Index | Wilder | 515 |
| Stochastic Momentum Index | Blau | 523 |
| Stochastic Oscillator | Lane | 524 |
| Swing Index | Wilder | 527 |
| Trix | unknown | 534 |
| Ultimate Oscillator | Williams | 535 |
| Williams' %R | Williams | 541 |
| Williams' Accumulation/Distribution | Williams | 542 |

Cycle Indicators

The following indicators and line studies can be used to measure cycles. Many securities, particularly futures, show a tendency to move in cyclical patterns. Price changes can often be anticipated at key cyclical intervals.

| Indicator | Creator | Page Reference |
|----------------------------|---------|----------------|
| Cycle Lines | | 460 |
| Detrended Price Oscillator | | 462 |
| Fibonacci Time Zones | | 469 |
| Fourier Transform | | 469 |

| | | |
|--------------------------|--------|-----|
| MESA Sine Wave Indicator | Ehlers | 484 |
|--------------------------|--------|-----|

Market Strength Indicators

The following indicators can be used to measure market strength. Each of these indicators incorporate either volume or open interest, which are the basic ingredients to the measurement of market strength. Generally higher volume and/or open interest levels indicate more participants and therefore more strength.

| Indicator | Creator | Page Reference |
|----------------------------------|-----------------|----------------|
| Accumulation/Distribution | Williams | 448 |
| Demand Index | Sibbet | 462 |
| Chaikin Money Flow | Chaikin | 456 |
| Chaikin Oscillator | Chaikin | 453 |
| Ease of Movement | Arms | 465 |
| Herrick Payoff Index | Herrick | 472 |
| Klinger Oscillator | Klinger | 476 |
| Money Flow Index | Quong/Soudack | 485 |
| Moving Average (volume adjusted) | Arms | 487 |
| Negative Volume Index | Fosback | 492 |
| On Balance Volume | Granville | 495 |
| Open Interest | | 496 |
| Positive Volume Index | Fosback | 501 |
| Price Volume Trend | | 505 |
| Trade Volume Index | Equis (Slauson) | 531 |
| Volume | | 537 |
| Volume Oscillator | | 538 |
| Volume Rate-Of-Change | | 539 |

Support and Resistance Indicators

The following indicators and line studies can be used to measure support and resistance. A common occurrence is for prices to repeatedly rise or fall to a certain level and then reverse. This phenomenon (attributed to basic supply and demand) is called support and resistance.

| Indicator | Creator | Page Reference |
|-----------|---------|----------------|
|-----------|---------|----------------|

| | | |
|---------------------------------------|---------|-----|
| Andrews' Pitchfork | Andrews | 449 |
| Envelope | | 466 |
| Fibonacci Arcs, Fans, Retracements | | 467 |
| Gann Lines, Fans, Grids | Gann | 471 |
| Projection Bands | Widner | 506 |
| Projection Oscillator | Widner | 507 |
| Quadrant Lines | | 509 |
| Speed Resistance Lines | | 518 |
| Tirone Levels | Tirone | 531 |
| Trendlines | | 532 |

Accumulation/Distribution

The contents of the Accumulation/Distribution Line are explained in detail under the discussion of the Chaikin Oscillator (page 4). Briefly, the indicator is:

$$\left[\left[\frac{(\text{Close} - \text{Low}) - (\text{High} - \text{Close})}{(\text{High} - \text{Low})} \times \text{Volume} \right] + I \right]$$

Where "I" is yesterday's Accumulation/Distribution value.

See page 163 for more information on plotting indicators. See page 175 for more information on the Accumulation/Distribution's parameters.

Interpretation

The interpretation of the Accumulation/Distribution Line is similar to the interpretation of On Balance Volume (see page 493) wherein the indicator displays the flow of volume into or out of a security. The discussion on the Chaikin Oscillator (see page 451) explains the principles behind the Accumulation/Distribution Line.

Tips

Please don't confuse the *volume* Accumulation/Distribution indicator with Williams' *price* Accumulation/Distribution indicator (see page 539).

An example custom indicator (see page 308) shows how to calculate the Accumulation/Distribution line.

Accumulation Swing Index

The Accumulation Swing Index is a cumulative total of the Swing Index (see page 524). Step-by-step instructions on calculating the Swing Index are provided in Wilder's book, New Concepts In Technical Trading Systems (see page 544).

See page 163 for more information on plotting indicators. See page 175 for more information on the Accumulation Swing Index's parameters.

Interpretation

A breakout is indicated when the Accumulation Swing Index exceeds its value on the day when a previous significant high swing point was made. A downside breakout is indicated when the value of the Accumulation Swing Index drops below its value on a day when a previous significant low swing point was made.

You can confirm trendline breakouts by comparing trendlines on the Accumulation Swing Index to trendlines on the price chart. A false breakout is indicated when a trendline drawn on a price chart is

penetrated, but a similar trendline drawn on the Accumulation Swing Index is not penetrated.

Andrews' Pitchfork

Andrews' Pitchfork is a line study consisting of three parallel lines. The lines are drawn from three points that you select.

The three trendlines are drawn as follows: The first trendline begins at the left-most point selected and is drawn so it passes directly between the right-most points. This line is the handle of the pitchfork. The second and third trendlines are then drawn beginning at the right-most points and are drawn parallel to the first line. These lines are the tines of the pitchfork.

See page 205 for more information on drawing line studies. See page 215 for more information on the Andrews' Pitchfork parameters.

Interpretation

The interpretation of a Pitchfork is based on normal trendline support and resistance principles (see page 529).

Aroon

The Aroon indicator was developed by Tushar Chande. Aroon is Sanskrit word meaning “dawn’s early light” or the change from night to day. The Aroon indicator allows you to anticipate changes in security prices from trending to trading range. For more information on the Aroon indicator see the article written by Tushar Chande in the September 1995 issue of Technical Analysis of Stocks & Commodities magazine.

These changes are anticipated by measuring the number of periods that have passed since the most recent x-period high and x-period low. Therefore, the Aroon indicator consists of two plots; one measuring the number of periods since the most recent x-period high (Aroon Up) and the other measuring the number of periods since the most recent x-period low (Aroon Down).

The actual plotted value is a “stochastic” like scale (see page 521) ranging from 0 to 100. Assuming a default time-period of 14 days, if a security makes a new 14-day high, the Aroon Up = 100; when the security makes a new 14-day low, the Aroon Down = 100. When the security *has not* made a new high for 14 days, the Aroon Up = 0; when the security *has not* made a new low for 14 days, the Aroon Down = 0.

As explained in the interpretation section for the VHF indicator (see page 533) the age-old problem for many trading systems is their inability to determine if a trending or trading range market is at hand. Trend-following indicators such as MACD and moving averages, tend to be whipsawed as markets enter a non-trending congestion phase. On the

other hand, overbought/oversold oscillators (which work well during trading range markets) tend to overreact to price pull-backs during trending markets—thereby closing a position prematurely. The Aroon indicator attempts to remedy this by helping you determine when trend-following or overbought/oversold indicators are likely to succeed.

See page 163 for more information on plotting indicators. See page 175 for more information on the Aroon parameters.

Interpretation

There are basically three conditions that you look for when interpreting the Aroon indicator: extremes at 0 and 100, parallel movement between Aroon Up and Aroon Down, and crossovers between Aroon Up and Aroon Down.

Extremes. When the Aroon Up line reaches 100, strength is indicated. If the Aroon Up remains persistently between 70 and 100, a new uptrend is indicated. Likewise if the Aroon Down line reaches 100, potential weakness is indicated. If the Aroon Down remains persistently between 70 and 100, a new downtrend is indicated.

A strong uptrend is indicated when the Aroon Up line persistently remains between 70 and 100 while the Aroon Down line persistently remains between 0 and 30. Likewise a strong downtrend is indicated when the Aroon Down line persistently remains between 70 and 100 while the Aroon Up line persistently remains between 0 and 30.

Parallel Movement. When the Aroon Up and Aroon Down Lines move parallel with each other (are roughly at the same level), then consolidation is indicated. Expect further consolidation until a directional move is indicated by an extreme level or a crossover.

Crossovers. When the Aroon Down line crosses above the Aroon Up line, potential weakness is indicated. Expect prices to begin trending lower. When the Aroon Up line crosses above the Aroon Down line, potential strength is indicated. Expect prices to begin trending higher.

Average True Range

The True Range indicator is defined by Wilder to be the *greatest* of the following for each period:

- The distance from today's high to today's low.
- The distance from yesterday's close to today's high.
- The distance from yesterday's close to today's low.
- The Average True Range is simply the *average* of the true ranges over the past x periods (where x is specified by the user).

See page 163 for more information on plotting indicators. See page 175 for more information on the Average True Range parameters.

Interpretation

In his book, New Concepts In Technical Trading Systems (see page 544), Wilder defines a trading system that uses the Average True Range. He also provides details on calculating the Average True Range and the trading system.

The Average True Range also can be interpreted using the same techniques that are used with the other volatility indicators. Refer to the discussion on Standard Deviation for additional information on volatility interpretation (see page 516).

Bollinger Bands

Bollinger Bands are a type of envelope (see page 464) developed by John Bollinger. However, where envelopes are plotted at a fixed percentage above and below a moving average, Bollinger Bands are plotted at standard deviation levels above and below a moving average.

You may find the expert named "Equis - Bollinger Bands" helpful in interpreting Bollinger Bands. See page 435 for more information and experts.

For information on products and services offered by John Bollinger contact Bollinger Capital Management at 1-310-798-8855.

See page 163 for more information on plotting indicators. See page 176 for more information on the Bollinger Band parameters.

Interpretation

When displaying Bollinger Bands in MetaStock Pro (see page 176), you are prompted to enter the number of periods in the bands and the number of standard deviations between the bands and the moving average. Mr. Bollinger recommends default values of "20" for the number of periods, "simple" for the moving average method, and "2" deviations. He notes that periods of less than 10 periods do not appear to work very well.

MetaStock Pro plots Bollinger Bands on the security's prices or indicator. These interpretational comments refer to bands on the security's closing price.

Because the spacing between Bollinger Bands is based on the standard deviation of the security, the bands widen when the security becomes more volatile, and contract when the security becomes less volatile.

Mr. Bollinger notes the following characteristics of Bollinger Bands.

- Sharp price changes tend to occur after the bands tighten, as volatility lessens.
- When prices move outside the bands, a continuation of the trend is implied.

- Bottoms/tops made outside the bands followed by bottoms/tops made inside the bands call for reversals in the trend.
- A move that originates at one band tends to go all the way to the other band. This observation is useful when projecting price targets.

Tip

An example custom indicator (see page 308) shows how to calculate Bollinger Bands.

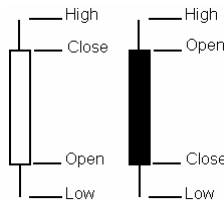
Candlesticks, Japanese

The Japanese developed a method of technical analysis in the 1600s to analyze the price of rice contracts. This technique is called Candlestick charting.

Candlestick charts display the open, high, low, and closing prices in a format similar to a modern-day bar-chart. Articles written by Steven Nison that explain Candlestick charting appeared in the December, 1989 and April, 1990 issues of Futures Magazine. The definitive book on the subject is Japanese Candlestick Charting Techniques also by Steve Nison (see page 544).

You may find the expert named "Equis - Candlesticks" helpful in interpreting Candlestick patterns. See page 435 for more information an experts.

The following illustration shows the components of the two types of candlesticks:



Some investors are attracted to Candlestick charts by their mystique-- maybe they are the "long forgotten Asian secret" to investment analysis. Other investors may be turned-off by their mystique. Regardless of your feelings about the mystique of Candlestick charting, we strongly encourage you to explore their use. Candlestick charts dramatically illustrate supply/demand concepts defined by classical technical analysis theories.

IMPORTANT: Because Candlesticks display the relationship between the open, high, low, and closing prices, they cannot be displayed on securities that only have closing prices, nor were they intended to be displayed on securities that lack opening prices. If you attempt to display a Candlestick chart on a security that does not have opening prices,

MetaStock Pro will use the previous period's closing prices in place of opening prices. Note that this technique can create Candlestick lines and patterns that are not valid (e.g., the previous period's close may have been outside the current period's high-low range).

Interpretation

See page 288 for detailed information on many candlestick patterns.

A good way to learn about candlestick patterns is to attach the expert named "Equis - Candlesticks" to a chart.

Candlevolume

Candlevolume charts are a unique hybrid of the Equivolume and Candlestick charting methods. A candlevolume chart possesses the shadows and empty/filled body characteristics of Candlestick charts, plus the volume-based body width of Equivolume charts. This combination gives you the unique ability to study Candlestick patterns in combination with their volume.

Chaikin A/D Oscillator

The Chaikin Oscillator is created by subtracting a 10-period exponential moving average of the Accumulation/Distribution Line (see page 446) from a 3-period moving average of the Accumulation/Distribution Line. The formula equivalent of the calculation is shown below:

$$mov(ad(), 3, E) - mov(ad(), 10, E)$$

See page 163 for more information on plotting indicators. See page 178 for more information on the Chaikin Oscillator parameters.

Interpretation

The following article on volume accumulation/distribution interpretation, written by Mr. Marc Chaikin, is reprinted here with his permission.

Technical analysis of both market averages and stocks must include volume studies in order to give the technician a true picture of the internal dynamics of a given market. Volume analysis helps in identifying internal strengths and weaknesses that exist under the cover of price action. Very often, volume divergences versus price movement are the only clues to an important reversal that is about to take place. While volume has always been mentioned by technicians as important, little effective volume work was done until Joe Granville and Larry Williams began to look at volume versus price in the late 1960s in a more creative way.

For many years it had been accepted that volume and price normally rose and fell together, but when this relationship changed, the price action should be examined for a possible change of trend. The Granville OBV

concept which views the total volume on an *up day* as accumulation and the total volume on a *down day* as distribution is a decent one, but much too simplistic to be of value. The reason is that there are too many important tops and bottoms, both short-term and intermediate-term, where OBV confirms the price extreme. However, when an OBV line gives a divergence signal versus a price extreme, it can be a valuable technical signal and usually triggers a reversal in price.

Larry Williams took the OBV concept and improved on it. In order to determine whether there was accumulation or distribution in the market or an individual stock on a given day, Granville compared the closing price to the *previous close*, whereas Williams compared the closing price to the *opening price*. He [Williams] created a cumulative line by adding a percentage of total volume to the line if the close was higher than the opening and, subtracting a percentage of the total volume if the close was lower than its opening price. The accumulation/distribution line improved results dramatically over the classic OBV approach to volume divergences.

Williams then took this one step further in analyzing the Dow Jones Industrials by creating an oscillator of the accumulation/distribution line for even better buy and sell signals. In the early 1970s, however, the opening price for stocks was eliminated from the daily newspaper and Williams' formula became difficult to compute without many daily calls to a stockbroker with a quote machine. Because of this void, I created the Chaikin Oscillator substituting the average price of the day for Williams' opening and took the approach one step further by applying the oscillator to stocks and commodities. The Chaikin Oscillator is an excellent tool for generating buy and sell signals when its action is compared to price movement. I believe it is a significant improvement over the work that preceded it.

The premise behind my oscillator is three-fold. The first premise is that if a stock or market average closes above its midpoint for the day (as defined by $[\text{high} + \text{low}] / 2$), then there was accumulation on that day. The closer a stock or average closes to its high, the more accumulation there was. Conversely, if a stock closes below its midpoint for the day, there was distribution on that day. The closer a stock closes to its low, the more distribution there was.

The second premise is that a healthy advance is accompanied by rising volume and a strong volume accumulation. Since volume is the fuel that powers rallies, it follows that lagging volume on rallies is a sign of less fuel available to move stocks higher.

Conversely, declines are usually accompanied by low volume, but end with panic-like liquidation on the part of institutional investors. Thus, we look for a pickup in volume and then lower lows on reduced volume with some accumulation before a valid bottom can develop.

The third premise is that by using the Chaikin Oscillator, you can monitor the flow of volume into and out of the market. Comparing this flow to

price action can help identify tops and bottoms, both short-term and intermediate-term.

Since no technical approach works all the time, I suggest using the oscillator along with other technical indicators to avoid problems. I favor using a price envelope (see page 464) around a 21-day moving average and an overbought/oversold oscillator together with the Chaikin Oscillator for the best short and intermediate-term technical signals.

1. The most important signal generated by the Chaikin Oscillator occurs when prices reach a new high or new low for a swing, particularly at an overbought or oversold level, and the oscillator fails to exceed its previous extreme reading and then reverses direction.

Signals in the direction of the intermediate-term trend are more reliable than those against the trend.

A confirmed high or low does not imply any further price action in that direction. I view that as a non-event.

2. A second way to use the Chaikin Oscillator is to view a change of direction in the oscillator as a buy or sell signal, but only in the direction of the trend. For example, if we say that a stock that is above its 90-day moving average of price is in an up-trend, then an upturn of the oscillator while in negative territory would constitute a buy signal only if the stock were above its 90-day moving average--not below it.

A downturn of the oscillator while in positive territory (above zero) would be a sell signal if the stock were below its 90-day moving average of closing prices. <End of Chaikin's article>

Tips

Advanced users can perform variations on the Chaikin Oscillator by changing the "3" and "10" in the following formula (see page 300).

$mov(ad(), 3, E) - mov(ad(), 10, E)$

An example custom indicator (see page 309) shows how to calculate the Chaikin Oscillator.

Chaikin Money Flow

Like the popular Chaikin A/D Oscillator developed by Marc Chaikin, the Chaikin Money Flow indicator is based on the Accumulation/Distribution line. It is created by summing the values of the Accumulation/Distribution Line for 21 periods and then dividing by a 21 period sum of the volume.

$$\text{sum}(((C-L)-(H-C)) / (H-L)) * V, 21) / \text{sum}(V, 21)$$

See page 163 for more information on plotting indicators. See page 177 for more information on the Chaikin Money Flow parameters.

Interpretation

The interpretation of the Chaikin Money Flow indicator is based on the assumption that market strength is usually accompanied by prices closing in the upper half of their daily range with increasing volume. Likewise, market weakness is usually accompanied by prices closing in the lower half of their daily range with increasing volume.

If prices consistently close in the upper half of their daily high/low range on increased volume, then the indicator will be positive (i.e., above the zero line). This indicates that the market is strong. Conversely, if prices consistently close in the lower half of their daily high/low range on increased volume, then the indicator will be negative (i.e., below the zero line). This indicates that the market is weak.

The Chaikin Money Flow indicator provides excellent confirmation signals of trendline and support/resistance breakouts. For example, if a security's prices have recently penetrated a downward sloping trendline (signaling a potential trend reversal), you may want to wait for further confirmation by allowing the Chaikin Money Flow indicator to cross above the zero line. This may indicate an overall shift from a downtrend to a new uptrend.

A divergence between the Chaikin Money Flow indicator and prices are also significant. For example, if the most recent peak of the indicator is lower than its prior peak, yet prices are continuing upward, this may indicate weakness.

Chande Momentum Oscillator

The Chande Momentum Oscillator (CMO) was developed by Tushar Chande. A scientist, an inventor, and a respected trading system developer, Mr. Chande developed the CMO to capture what he calls "pure momentum." For more definitive information on the CMO and other indicators we highly recommend the book [The New Technical Trader](#) by Tushar Chande and Stanley Kroll.

The CMO is closely related to, yet unique from, other momentum oriented indicators such as RSI, Stochastic, Rate-of-Change, etc. It is most closely related to Welles Wilder's RSI (see page 512), yet it differs in several ways:

- It uses data for both up days *and* down days in the numerator, thereby directly measuring momentum.
- The calculations are applied on *unsmoothed* data. Therefore, short-term extreme movements in price are not hidden. Once calculated, smoothing can be applied to the CMO, if desired.

- The scale is bounded between +100 and -100, thereby allowing you to clearly see changes in net momentum using the 0 level. The bounded scale also allows you to conveniently compare values across different securities.

You may find the expert named "Equis - Chande Momentum Oscillator" helpful in interpreting the Chande Momentum Oscillator. See page 435 for more information on experts.

See page 163 for more information on plotting indicators. See page 177 for more information on the Chande Momentum Oscillator parameters.

Interpretation

The CMO can be used to measure several conditions.

Overbought/oversold. The primary method of interpreting the CMO is looking for extreme overbought and oversold conditions. As a general rule, Mr. Chande quantifies an overbought level at +50 and the oversold level at -50. At +50, up-day momentum is three times the down-day momentum. Likewise, at -50, down-day momentum is three times the up-day momentum. These levels correspond to the 70/30 levels on the RSI indicator.

You could also establish overbought/oversold entry and exit rules by plotting a moving average trigger line on the CMO. For example, if you are using the default 20-period CMO, a 9-period moving average may serve as a good trigger line. Buy when the CMO crosses above the 9-period trigger line; sell when it crosses below.

Trendiness. The CMO (much like the VHF indicator, see page 533) can also be used to measure the degree to which a security is trending. The higher the CMO, the stronger the trend. Low values of the CMO show a security in a sideways trading range.

You may find the CMO helpful in establishing the entry and exit rules of a trend following system. Enter when the CMO is high and exit when it moves lower.

Divergence. Although not specifically mentioned in Mr. Chande's book, you could also look for divergence between the CMO and the price, as is often done with other momentum indicators. See the discussion about divergence in the Interpretation section of RSI (see page 512).

Other. Although not specifically mentioned in Mr. Chande's book, you may also look for chart formations (head and shoulders, rising wedges, etc.), failure swings, and support/resistance. See the discussion on these methods in the Interpretation section of RSI (see page 512).

Commodity Channel Index

The Commodity Channel Index (CCI) is calculated by first determining the difference between the mean price of a commodity and the average of the means over the time period chosen. This difference is then compared to the average difference over the time period (this factors in the commodity's own inherent volatility). The result is then multiplied by a constant that is designed to adjust the CCI so that it fits into a "normal" trading range of +/-100.

A complete explanation of the CCI is beyond the scope of the manual. Further details on the contents and interpretation of the CCI can be found in the October 1980 issue of Commodities magazine (now known as Futures). The article was written by Donald Lambert.

The CCI indicator used in older versions of MetaStock is called "CCI (EQUIS)." "CCI (Standard)" is the recently modified version that is consistent with the author's current calculation method. The interpretation of both methods is identical.

See page 163 for more information on plotting indicators. See page 177 for more information on the CCI parameters.

Interpretation

While the CCI was originally designed for commodities, the indicator also works very well with stocks and mutual funds.

There are two methods of interpreting the CCI:

- Looking for divergences

A popular method of analyzing the CCI is to look for divergences in which the underlying security is making new highs while the CCI is failing to surpass its previous highs. This classic divergence is usually followed by a correction in the security's price.

- As an overbought/oversold indicator

The CCI usually oscillates between +/-100. Readings outside these ranges imply an overbought/oversold condition.

Commodity Selection Index

The CSI is calculated using the ADXR component of the Directional Movement indicator. Refer to New Concepts in Technical Trading Systems (see page 544) for more information on the calculation and interpretation of the indicator.

See page 163 for more information on plotting indicators. See page 178 for more information on this indicator's parameters.

Interpretation

A high CSI rating indicates that the commodity has strong trending and volatility characteristics. The trending characteristics are brought out by the Directional Movement factor in the calculation--the volatility characteristic by the Average True Range factor.

Wilder's approach is to trade commodities with high CSI values (relative to other commodities). Because these commodities are highly volatile, they have the potential to make the "most money in the shortest period of time." High CSI values imply trending characteristics, which makes it easier to trade the security.

The CSI is designed for short-term traders who can handle the risks associated with highly volatile markets.

Correlation

The purpose of correlation analysis is to measure the relationship between two variables. This relationship is called the "correlation coefficient."

The correlation coefficient ranges between ± 1.0 . A coefficient of $+1.0$ is a perfect positive correlation and -1.0 is a perfect negative correlation. Two variables with no relationship will have a coefficient of zero.

See page 163 for more information on plotting indicators. See page 178 for more information on the Correlation parameters.

Interpretation

Correlation analysis involves a "dependent" and an "independent" variable. Correlation analysis measures whether or not a change in the independent variable will result in a change in the dependent variable.

A low correlation coefficient (e.g., ± 0.10) suggests that the relationship between the two variables is weak or non-existent. A high correlation indicates that the dependent variable (e.g., the security's price) will change when the independent variable (e.g., an indicator) changes.

The direction of the dependent variable's change depends on the sign of the coefficient. If the coefficient is a positive number, then the dependent variable will move in the same direction as the independent variable; if the coefficient is negative, then the dependent variable will move in the opposite direction of the independent variable.

A useful feature of correlation analysis is its predictive capability, because the correlation coefficient shows how well a change in the independent variable (e.g., an indicator) predicts a change in the dependent variable (e.g., the security's price).

The Correlation indicator can be used in three ways:

- Correlation of a security's price to an indicator

You can measure the relationship between an indicator and a security's price. A high positive correlation coefficient means that a change in the indicator usually predicts a change in the security's price. A high negative correlation (e.g., -0.70) means that when the indicator's value changes, the security's price will usually move in the opposite direction. Remember, a low (e.g., 0.10) correlation coefficient indicates that the relationship between the security's price and the indicator is not significant.

- Correlation of one security to another

Another use of correlation analysis is to measure the strength of a relationship between two securities. Often, one security's price "leads" or predicts the price of another security. This is especially noticeable with commodities. For example, the correlation coefficient of gold versus the dollar shows a strong negative relationship. In other words, an increase in the dollar usually predicts a decrease in the price of gold.

- Correlation of one indicator to another

Another use of correlation analysis is to measure the strength of a relationship between two indicators. Often, one indicator's movement "leads" or predicts the movement of another indicator. For example, a volume-based indicator (i.e., Chaikin Oscillator, Money Flow Index, etc.) may be found to lead a momentum based indicator (i.e., RSI, Stochastic, etc.).

Cycle Lines

Cycles allow us to accurately predict events in nature: bird migrations, the tides, planetary movements, etc. You can also use cycle analysis to predict changes in financial markets, although not always with the accuracy found in nature.

We know that prices are a consensus of human expectations. These expectations are always changing, shifting the supply/demand lines (see page 523), and causing prices to oscillate between overbought and oversold levels. Fluctuations in prices are a natural process of changing expectations and lead to cyclical patterns.

See page 205 for more information on drawing line studies. See page 215 for more information on Cycle Line parameters.

Interpretation

An obvious example of a cyclical pattern is shown in a chart of a sine wave. Although security prices rarely move with this degree of

predictability, even a quick glance at many security charts is enough to see evidence of some type of cyclical pattern.

MetaStock Pro's Cycle Line tool allows you to place equally spaced vertical lines on a chart. Since you can control the spacing between the cycle lines, you may be able to visually extrapolate the cycles evident in a plot. If you extend the right margin of a chart, the cycle lines will extend into the future. This can help you anticipate when the next peak or trough of a cycle may occur.

DEMA

DEMA is a unique smoothing indicator developed by Patrick Mulloy. It was originally introduced in the February 1994 issue of Technical Analysis of Stocks & Commodities magazine.

As Mr. Mulloy explains in the article:

"Moving averages have a detrimental lag time that increases as the moving average length increases. The solution is a modified version of exponential smoothing with less lag time."

DEMA is an acronym that stands for Double Exponential Moving Average. However, the name of this smoothing technique is a bit misleading in that it is not simply a moving average of a moving average. It is a unique composite of a single exponential moving average and a double exponential moving average that provides less lag than either of the two components individually.

See page 163 for more information on plotting indicators. See page 179 for more information on the DEMA parameters.

Interpretation

DEMA can be used in place of traditional moving averages. You can use it to smooth price data or other indicators. Some of Mr. Mulloy's original testing of DEMA was done on the MACD. Oddly, he found that the faster responding DEMA-smoothed MACD produced fewer (yet more profitable) signals than the traditional 12/26 smoothed- MACD. A custom indicator named "MACD (DEMA-smoothed)" is included with MetaStock Pro.

This type of smoothing is certainly not limited to the MACD. You may want to experiment on other indicators as well.

See page 525 for information on TEMA, a similar smoothing method developed by Mr. Mulloy.

Demand Index

The Demand Index, developed by James Sibbet, combines price and volume in such a way that it is often a leading indicator of price change. The Demand Index calculations are too complex, however, for this text.

The calculations require 21-column accounting paper to calculate manually.

MetaStock Pro uses a slight variation on the Sibbet's original Index so that the Index is displayed on a "normal" y-axis scale. The author's Index is plotted on a scale labeled +0 at the top, 1 in the middle, and -0 at the bottom. MetaStock Pro uses a scale from +100 to -100. Other than the difference in y-axis labeling, the indicator is calculated exactly as designed by its author.

See page 163 for more information on plotting indicators. See page 179 for more information on the Demand Index parameters.

Interpretation

There are six "rules" to the Demand Index:

- A divergence between the Demand Index and the price trend suggests an approaching weakness in price.
- One more rally to new highs usually follows an extreme peak in the Demand Index (the Index is performing as a leading indicator).
- Higher prices with a lower Demand Index peak usually coincides with an important top (the Index is performing as a coincidental indicator).
- The Demand Index penetrates the level of zero indicating a change in trend (the Index is performing as a lagging indicator).
- When the Demand Index stays near the level of zero for any period of time, a weak price movement that will not last long is indicated.
- A large long-term divergence between prices and the Demand Index indicates a major top or bottom.

Detrended Price Oscillator

The Detrended Price Oscillator (DPO) is an indicator that attempts to eliminate the trend in prices. Detrended prices allow you to more easily identify cycles and overbought/oversold levels.

The calculation is quite simple; you simply center an x-period moving average by shifting it back $x/2 + 1$ periods. This centered moving average is then subtracted from the close. The result is an oscillator that crosses above and below zero.

Since the DPO is shifted back " $x/2 + 1$ " periods, the last " $x/2 + 1$ " periods will have no values.

MetaStock Pro prompts you to enter the number of periods. The value entered should be the approximate length of the cycle you wish to identify. Cycles longer than the number of periods you enter will not be shown. The default value is 20.

See page 163 for more information on plotting indicators. See page 179 for more information on the Detrended Price Oscillator parameters.

Interpretation

Long-term cycles are made up of a series of short-term cycles. Analyzing these shorter term components of the long-term cycles can be helpful in identifying major turning points in the longer term cycle. The DPO is helpful in recognizing the underlying cyclical components of the price action.

You may find it helpful to fit cycle lines (see page 458) to the DPO to determine the length of the cycles.

Directional Movement

The Directional Movement System, developed by J. Welles Wilder, is explained thoroughly in his book, New Concepts in Technical Trading Systems (see page 544). MetaStock Pro calculates and plots all five of the indicators that comprise the Directional Movement System (i.e., CSI, +DI, -DI, ADX, and ADXR).

MetaStock Pro also calculates a related indicator, the Commodity Selection Index (see page 456).

Wilder's book gives complete step-by-step instructions (and examples) on calculating and interpreting each of the above indicators.

You may find the expert named "Equis - Directional Movement" helpful in interpreting Directional Movement indicators. See page 435 for more information an experts.

See page 163 for more information on plotting indicators. See page 180 for more information on the Directional Movement parameters.

Interpretation

The basic Directional Movement trading system involves plotting the 14-period +DI and the 14-period -DI on top of each other in the same inner window (see page 172). An improved method of displaying these two indicators is to plot their difference using the following formula:

$$pdi(14) - mdi(14)$$

Positions should be taken by buying when the +DI rises above the -DI (i.e., the formula shown above rises above zero) and selling when the +DI falls below the -DI (i.e., the formula falls below zero).

These simple trading rules are qualified with the "extreme point rule." This rule is designed to prevent whipsaws and reduce the number of trades.

The extreme point rule requires that on the day that the +DI and -DI cross, you note the "extreme price." If you are long, the extreme price is the low

price on the day the lines cross. If you are short, the extreme price is the high price on the day the lines cross.

The extreme point is then used as a trigger point at which you should implement the trade. For example, after receiving a buy signal (the +DI rose above the -DI), you should then wait until the security's price rises above the extreme point (the high price on the day that the +DI and -DI lines crossed) before buying. If the price fails to rise above the extreme point, you should continue to hold your short position.

In Wilder's book, he notes that this system works best on securities that have a high Commodity Selection Index (CSI) value. He says, "as a rule of thumb, the system will be profitable on commodities that have an ADXR value above 25. When the ADXR drops below 20, then do not use a trend-following system."

Dynamic Momentum Index

The Dynamic Momentum Index (DMI) was developed by Tushar Chande and Stanley Kroll. The indicator is covered in detail in their book [The New Technical Trader](#).

The DMI is identical to Welles Wilder's RSI (see page 512) except the number of periods is variable rather than fixed. The variability of the time periods used in the DMI is controlled by the recent volatility of prices. The more volatile the prices, the more sensitive the DMI is to price changes. In other words, the DMI will use more time periods during quiet markets, and less during active markets. The maximum time periods the DMI can reach is 30 and the minimum is 3. This calculation method is similar to the Variable Moving Average, also developed by Tushar Chande (see page 484).

The advantage of using a variable length time period when calculating the RSI is that it overcomes the negative effects of smoothing, which often obscure short-term moves.

The volatility index used in controlling the time periods in the DMI is based on a calculation using a five period standard deviation and a ten period average of the standard deviation.

See page 163 for more information on plotting indicators. See page 180 for more information on the Dynamic Momentum Index parameters.

Interpretation

Chande recommends using the DMI much the same as the RSI. However, because the DMI is more sensitive to market dynamics, it often leads the RSI into overbought/oversold territories by one or two days.

Like the RSI, look for overbought (bearish) conditions above 70 and oversold (bullish) conditions below 30. However, before basing any trade off of strict overbought/oversold levels using DMI or any overbought/oversold indicator, Chande recommends that you first qualify

the trendiness of the market using indicators such as r-squared (see page 506) or CMO (see page 454). If these indicators suggest a non-trending market, then trades based on strict overbought/oversold levels should produce the best results. If a trending market is suggested, you can use the DMI to enter trades in the direction of the trend.

Ease of Movement

The Ease of Movement indicator was developed by Richard W. Arms, Jr., best known for the popular Arms Index and the Equivolume charting method. The Ease of Movement indicator is a product of the Equivolume charting method. The Ease of Movement indicator provides one value (for each time period) representing the price and volume for that period. It calculates the ease at which prices are moving. The larger the price move and the lighter the volume, the easier the movement.

Ease of Movement (EMV) is calculated as follows:

$$EMV = \frac{\text{Midpoint Move}}{\text{Box Ratio}}$$

Where:

$$\text{Midpoint} = \frac{\text{Today's High} + \text{Today's Low}}{2} - \frac{\text{Yesterday's High} + \text{Yesterday's Low}}{2}$$

$$\text{Box Ratio} = \frac{\text{Volume (in 10,000s)}}{\text{High} - \text{Low}}$$

The raw Ease of Movement values is usually smoothed by a moving average.

See page 163 for more information on plotting indicators. See page 180 for more information on the Ease of Movement parameters.

Interpretation

The Ease of Movement indicator produces a buy signal when the indicator crosses above the zero center line, indicating that the security is moving upward easily; a sell signal is given when the indicator crosses below the zero center line, indicating that the security is moving downward easily.

High ease of movement values correspond with easy upward price movement whereas low ease of movement values correspond with easy downward price movement. When price movement is small on heavy volume, the ease of movement indicator is zero.

Envelope

An envelope is comprised of two moving averages (see page 484). One moving average is shifted upward and the second moving average is shifted downward. The envelope is plotted around a price plot or indicator.

See page 163 for more information on plotting indicators. See page 181 for more information on Envelope parameters.

Interpretation

Envelopes define the upper and lower boundaries of a security's normal trading range. A sell signal is generated when the security reaches the upper band, whereas a buy signal is generated at the lower band. The optimum percentage shift depends on the volatility of the security--the more volatile, the larger the percentage.

The logic behind envelopes is that overzealous buyers and sellers push the price to the extremes (i.e., the upper and lower bands), at which point the prices often stabilize by moving to more realistic levels. This is similar to the interpretation of Bollinger Bands (see page 449).

Equivolume

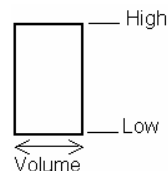
Developed by Richard W. Arms, Jr., and explained in his book [Volume Cycles in the Stock Market](#) (see page 544), Equivolume presents a highly informative picture of market activity for stocks, futures, and indices.

Equivolume departs from other charting methods with its emphasis on volume as an equal partner with price. Instead of being displayed as an "afterthought" on the lower margin of a chart, volume is combined with price in a two-dimensional box. The top line of the box is the high for the period and the bottom line is the low for the period. The width of the box is the unique feature of Equivolume charting; it represents the volume of trading for the period.

The width of the box is controlled by a normalized volume value. The volume for an individual box is normalized by dividing the actual volume for the period by the total of all volume displayed on the chart.

Therefore, the width of each Equivolume box is based on a percentage of total volume, with the total of all percentages equaling 100.

The following illustration shows the components of an Equivolume box:



The resulting charts represent an important departure from all other analytical methods, in that time becomes less important than volume in analyzing price moves. It suggests that each movement is a function of the number of shares or contracts changing hands rather than the amount of time elapsed.

Perhaps the Equivolume charting method is best summed up by the developer himself as follows: "If the market wore a wristwatch, it would be divided into shares, not hours."

Interpretation

The shape of each Equivolume box provides a picture of the supply and demand for the security during a specific trading period. Short and wide boxes (i.e., small change in price combined with heavy volume) tend to be seen at turning points, while tall and narrow boxes (i.e., large change combined with low volume) are more likely to be seen during continuing moves.

Especially important are boxes which penetrate old support or resistance levels, since it takes "power" to create a reliable penetration. A "power box" is one in which both height and width increase substantially. Lack of box width, due to light volume, puts the validity of a breakout in question.

The more volume in a top or bottom consolidation, the larger the ensuing move is likely to be. Volume is directly observable on an Equivolume chart by noting the overall width of the consolidation.

For an in-depth understanding of Equivolume, we recommend the book [Volume Cycles in the Stock Market](#) by the developer, Richard W. Arms, Jr. (see page 544).

Fibonacci Studies

Leonardo Fibonacci was an important mathematician who was born in Italy around the year 1170. It is rumored that Fibonacci discovered the relationship of what are now referred to as Fibonacci numbers while studying the Great Pyramid of Giza in Egypt.

Fibonacci numbers are a sequence of numbers in which each successive number is the sum of the two previous numbers:

1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377, 610, etc.

These numbers possess an intriguing number of interrelationships, such as the fact that any given number is approximately 1.618 times the preceding number and any given number is approximately 0.618 times the following number. The booklet [Understanding Fibonacci Numbers](#) by Edward Dobson (see page 544) contains a good discussion of these interrelationships.

See page 205 for more information on drawing line studies. See Fibonacci Arcs (page 216), Fibonacci Fans (page 217), Fibonacci

Retracements (page 217), and Fibonacci Time Zones (page 217) for more information on the Fibonacci parameters.

Interpretation

MetaStock Pro has four Fibonacci studies: arcs, fans, retracements, and time zones.

The general interpretation of the Fibonacci studies involves the anticipation of a change in trend as prices near the lines created by the Fibonacci studies.

Arcs

The calculation and interpretation of Fibonacci Arcs is similar to that of Fibonacci Fan Lines. First, a trendline is drawn between two extreme points. MetaStock Pro then draws three arcs, centered on the second extreme point, that intersect the trendline drawn between the two extreme points at the Fibonacci levels of 38.2%, 50.0%, and 61.8%.

The interpretation of Fibonacci Arcs involves looking for, or anticipating, support and resistance as prices approach the arcs. A common technique is to display both Fibonacci Arcs and Fibonacci Fan Lines and to anticipate support/resistance at the points where the Fibonacci studies cross.

The points where the Arcs cross the price data will vary depending on the scaling, because the Arcs are drawn so they always appear circular relative to the computer screen.

Fans

Fibonacci Fan Lines are displayed by first drawing a trendline between two extreme points. MetaStock Pro then draws an invisible vertical line through the second extreme point. This vertical line is then divided at the Fibonacci levels of 38.2%, 50.0%, and 61.8%. Finally, three trendlines are drawn from the first extreme point so they pass through the invisible vertical line at the above three levels. (This technique is similar to the method used to calculate Speed Resistance Lines, see page 515.)

Retracements

Fibonacci Retracements are displayed by first drawing a trendline between two extreme points (i.e., a significant trough and peak). After selecting *Fibonacci Retracement* from the Insert menu, a series of up to nine horizontal lines will be drawn at the Fibonacci levels of 0.0%, 23.6%, 38.2%, 50.0%, 61.8%, 100%, 161.8%, 261.8%, and 423.6%.

After a significant move (either up or down), prices will often rebound and retrace a significant portion (if not all) of the original move. As the price retraces, support and resistance levels will often occur at or near the Fibonacci Retracement levels.

Time Zones

The Fibonacci Time Zones command displays vertical lines at the Fibonacci intervals of 1, 2, 3, 5, 8, 13, 21, 34, etc. The interpretation of Fibonacci Time Zones involves looking for significant changes in price near the vertical lines.

Forecast Oscillator

The Forecast Oscillator is an extension of the linear regression based indicators made popular by Tushar Chande. The Forecast Oscillator plots the percentage difference between the forecast price (generated by an x-period linear regression line) and the actual price. The oscillator is above zero when the forecast price is greater than the actual price. Conversely, it's less than zero if its below. In the rare case when the forecast price and the actual price are the same, the oscillator would plot zero.

For more on linear regression analysis see pages 480, 478, and 530.

Interpretation

Actual prices that are persistently below the forecast price suggest lower prices ahead. Likewise, actual prices that are persistently above the forecast price suggest higher prices ahead. Short-term traders should use shorter time periods and perhaps more relaxed standards for the required length of time above or below the forecast price. Long-term traders should use longer time periods and perhaps stricter standards for the required length of time above or below the forecast price.

Chande also suggests plotting a three-day moving average trigger line of the Forecast Oscillator to generate early warnings of changes in trend. When the oscillator crosses below the trigger line, lower prices are suggested. When the oscillator crosses above the trigger line, higher prices are suggested.

Fourier Transform

It is beyond the scope of the manual to provide a full explanation of Fourier analysis. Further information can be found in Technical Analysis of Stocks & Commodities magazine (TASC), Volume One issues #2, #4, and #7; Volume Two issue #4; Volume Three issues #2 and #7 (Understanding Cycles); Volume Four issue #6; Volume Five issues #3 (In Search of the Cause of Cycles) and #5 (Cycles and Chart Patterns); and Volume Six issue #11 (Cycles).

Fourier Transforms were originally developed as an engineering tool to study repetitious (cyclical) phenomena such as the vibration of a stringed musical instrument or an airplane wing during flight.

The complete analysis concept is called spectral analysis. Fast Fourier Transform (FFT) is an abbreviated calculation that computes in seconds

rather than minutes. The FFT sacrifices phase relationships and concentrates only on cycle length and amplitude (strength).

The benefit of FFT is its ability to extract the predominate cycle(s) from a series of data (e.g., an indicator or a security's price).

FFTs are based on the principal that any finite, time-ordered set of data can be approximated arbitrarily well by decomposing the data into a set of sine waves. Each sine wave has a specific cycle length, amplitude, and phase relationship to the other sine waves.

Problems occur when applying FFT analysis to security price data because FFTs were designed to be applied to non-trending, periodic data (whereas security price data tends to be trending). This is overcome by "detrending" the data using either a linear regression trendline or a moving average.

Security data is not truly periodic, since securities are not traded on weekends and some holidays. MetaStock Pro removes these discontinuities by passing the data through a smoothing function called a "hamming window."

See page 163 for more information on plotting indicators. See page 180 for more information on the Fourier Transform parameters.

Interpretation

As stated at the beginning of this section, it is beyond the scope of the manual to provide complete interpretation of FFT analysis. The remainder of this section explains the interpretation of MetaStock Pro's Interpreted FFT.

The Interpreted FFT displays an indicator that shows the three predominate cycle lengths and the relative strength (i.e., the relative amplitudes) of the cycles.

The Interpreted FFT indicator is always displayed from the most significant cycle to the least significant cycle. The longer the indicator remains at a specific cycle length, the more predominate it was in the data being analyzed.

Once you know the predominate cycle length, you may want to use it as a parameter for other indicators. For moving averages, use 1/2 of the cycle length for the optimum number of periods. For example, if you know that a security has a 40-day cycle, you may want to plot a 20-day moving average.

Gann Studies

W. D. Gann (1878-1955) designed several unique techniques for studying price charts. Central to Gann's techniques was the use of geometric angles in conjunction with time and price. Gann believed that specific

geometric patterns and angles had unique characteristics that could be used to predict price action.

All of Gann's techniques require that equal time and price intervals be used on the charts, so that a rise/run of 1 x 1 will always equal a 45 degree angle.

Gann believed that the ideal balance between time and price exists when prices rise or fall at a 45 degree angle relative to the time axis. This is also called a 1 x 1 angle (i.e., prices rise one price unit for each time unit).

See page 205 for more information on plotting line studies. See page 218 for more information on the Gann Study parameters.

Interpretation

Gann Angles are drawn between a significant bottom and top (or vice versa) at various angles. Deemed the most important by Gann, the 1 x 1 trendline signifies a bull market if prices are above the trendline or a bear market if below. Gann felt that a 1 x 1 trendline provides major support during an up-trend and when the trendline is broken, it signifies a major reversal in the trend. Gann identified nine significant angles, with the 1 x 1 being the most important:

| | | |
|--------------|---|-------------------|
| 1 x 8 | - | 82.5 degrees |
| 1 x 4 | - | 75 degrees |
| 1 x 3 | - | 71.25 degrees |
| 1 x 2 | - | 63.75 degrees |
| 1 x 1 | - | 45 degrees |
| 2 x 1 | - | 26.25 degrees |
| 3 x 1 | - | 18.75 degrees |
| 4 x 1 | - | 15 degrees |
| 8 x 1 | - | 7.5 degrees |

Note that in order for the rise/run values (e.g., 1 x 1, 1 x 8, etc.) to match the actual angles (in degrees), the x- and y-axes must have equally spaced intervals. This means that one unit on the x-axis (i.e., hour, day, week, month, etc.) must be the same distance as one unit on the y-axis. The easiest way to calibrate the chart is make sure that a 1 x 1 angle produces a 45 degree angle.

Gann observed that each of the angles can provide support and resistance depending on the trend. For example, during an up-trend the 1 x 1 angle tends to provide major support. A major reversal is signaled when prices fall below the 1 x 1 angled trendline. According to Gann, prices should then be expected to fall to the next trendline (i.e., the 2 x 1 angle). In other words, as one angle is penetrated, expect prices to move and consolidate at the next angle.

Gann developed several techniques for studying market action. These include Gann Lines, Gann Fans, and Gann Grids.

Herrick Payoff Index

The Herrick Payoff Index is used to analyze futures and commodities. Because the Index uses open interest in its calculations, the security must contain open interest.

Briefly, the calculation of the Herrick Payoff Index involves computing the mean price for each day and then using this information to compute the difference in mean prices for each day. The flow of money into, or out of, the commodity is then computed by multiplying the change in the mean prices by the day's volume to arrive at a total change in dollars for the day. MetaStock Pro uses the dollar value of a one cent move (input by the user) to modify the "money flow" by changes in open interest. The daily values of the "modulated dollar amount" are then smoothed with an exponential moving average.

According to Herrick, the recommended input for "the value of a one cent move" is "100" for most commodities. The only exception is for Silver, which should be "50."

Before the Herrick Payoff Index is calculated, you will be prompted to enter a smoothing factor known as the "multiplying factor." The multiplying factor is part of a complex smoothing mechanism. However, the results are similar to the smoothing obtained by a moving average. For example, a multiplying factor of ten produces results similar to a 10-period moving average.

See page 163 for more information on plotting indicators. See page 183 for more information on the Herrick Payoff Index parameters.

Interpretation

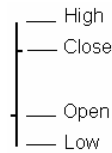
The interpretation of the Herrick Payoff Index involves visually comparing the action of the Index with the price while looking for divergences and convergences. An example divergence would be increasing prices while the Index is falling. An example convergence would be decreasing prices while the Index is rising.

Tip

Open interest is usually not available for the most recent day. Thus, the right most data point of the Herrick Payoff Index is usually blank.

High/Low/Close Bar

A bar chart is the most popular way to display security prices. A bar chart is made up of vertical bars, with each bar representing the price movement for a time period (i.e., hour, day, week, month, etc.). Hash marks on the left and right sides of the bar represent the opening and closing prices respectively. The top of the bar represents the high price and the bottom of the bar represents the low price.



Interpretation

Bar charts, by themselves are used to view the movement of the security's prices over a specific time period. Indicators (see page 163) and line studies (see page 205) can be displayed along with bar charts to help determine the future direction of the security's price.

Inertia

The Inertia indicator was developed by Donald Dorsey. It was originally introduced in the September 1995 issue of Technical Analysis of Stocks & Commodities magazine. It is an outgrowth of Dorsey's Relative Volatility Index (see page 513).

Dorsey chose the name "Inertia" because of his definition of a trend. He asserts that a trend is simply the "outward result of inertia." It takes significantly more energy for a market to reverse direction than to continue along the same path. Therefore a trend is a measurement of market inertia.

In physics, Inertia is defined in terms of mass and direction of motion. Using technical analysis to analyze security prices, the direction of motion is easily defined. However, mass is not so easily defined. Dorsey asserts that "volatility" may be the simplest and most accurate measurement of inertia. This theory led him to use the Relative Volatility Index (RVI) as the basis for a trend indicator.

Inertia is simply a smoothed RVI. The smoothing mechanism is a Linear Regression indicator (see page 475). The RVI helps measure the general direction of volatility. Dorsey found that by smoothing the RVI, a good long-term trend indicator resulted.

See page 163 for more information on plotting indicators. See page 183 for more information on the Inertia parameters.

Interpretation

If the Inertia indicator is above 50, positive inertia is indicated. The long-term trend is up and should remain up as long as the indicator is above 50. If it's below 50, negative inertia is indicated. The long-term trend is down and should remain down as long as the indicator is below 50.

Intraday Momentum Index

The Intraday Momentum Index (IMI) was developed by Tushar Chande. It is a cross-breed between the RSI (see page 512) and candlestick analysis (see page 450). For more information on the IMI, refer to the book The New Technical Trader by Tushar Chande and Stanley Kroll.

The calculation of the IMI is very similar to the RSI, except it uses the relationship between the intraday opening and closing prices to determine whether the day is “up” or “down.” If the close is above the open, it is an up day. If the close is below the open it is a down day. Therein lies its tie to candlestick charting. For those familiar with candlestick charting, the IMI separates the black and white candlesticks and performs a RSI calculation on the candlestick bodies.

See page 163 for more information on plotting indicators. See page 183 for more information on the Intraday Momentum Index parameters.

Interpretation

Overbought/oversold. Index values above 70 indicate a potential overbought situation with lower prices ahead. Values below 30 indicate a potential oversold situation with higher prices ahead. As with all overbought/oversold indicators, you should first quantify the trendiness of the market before acting on the signals. Indicators like the VHF (see page 533), CMO (see page 454), and r-squared (see page 506) can be used to gauge the trendiness of the market.

Divergences. The basic premise behind the IMI, is that shifts in intraday momentum lead shifts in interday momentum. Look for divergences between the indicator and the price action. If the price trends higher (lower) and the IMI trends lower (higher), then a reversal may be imminent.

Candlestick Confirmation. The IMI is useful in confirming candlestick patterns. For example, before acting on a bullish candlestick pattern such as the Engulfing Bullish Lines (see page 291), you may want to confirm the bullishness with the IMI.

Kagi

Kagi charts are thought to have been created around the time the Japanese stock market started trading in the 1870s. Kagi charts were introduced to the western world by Steve Nison (a well-known authority on the Candlestick charting method). Kagi charts display a series of connecting vertical lines where the thickness and direction of the lines are dependent on the price action. If closing prices continue to move in the direction of the prior vertical Kagi line, that line is extended. However, if the closing price reverses by a pre-determined "reversal" amount, a new Kagi line is drawn in the next column in the opposite direction. An interesting aspect

of the Kagi chart is that when closing prices penetrate the prior column's high or low, the thickness of the Kagi line changes.

To draw Kagi lines, compare the close to the ending point of the last Kagi line. If the price continues in the same direction as the prior line, the line is extended in the same direction, no matter how small the move.

However, if the closing price moves in the opposite direction by the reversal amount or more (this could take a number of sessions), then a short horizontal line is drawn to the next column and a vertical line is continued to the new closing price. If the closing price moves in the opposite direction of the current column by less than the reversal amount then no lines are drawn.

In addition, if a thin Kagi line exceeds the prior high point (on the Kagi chart), the line becomes thick. Likewise, if a thick Kagi line breaks a prior low point, the line becomes thin.

Interpretation

Kagi charts are an excellent way to view the underlying supply and demand of a security. A series of thick lines shows that demand is exceeding supply (a rally); a series of thin lines shows that supply is exceeding demand (a decline); and a series of alternating thick and thin lines shows that the market may be in a relative state of equilibrium (i.e., supply equals demand).

The most basic trading technique for Kagi charts is to buy when the Kagi line changes from thin to thick and to sell when the Kagi line changes from thick to thin.

A sequence of higher highs and higher lows on Kagi charts shows the underlying force of the bulls. As a general rule of thumb, eight to 10 higher highs on a Kagi chart often coincides with an overextended market (i.e., a downside reversal may be imminent). Whereas, lower highs and lower lows may reflect an underlying weakness.

Indicators calculated on kagi charts use all the data in each column and then display the average value of the indicator for that column.

For more in-depth coverage of the Kagi charting method, we recommend the book [Beyond Candlesticks](#) by Steve Nison (see page 544).

Klinger Oscillator

The Klinger Oscillator (KO) was developed by Stephen J. Klinger. Learning from prior research on volume by such well-known technicians as Joseph Granville, Larry Williams, and Marc Chaikin, Mr. Klinger set out to develop a volume-based indicator to help in both short- and long-term analysis.

The KO was developed with two seemingly opposite goals in mind: to be sensitive enough to signal short-term tops and bottoms, yet accurate enough to reflect the long-term flow of money into and out of a security.

The KO is based on the following tenets:

- Price range (i.e. High - Low) is a measure of movement and volume is the force behind the movement. The sum of High + Low + Close defines a trend. Accumulation occurs when today's sum is greater than the previous day's. Conversely, distribution occurs when today's sum is less than the previous day's. When the sums are equal, the existing trend is maintained.
- Volume produces continuous intra-day changes in price reflecting buying and selling pressure. The KO quantifies the difference between the number of shares being accumulated and distributed each day as "volume force." A strong, rising volume force should accompany an uptrend and then gradually contract over time during the latter stages of the uptrend and the early stages of the following downtrend. This should be followed by a rising volume force reflecting some accumulation before a bottom develops.
- By converting the volume force into an oscillator representing the difference between a 34-period and 55-period exponential moving average with a 13-period trigger, the force of volume into and out of a security can easily be tracked. Comparing this force to price action can help identify divergences at tops and bottoms.

See page 163 for more information on plotting indicators.

Interpretation

Mr. Klinger recommends the following guidelines for using the KO:

- 1) The most reliable signals occur in the direction of the prevailing trend. Strict stop guidelines (i.e., failure to penetrate the zero line or a violation of the trigger line) should remain in force.
- 2) The most important signal occurs when the KO diverges with the underlying price action, especially on new highs or new lows in overbought/oversold territory. For example, when a stock makes a new high or low for a cycle and the KO fails to confirm this, the trend may be losing momentum and nearing completion.
- 3) If the price is in an uptrend (i.e., above an 89-day exponential moving average), buy when the KO drops to unusually low levels below zero, turns up, and crosses its trigger line. If the price is in a downtrend (i.e., below an 89-day exponential moving average), sell when the KO rises to unusually high levels above zero, turns down, and crosses its trigger line.

While the KO works well for timing trades in the direction of the trend, it is less effective against the trend. This can create problems for the trader trying to "scalp" a trade against the prevailing trend. However, when the KO is used in conjunction with other technical indicators, better results

can be achieved. William's %R (see page 538) is recommended for confirming an overbought/oversold price condition and Gerald Appel's MACD (see page 478) is recommended for confirming the short-term direction of price.

Tip

Stephen Klinger suggests the following formula for viewing the cumulative flow of money into and out of a security:

```
cum(kvo( ))
```

Plot a 13-period moving average of the formula as a trigger line for entering buy and sell trades. See page 299 for more information on creating formulas.

Line Chart

A line chart is the simplest type of chart. One price (typically the close) is plotted for each time period (i.e., day, week, month, etc.). A single, unbroken line connects each of these price points.

Interpretation

Line charts, by themselves are used to view the movement of the security's prices over a specific time period. Indicators (see page 163) and line studies (see page 205) can be displayed along with line charts to help determine the future direction of the security's price.

A line chart's strength comes from its simplicity. It provides an uncluttered, easy to understand view of a security's price. Line charts are typically displayed using a security's closing prices.

Linear Regression Indicator

The Linear Regression indicator is based on the trend of a security's price over a specified time period. The trend is determined by calculating a linear regression trendline using the "least squares fit" method. The least squares fit technique fits a trendline to the data in the chart by minimizing the distance between the data points and the linear regression trendline.

Any point along the Linear Regression indicator is equal to the ending value of a Linear Regression trendline. For example, the ending value of a Linear Regression trendline that covers 10 days will have the same value as a 10-day Linear Regression indicator. This differs slightly from the Time Series Forecast indicator (see page 527) in that the TSF adds the slope to the ending value of the regression line. This makes the TSF a bit more responsive to short term price changes. If you plot the TSF and the Linear Regression indicator side-by-side, you'll notice that the TSF hugs the prices more closely than the Linear Regression indicator.

Rather than plotting a straight Linear Regression trendline, the Linear Regression indicator plots the ending values of multiple Linear Regression trendlines.

See page 163 for more information on plotting indicators. See page 184 for more information on the Linear Regression indicator parameters.

Interpretation

The interpretation of a Linear Regression indicator is similar to a moving average. However, the Linear Regression indicator has two advantages over moving averages.

Unlike a moving average, a Linear Regression indicator does not exhibit as much "delay." Since the indicator is "fitting" a line to the data points rather than averaging them, the Linear Regression line is more responsive to price changes.

The indicator is actually a forecast of the next periods (tomorrow's) price plotted today. The Forecast Oscillator plots the percentage difference between the forecast price and the actual price. Tushar Chande suggests that when prices are persistently above or below the forecast price, prices can be expected to snap back to more realistic levels. In other words the Linear Regression indicator shows where prices should be trading on a statistical basis. Any excessive deviation from the regression line should be short-lived.

Linear Regression Slope

The Linear Regression method provides several useful outputs for technical analysts, including the Slope. The Slope shows how much prices are expected to change per unit of time. Some may remember this as "rise over run."

See page 163 for more information on plotting indicators. See page 185 for more information on the Linear Regression Slope parameters.

Interpretation

It is helpful to consider Slope in relation to r-squared (see page 506). While Slope gives you the general direction of the trend (positive or negative), r-squared gives you the strength of the trend. A high r-squared value can be associated with a high positive or negative Slope.

When the Slope of the trend first becomes significantly positive, you could open a long position. You could sell, or open a short position when the Slope first becomes significantly negative. You should refer to the table below to determine when a trend is deemed "significant." For example, if the 14-period Slope has recently turned from negative to positive (i.e., crossed above zero), you may consider buying when r-squared crosses above the 0.27 level.

To determine if the trend is statistically significant for a given x-period linear regression line, plot the r-squared indicator and refer to the following table. This table shows the values of r-squared required for 95% confidence level at various time periods. If the value is less than the critical values shown, you should assume that prices show no statistically significant trend.

| Number of Periods | r-squared Critical Value (95% confidence) |
|-------------------|---|
| 5 | 0.77 |
| 10 | 0.40 |
| 14 | 0.27 |
| 20 | 0.20 |
| 25 | 0.16 |
| 30 | 0.13 |
| 50 | 0.08 |
| 60 | 0.06 |
| 120 | 0.03 |

You may even consider opening a short-term position opposite the prevailing trend when you observe the Slope rounding off at extreme levels. For example, if the Slope is at a relatively high level and begins to turn down, you may consider selling or opening a short position.

There are numerous ways to use the linear regression outputs of Slope and r-squared in trading systems. For more detailed coverage, refer to the book The New Technical Trader by Tushar Chande and Stanley Kroll.

Linear Regression Trendline

Linear regression is a statistical tool used to predict future values from past values. In the case of security prices, it is commonly used as a quantitative way to determine the underlying trend and when prices are overextended.

A Linear Regression trendline uses the least squares method to plot a straight line through prices so as to minimize the distances between the prices and the resulting trendline.

See page 205 for more information on plotting line studies. See page 218 for more information on the Linear Regression parameters.

Interpretation

If you had to guess what a particular security's price would be tomorrow, a logical guess would be "fairly close to today's price." If prices are

trending up, a better guess might be “fairly close to today’s price with an upward bias.” Linear regression analysis is the statistical confirmation of these logical assumptions.

A Linear Regression trendline is simply a trendline drawn between two points using the least squares fit method. The trendline is displayed in the exact middle of the prices. If you think of this trendline as the “equilibrium” price, any move above or below the trendline indicates overzealous buyers or sellers.

A Linear Regression trendline shows where equilibrium exists. Raff Regression Channels (see page 508) show the range prices can be expected to deviate from a Linear Regression trendline.

The Time Series Forecast indicator (see page 527) displays the same information as a Linear Regression trendline. Any point along the Time Series Forecast is equal to the ending value of a Linear Regression Trendline plus its slope. For example, the ending value of a Linear Regression trendline (plus its slope) that covers 10 days will have the same value as a 10-day Time Series Forecast.

Linear Regression trendlines is used to construct Raff Regression Channels (see page 220), Projection Bands (see page 503), Projection Oscillator (see page 504) and the Linear Regression indicator (see page 475).

MACD

The Moving Average Convergence/Divergence indicator (MACD) is calculated by subtracting the value of a 0.075 (26-period) exponential moving average from a 0.15 (12-period) exponential moving average. A 9-period dotted exponential moving average (the “signal line”) is automatically displayed on top of the MACD indicator line.

You may find the expert named “Equis - MACD” helpful in interpreting the MACD indicator. See page 435 for more information an experts.

See page 163 for more information on plotting indicators. See page 185 for more information on the MACD parameters.

Interpretation

The basic MACD trading rule is to sell when the MACD falls below its 9-period signal line. Similarly, a buy signal occurs when the MACD rises above its signal line.

A variation of the MACD can be created by plotting the following formula:

macd() - *mov(macd(), 9, E)*

Then change the indicator line style to a histogram (see page 169), and plot a 9-period dotted moving average of the indicator.

In a system test of this indicator, sell arrows are drawn when the histogram peaked and turned down and buy arrows are drawn when the histogram formed a trough and turned up.

Tips

Additional variations on the MACD (e.g., different moving average time periods) can be created using the Price Oscillator indicator (see page 501).

An example custom indicator (see page 309) shows how to calculate the MACD.

Market Facilitation Index

In his book, Trading Chaos, Dr. Bill Williams, introduces a unique method of combining price action with volume. The main component of this method is a simple indicator he developed called the Market Facilitation Index (MFI).

The MFI simply divides the day's range (high to low) by the total volume. The result shows the efficiency of price movement by quantifying the price movement per unit of volume.

The "Profitunity" expert, written by Bill Williams, is included with MetaStock Pro. This expert labels each bar on your chart and provides commentary on the current bar. See 399 for more information on the Expert Advisor.

For information on other products and services offered by Bill Williams, call Profitunity Trading Group at 1-409-945-8880.

See page 163 for more information on plotting indicators. See page 185 for more information on the MFI parameters.

Interpretation

The MFI as a stand-alone indicator has little value. However, by comparing the current bar's MFI and volume with the previous bar's MFI and volume, a very tradable system emerges.

William's defines the four possible combinations of MFI and volume as follows. A plus sign means the current bar's value is greater than the previous bar's value. A minus sign means the current bar's value is less than the previous bar's value.

| Volum e | MFI | Label |
|------------|-----|-------|
| + | + | Green |
| - | - | Fade |
| - | + | Fake |

| | | |
|---|---|-------|
| + | - | Squat |
|---|---|-------|

Green. This bar shows an increase in volume and MFI relative to the previous bar. Hence, there is price movement, and the MFI is larger for this bar than that for the previous bar. Further, more players are entering the market as signaled by the increase in volume. This activity in the futures market means that off-floor traders are very active. In addition, the price action is directional--that is, the market is moving in one direction due to the involvement of new traders putting on new positions. This is the kind of day that you would already want to have a trade on in the same direction.

Fade. This bar shows a decrease in volume and MFI relative to the previous bar. The market has slowed and there is a minor amount of activity as indicated by the low volume. This type of day is called a fade, as the traders' interest in the market by this point is fading. Often, this sort of day happens at the end of a trend. The market has simply reached a point where nobody is willing to establish any new positions. At this point the market appears to be suffering from a certain amount of boredom. Keep in mind, however, that out of this market condition, a new trend could emerge.

Fake. This bar shows a decrease in volume but an increase in the MFI. This condition means that the market is moving more relative to the previous bar (the greater MFI), but the lack of volume is evidence that there is no new participation. The price action may be driven by just the traders in the pit and is not attracting new players from the outside. Williams has an hypothesis, that the traders in the pit may be just strong enough to push the market to price levels where there are many stop orders resting in the hands of the brokers, hence faking out the off-floor traders.

Squat. This bar shows an increase in volume relative to the previous bar, but the MFI is lower. The increase in volume indicates heavy activity, but the decrease in the MFI indicates that the market is unable to make any real headway. Volume increased, the trend has stalled and the price movement has stopped. This price action usually, but not always occurs prior to an important move in the opposite direction. This type of bar is called a squat bar because the market appears to be squatting prior to a breakout. Often, the breakout of such a bar will indicate whether this squat is a trend reversal squat or a trend continuation squat.

Mass Index

The Mass Index, popularized by Tushar Chande and Donald Dorsey (see the June 1992 issue of Technical Analysis of Stocks & Commodities magazine), is calculated by summing an exponentially smoothed moving average of the daily ranges (High-Low) over 25 periods.

The Mass Index is designed to identify reversals in trend by measuring the narrowing and widening of the average range between the high and low prices. As the range widens, the Mass Index increases. As the range narrows, the Mass Index decreases.

See page 163 for more information on plotting indicators. See page 186 for more information on the Mass Index parameters.

Interpretation

The most significant pattern to watch for is called the "reversal bulge." A reversal bulge occurs when a 25 period Mass Index rises above 27 and subsequently falls below 26.5. A reversal in price is likely once the Mass Index falls below 26.5. The overall direction of prices (i.e., trending or trading range), is unimportant.

A 9-period exponential moving average is used to determine whether the reversal bulge indicates a "buy" or "sell" signal. Since the Mass Index attempts to predict reversals in trend, positions should be taken by buying if the moving average is trending down and selling if the moving average is trending up. Since trends can fail to reverse, stop-loss orders should be placed with new positions.

Median Price

The Median Price indicator is calculated by adding the high price and the low price together, and then dividing by two. The result is the average, or median, price.

$$\text{Median Price} = \frac{\text{High} + \text{Low}}{2}$$

See page 163 for more information on plotting indicators. See page 186 for more information on the Median Price parameters.

Interpretation

The Median Price indicator provides a simple, single-line chart of the day's average price. You may find it helpful when testing moving average penetration systems to display moving averages of the Median Price indicator, rather than of the security's closing price.

Tip

An example custom indicator (30907) shows how to calculate the Median Price indicator.

MESA Sine Wave

The MESA Sinewave indicator was developed by recognized cycle specialist John Ehlers. The MESA Sinewave indicator looks like a sinewave when the market is in a cycle mode and tends to wander when the market is in a trend mode. The MESA Sinewave indicator anticipates cycle mode turning points rather than waiting for confirmation as is done with most oscillators. The MESA Sinewave indicator has the additional advantage that trend mode whipsaw signals are minimized.

The Sine Wave indicator was introduced in the November 1996 issue of Technical Analysis of Stocks & Commodities magazine.

See page 163 for more information on plotting indicators. See page 186 for more information on the MESA Sine Wave indicator parameters.

Interpretation

The MESA Sinewave indicator consists of two plots - one displaying the Sine of the measured phase angle over the time period parameter and the other the Sine of the phase angle advanced by 45 degrees (called the Lead Sine). Together, the crossings of the Sine and Lead Sine plots give clear advanced indication of cycle mode turning points.

When the MESA Sinewave indicator resembles an actual sine wave, this suggests the market is in a cycle mode. The indicator lines are not well structured when the market is in a trend mode. A buy signal is given when the Sine plot crosses above the Lead Sine plot. A sell signal is given when the Sine plot crosses below the Lead Sine plot. An obvious advantage that the MESA Sinewave indicator has over its “overbought/oversold” counterparts is that it enters and exits much more precisely without giving up a piece of the market’s movement by waiting for confirmation.

When the market is in a trend mode the MESA Sinewave indicator does not resemble a sine wave. In fact, the Sine and Lead Sine plots typically languish in a sideways pattern around zero, running somewhat parallel and distant from each other. The correct trading strategy in the trend mode is to trade the trend. Basic moving average crossovers are helpful for entering and exiting positions in this type of market.

The MESA Sinewave indicator is sensitive to using the correct time period parameter. You can use the Cycle Lines line study (see page 215) to estimate the best time period to use.

Momentum

The momentum of a security is the ratio of today's price compared to the price x -time periods ago. The formula equivalent of the calculation is shown below:

$$\text{Momentum} = \frac{\text{Close}}{\text{ref}(\text{Close}, -10)} \times 100$$

Where:

$\text{ref}(\text{Close}, -10)$ = The closing price 10 periods ago

See page 163 for more information on plotting indicators. See page 186 for more information on the Momentum parameters.

Interpretation

The interpretation of the Momentum indicator is identical to the interpretation of the Price R.O.C (see page 501). Both indicators display the rate-of-change of a security's price. The Price R.O.C. indicator displays the rate-of-change as a percentage. The Momentum indicator displays the rate-of-change as a ratio.

Money Flow Index

The Money Flow Index (MFI) attempts to measure the strength of money flowing in and out of a security. It is closely related to the Relative Strength Index (RSI); however, the Money Flow Index accounts for volume action. The RSI incorporates price action only.

Money flow (not the Money Flow Index) is calculated by determining the average price for the day and then comparing this figure to the previous day's average price. If today's average price is greater, it is considered positive money flow. If today's average price is less, it is considered negative money flow. Money flow for a specific day is calculated by multiplying the average price by the volume.

$$\text{Money Flow} = \text{Volume} \times \text{Average Price}$$

Positive Money Flow is the sum of the positive money flow over the specified number of periods. Negative Money Flow is the sum of the negative money flow over the specified number of periods.

$$\text{Money Ratio} = \frac{\text{Positive Money Flow}}{\text{Negative Money Flow}}$$

Finally, the Money Flow Index is calculated using the following formula:

$$\text{Money Flow Index (MFI)} = 100 - \frac{100}{1 + \text{Money Ratio}}$$

See page 163 for more information on plotting indicators. See page 187 for more information on the Money Flow Index parameters.

Interpretation

The interpretation of the Money Flow Index is as follows:

- Look for divergence/failure swings between the indicator and the price action. If the price trends higher (lower) and the MFI trends lower (higher), then a reversal may be imminent.
- Look for market tops to occur when the MFI is above a specific level (e.g., 80). Look for market bottoms to occur when the MFI is below a specific level (e.g., 20).

Moving Averages

A moving average is a method of calculating the average value of a security's price, or indicator, over a period of time. The term "moving" implies, and rightly so, that the average changes or moves. When calculating a moving average, a mathematical analysis of the security's average value over a predetermined time period is made. As the security's price changes over time, its average price moves up or down.

MetaStock Pro calculates and displays six different types of moving averages: simple (also referred to as arithmetic), exponential, time series, triangular, variable, and weighted. In addition, MetaStock Pro will calculate moving averages of the security's open, high, low, close, median price, typical price, volume, open interest, or indicator.

The only significant difference between the various types of moving averages is the weight assigned to the most recent data. Once this "weighting" scheme has been determined, it is held static over the range of calculations. The exceptions are the variable moving average and volume adjusted moving average. The variable moving average automatically adjusts its weighting based on market conditions. A variable moving average becomes more sensitive to recent data as volatility increases and less sensitive to recent data as volatility decreases. Similarly, the volume adjusted moving average automatically adjusts as the security's *volume* increases and decreases.

See page 163 for more information on plotting indicators. See page 187 for more information on moving average parameters.

Moving Average Calculation Methods

Exponential

An exponential (or exponentially weighted) moving average is calculated by applying a percentage of today's closing price to yesterday's moving average value.

For example, to calculate a 9% exponential moving average of IBM: First, we would take today's closing price and multiply it by 9%. We would then add this product to the value of yesterday's moving average multiplied by 91% (100% - 9% = 91%).

$$m.a. = [(today's\ close) \times 0.09] + [(yesterday's\ m.a.) \times 0.91]$$

Because most investors feel more comfortable working with time periods rather than with percentages, MetaStock Pro converts days into an exponential percentage. For example, if a 21-day exponential moving average is requested, a 9% moving average is calculated.

The formula for converting days to exponential percentages is as follows:

$$\text{exponential percentage} = \frac{2}{\text{time periods} + 1}$$

For example, to calculate a 10-day exponential moving average, you would use 0.18:

$$0.18 = \frac{2}{10 + 1}$$

To convert an exponential percentage into time periods, you would use the following formula:

$$\text{time periods} = \frac{2}{\text{percentage}} - 1$$

Using our previous example, we can check to see that a 0.18 exponential moving average is actually a 10-day average.

$$10 = \frac{2}{0.18} - 1$$

The method used to calculate an exponential moving average puts more weight toward recent data and less weight toward past data than does the simple moving average method. This method is often called exponentially weighted.

Simple

A simple, or arithmetic, moving average is calculated by adding the closing price of the security for a number of time periods (e.g., 12 days) and then dividing this total by the number of time periods. The result is the average price of the security over the time period.

For example, to calculate a 21-day moving average of IBM: First, we would add up IBM's closing prices for the preceding 21 days. Next, we would divide that sum by 21; this would give us the average price of IBM over the preceding 21 days. We would plot this average price on the chart. The following day (tomorrow) we would do the same calculations: add up the previous 21 days' closing prices, divide by 21, and plot the resulting figure on the chart.

Time Series

The time series moving average is calculated using linear regression techniques. Rather than plotting a straight linear regression line, a time series moving average plots the last point of the line. It does this using

the specified number of periods for each day. The individual points are then connected together with a line to form a time series moving average.

This moving average is sometimes referred to as a "moving linear regression" study or a "regression oscillator."

For information on calculating linear regression using the least squares method (the basis behind time series moving averages), refer to any basic statistics book.

Triangular

A triangular moving average is similar to exponential and weighted moving averages except a different weighting scheme is used. Exponential and weighted moving averages assign the majority of the weight to the most recent data. Simple moving averages assign the weight equally across all the data. With a triangular moving average, the majority of the weight is assigned to the middle portion of the data.

A triangular moving average is simply a double-smoothed simple moving average. To calculate a 9-period (similar for all odd periods) triangular moving average:

- 1) Divide 9 by 2 to get 4.5
- 2) Round 4.5 up to 5
- 3) Triangular moving average (odd periods) = $(\text{mov}(\text{mov}(c,5,s),5),s)$

A 12-period (similar for all even periods) is calculated as follows:

- 1) Divide 12 by 2 to get 6.
- 2) Add 1 to 6 to get 7*.
- 3) Triangular moving average (even periods) = $(\text{mov}(\text{mov}(c,6,s),7),s)$

* The rule is to take the length divided by 2 as one average, and that number plus 1 as the second.

Variable

A variable moving average is an exponential moving average that automatically adjusts the smoothing constant based on the volatility of the data series. The more volatile the data, the larger the smoothing constant used in the moving average calculation. The larger the smoothing constant, the more weight given to the current data. The opposite is true for less volatile data.

Trader's often associate high volatility with strongly trending markets. However, this is a mistake. Strong trending markets are often less volatile because of the consistency of day-to-day price changes. Its when prices are erratic in their day-to-day movements (i.e., down a lot, up a little, up a little, up a lot, up a little, down a little, etc.), that volatility increases. This can occur in uptrending, downtrending, or sideways markets.

Typical moving averages suffer from the inability to compensate for changes in volatility. During volatile markets, you want a moving

average to increase its sensitivity, so that you will quickly be on the correct side of any wild gyrations. By automatically adjusting the smoothing constant, a variable moving average is able to adjust its sensitivity, allowing it to perform better in both high and low volatility markets.

$$VMA = (0.78 * (\text{volatility index}) * \text{close}) + (1 - 0.078 * \text{volatility index}) * \text{yesterday's VMA}$$

The absolute value of a 9-period Chande Momentum Oscillator is used for the volatility index. The higher this index the more volatile the market, thereby increasing the sensitivity of the moving average.

This method of calculating a variable moving average was presented by Tushar Chande in the March 1992 issue of Technical Analysis of Stocks & Commodities magazine.

Volume Adjusted

Dick Arms, well-known as the developer of the Arms Index and the equivolume charting method (see page 464), has developed a unique method for calculating moving averages. In keeping with his prior work, the calculation method incorporates volume and is appropriately called a *volume adjusted moving average*.

The calculation for a volume adjusted moving average is somewhat complex; however, it is conceptually easy to understand. All moving averages (even volume adjusted) use some type of weighting scheme to "average" the data. Exponential and weighted moving averages assign the majority of weight to the most recent data. Simple moving averages assign the weight equally across all data. Variable moving averages assign the majority of the weight to the most volatile data. And as its name implies, volume adjusted moving averages assign the majority of weight to the day's with the most volume.

A volume adjusted moving average is calculated as follows:

1. Calculate the average volume using every time period in the chart.
2. Calculate the volume increment by multiplying the average volume by 0.67.
3. Calculate each period's volume ratio by dividing each period's actual volume by the volume increment.
4. Starting at the most recent time period and working backwards, multiply each period's price by the period's volume ratio and cumulatively sum these values until the user-specified number of volume increments is reached. Note that only a fraction of the last period's volume will likely be used.

Weighted

A weighted moving average is also designed to put more weight on recent data and less weight on past data. A weighted moving average is calculated by multiplying each of the previous day's data by a weight.

The following table shows how a 5-day weighted moving average is calculated.

| Day No. | Weight | * Price | = Weighted Price |
|---------------|--------|---------|------------------|
| 1 | 1 | 25 | 25 |
| 2 | 2 | 26 | 52 |
| 3 | 3 | 28 | 84 |
| 4 | 4 | 25 | 100 |
| 5 | 5 | 29 | 145 |
| Totals | 15 | 133 | = 27.067 |

Note how the 5-day weighted moving average gives five times more weight to today's price (i.e., $5 * 29$) than to the price five days ago (i.e., $1 * 25$).

Interpretation

The most popular method of interpreting a moving average is to compare the relationship between a moving average of the security's closing price and the security's closing price itself. A sell signal is generated when the security's price falls below its moving average and a buy signal is generated when the security's price rises above its moving average.

This type of moving average trading system is not intended to get you in at the exact bottom and out at the exact top. Rather, it is designed to keep you in line with the security's price trend by buying shortly after the security's price bottoms and selling shortly after it tops.

The critical element in a moving average is the number of time periods used in calculating the average. When using hindsight, you can always find a moving average that would have been profitable. The key is to find a moving average that will be consistently profitable. The most popular moving average is the 39-week (or 200-day) moving average. This moving average has a good track record in timing the major (long-term) market cycles. The length of a moving average should fit the market cycle you wish to follow:

| Trend | Moving Average Length |
|--------------------|-----------------------|
| Very Short Term | 5-13 days |
| Short Term | 14-25 days |
| Minor Intermediate | 26-49 days |
| Intermediate | 50-100 days |
| Long Term | 100-200 days |

When you display moving averages, the number of time periods you enter is based on the periodicity of the security that is loaded. For example, if you load daily data, then entering 12 for the number of time periods in the moving average will cause MetaStock Pro to calculate a 12-day moving average. If you had loaded weekly data, MetaStock Pro would calculate a 12-week moving average.

You can convert a daily moving average quantity into a weekly moving average quantity by dividing the number of days by 5 (e.g., a 200-day moving average is almost identical to a 40-week moving average). To convert a daily moving average quantity into a monthly quantity, divide the number of days by 21 (e.g., a 200-day moving average is very similar to a 9-month moving average).

MetaStock Pro enables you to plot moving averages of securities and any of the indicators tracked by the program. The interpretation of an indicator's moving average is similar to the interpretation of a security's moving average: when the indicator rises above its moving average, it signifies a continued upward movement by the indicator; when the indicator falls below its moving average, it signifies a continued downward movement by the indicator.

Indicators which are especially well-suited for use with moving average penetration systems include the MACD, Price R.O.C., Momentum, and Stochastics.

Some indicators, such as short-term Stochastics, fluctuate so erratically that it is difficult to tell what their trend really is. By removing the indicator (i.e., setting the Indicator Style to Invisible in the Indicator's Properties dialog) and then plotting a moving average of the indicator, we can see the general trend of the indicator rather than its day-to-day fluctuations.

Whipsaws can be reduced, at the expense of a slightly later signal, by plotting a short-term moving average (e.g., 2-10 day) of oscillating indicators such as the 12-day R.O.C., Stochastics, or the RSI. For example, rather than selling when the Stochastic Oscillator falls below 80, you might sell only when a 5-period moving average of the Stochastic Oscillator falls below 80.

Negative Volume Index

The Negative Volume Index (NVI) relates a decrease in volume to the change in the security's price. When volume decreases from the previous day, the NVI is adjusted by the percentage change in the security's price.

```
If (V < (ref(V,-1)) then  
NVI = I + (((C - ref(C,-1) / ref(C,-1)))  
If (V >= ref(V,-1)) then  
NVI = I
```

Where:

| | | |
|------------------|---|--|
| <i>C</i> | = | <i>Today's closing price</i> |
| <i>ref(C,-1)</i> | = | <i>Yesterday's closing price</i> |
| <i>I</i> | = | <i>Yesterday's Negative Volume Index</i> |
| <i>NVI</i> | = | <i>Today's Negative Volume Index</i> |
| <i>V</i> | = | <i>Today's volume</i> |
| <i>ref(V,-1)</i> | = | <i>Yesterday's volume</i> |

The NVI is constructed so it only displays changes on days when volume decreases from the previous day. Because falling prices are usually associated with falling volume, the NVI will usually trend downward.

See page 163 for more information on plotting indicators. See page 188 for more information on the NVI parameters.

Interpretation

Interpretation of the NVI assumes that on days when volume increases, the crowd-following "uninformed" investors are in the market. Conversely, on days with decreased volume, the "smart money" is quietly taking positions. Thus, changes shown in the NVI (remember that the NVI changes only on lower volume days) display what the smart money is doing.

Stock Market Logic, by Norman Fosback, points out that the odds of a bull market are 95 out of 100 when the NVI of the Dow Industrials is above its one-year moving average.

Tip

An example custom indicator (see page 309) shows how to calculate the Negative Volume Index.

ODDS Probability Cones

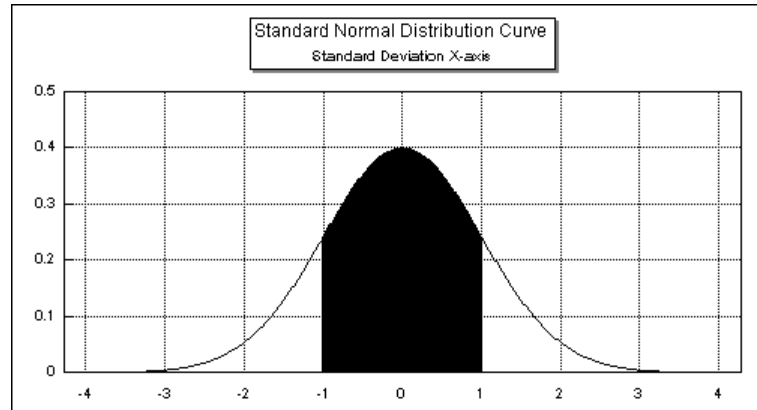
ODDS™ Probability Cones were developed by Don Fishback, renowned option expert and originator of the ODDS option trading methodology.

Perhaps Mr. Fishback's most significant contribution to option analysis includes the application of price volatility and its affect on the laws of probability. ODDS Probability Cones are a result of this work.

Fishback's ODDS methodology is based on the assumptions made in every commonly used option pricing model. If you use an option pricing model to value options, you are making the probability assumptions used by ODDS, whether you realize it or not.

The assumption is that the financial markets are random and that prices exhibit a normal distribution. That means that if you looked at the market's price changes over an extended period of time, the shape of the price distribution would look like a bell curve. The x-axis of a bell curve is in terms of standard deviations--the y-axis in terms of price. A normal distribution assumption has some very useful properties, including the one

that is the most important to us--probability is equal to the area under the curve.



The official definition of volatility is equal to one standard deviation of the price change (expressed in logarithmic terms) annualized. In simpler language, volatility provides us with a value that can be used to measure the "likelihood" of a significant price change. The higher the volatility, the greater the likelihood of a significant price move.

Notice that volatility is equal to one standard deviation, which happens to be the same unit as our bell curve's x-axis. It is this property that allows us to create the ODDS Probability Cones found in MetaStock Pro.

Option traders may find the expert named "Don Fishback – ODDS™ Option Analyst" helpful. See page 435 for more information on experts.

See page 205 for more information on plotting line studies. See page 219 for more information on the ODDS Probability Cones parameters.

For more information, contact Don Fishback at 1-800-637-8970.

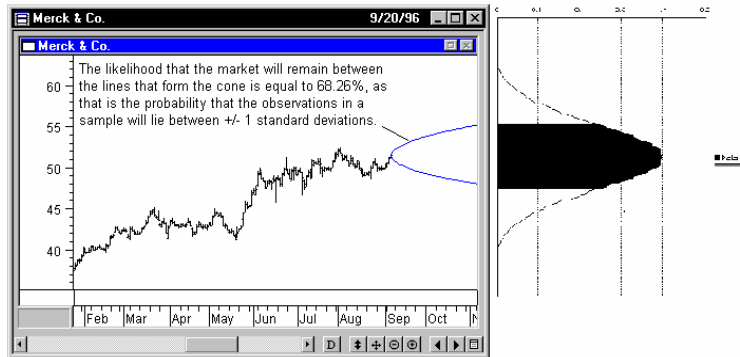
Interpretation

ODDS Probability Cones (which are greatly influenced by recent price volatility) provide you with a visual guide to the most probable range of future prices. This range (i.e. the cone's width) is determined by recent volatility in prices, the number of time periods projected, and the probability percentage (e.g., 68% confidence, 90% confidence, etc.). The more volatile the security prices, the wider the expected range of future prices and hence the wider the cones. The cones always widen from the apex even if recent volatility is very low, because as time increases, the better the odds of a significant price move.

By default, the cones show the expected range of prices given a 68.26% probability (this is equivalent to one standard deviation). This means that there is a 68.26% probability that prices will remain within the cones over the specified time frame. By increasing this percentage, you can control

the width of the cones. As you might expect, higher percentages result in wider cones.

The following illustration shows a chart and a standard bell curve (with one standard deviation shaded) flipped on its side. Note that this corresponds to the width of the Probability Cones on the chart (which are plotted using 68.26%, or one standard deviation).



The original use of this type of analysis was intended to help option traders determine the best strategy to implement. From a probability standpoint, an option trader would prefer to sell options with strikes that lie outside the cones and buy options with strikes that lie within the cones.

The cones also have equal value for the analysis of regular long and short positions. All else being equal and assuming you are confident in your price directional forecast, you would prefer to establish a long or short position in a security with wide cones rather than one with narrow cones. Of course, this assumes that the recent calculated volatility will continue or rise. If you expect volatility to drop, then you should reconsider.

On Balance Volume

On Balance Volume relates volume to price change. It is calculated by adding the day's volume to a cumulative total when the security's price closes up, and subtracting the day's volume when the security's price closes down.

*If today's close > yesterday's close then
 OBV = yesterday's OBV + today's volume
 If today's close < yesterday's close then
 OBV = yesterday's OBV - today's volume
 If today's close = yesterday's close then
 OBV = yesterday's OBV*

See page 163 for more information on plotting indicators. See page 188 for more information on the OBV parameters.

Interpretation

On Balance Volume is a running total of volume. It seeks to show if volume is flowing into or out of a security. When the security closes higher than the previous close, all of the day's volume is considered up-volume. When the security closes lower than the previous close, all of the day's volume is considered down-volume.

Joe Granville is the father of OBV and its analysis. We can barely begin to explain a simplified version of OBV interpretation here. If you want further information on OBV analysis, we recommend that you read his book, New Strategy of Daily Stock Market Timing for Maximum Profits (see page 544).

The basic assumption, regarding OBV analysis, is that OBV changes precede price changes. The theory is that smart money can be seen flowing into the security by a rising OBV. When the public then moves into the security, both the security *and* the OBV will surge ahead.

If the security's price movement precedes OBV movement, a "non-confirmation" is said to have occurred. Non-confirmations can occur at bull market tops (when the security rises without, or before, the OBV) or at bear market bottoms (when the security falls without, or before, the OBV).

The OBV is said to be in a rising trend when each new peak is higher than the previous peak and each new trough is higher than the previous trough. Likewise, the OBV is in a falling trend when each successive peak is lower than the previous peak and each successive trough is lower than the previous trough. When the OBV is moving sideways and is not making successive highs and lows, it is in a doubtful trend.

Once a trend is established, it remains in force until it is broken. There are two ways in which the OBV trend can be broken. The first occurs when the trend changes from a rising trend to a falling trend, or from a falling trend to a rising trend.

The second way the OBV trend can be broken is if the trend changes to a doubtful trend and remains doubtful for more than three days. Thus, if the security changes from a rising trend to a doubtful trend and remains doubtful for only two days before changing back to a rising trend, the OBV is considered to have always been in a rising trend.

When the OBV changes to a rising or falling trend, a *breakout* is said to have occurred. Since OBV breakouts normally precede security breakouts, investors should buy long on OBV upside breakouts. Likewise, investors should sell short when the OBV makes a downside breakout. Positions should be held until the trend changes (as explained in the preceding paragraph).

This method of analyzing On Balance Volume is designed for trading short-term cycles. According to Granville, investors must act quickly and decisively if they wish to profit from short-term OBV analysis.

Tip

An example custom indicator (see page 310) shows how to calculate On Balance Volume.

Open Interest

The Open Interest indicator plots the number of open contracts of a given commodity.

Open interest is only available for futures and can only be plotted if the data file contains open interest data. A simple way to tell if the file contains open interest data is to select the *Open Interest* indicator. If nothing is plotted, there is no open interest data.

See page 163 for more information on plotting indicators. See page 188 for more information on the Open Interest indicator's parameters.

Interpretation

Open interest is used to measure the activity and strength of a commodity. An increase in open interest accompanied with higher prices shows that new buyers are continuing to enter the market and thus can be viewed as a confirmation of the upward price move. Likewise, a decrease in open interest while prices are making new highs (a divergence) is often viewed as a warning sign suggesting an impending decline in prices.

Option Indicators

A brief interpretation of the option indicators in MetaStock Pro is provided below. For more information on these indicators and option analysis see page 543.

See page 163 for more information on plotting indicators. See page 189 for more information on the Option indicator parameters.

Option Delta

Delta shows the amount that the option's price will change if the underlying security's price changes by \$1.00.

For example, if XYZ is selling for \$105.00/share, a call option on XYZ is selling for \$2.00 and the Delta is 75%, then the option's price should increase \$0.75 (to \$2.75) if the price of XYZ increases to \$106.00/share. In other words, the option should go up \$0.75 for each \$1.00 that XYZ goes up.

Option Expiration

The Option Expiration indicator shows the month to month expiration cycle of stock and index options. It is designed primarily to help in the development of more robust trading systems using the indicator's function (see page 2720 for more information on the Option Expiration function). The visual interpretation of the plot itself is of little value as it simply shows the number of days until the next monthly option expiration date.

Stock and Index options expire on the Saturday following the third Friday of each month. Options may be written for one of three cycles. New options can be written every three months, with cycles beginning in January, February, and March.

The option expiration day in the months of March, June, September, and December are referred to as "triple witching." On these days, stock options, index options, and index futures all expire simultaneously. For this reason, triple witching days are often very volatile.

Since options officially expire on Saturdays (a non-trading day), the Next Option Expiration indicator's value on the Friday before expiration will be 1.00—meaning one day until expiration. This is also consistent with the way the Option Life function calculates (see page 272).

Some of the most active days in the history of the markets have occurred at option expiration. Because of the increasing use of options by both small and large investors as a means of hedging and speculating, it may be wise to consider the potential increase in volatility that can occur in the underlying security on option expiration days.

See page 163 for more information on plotting indicators. See page 188 for more information on the Option Expiration parameters.

Option Gamma

Gamma shows the anticipated change in Delta, given a one point increase in the underlying security. Thus, it shows how responsive Delta is to a change in the underlying security's price. For example, a Gamma of four indicates that the Delta will increase four points (e.g., from 50% to 54%) for each one point increase in the underlying security's price.

Option Life

Option Life shows the number of days until expiration. Generally speaking, the longer the time until expiration, the more valuable the option.

Option Price

The Option Price is the main output of the Black-Scholes model. It shows how much the option should sell for based on the various components that make up the model (e.g., volatility, option life, security price, etc.). It helps answer the question, "Is the option overpriced or underpriced?"

Option Theta

Theta shows the change in the option's price (in points) due to the effect of time alone. The longer the time until expiration, the less effect that time has on the price of the option. However, as the option nears expiration, the effect can be great, particularly on out-of-the-money options. Theta is also referred to as "time decay."

Option Vega

Vega shows the change in the option price due to an assumed 1% increase in the underlying security's volatility. Vega shows the dollar amount of gain that should be expected if the volatility goes up one point (all else being equal).

Option Volatility

Options of high volatility stocks are worth more than those with low volatility, because of the greater chance the option has of moving in-the-money by expiration. Option purchasers should prefer options with high volatilities and option writers should prefer options with low volatilities (all else being equal).

This measure of option volatility is a historical volatility measurement requiring 21 days of data. It is based on the "High-Low-Close Estimator" method presented in the book, The Complete Investment Book (see page 544).

Parabolic SAR

The Parabolic Time/Price System, developed by J. Welles Wilder, is explained thoroughly in his book, New Concepts in Technical Trading Systems (see page 544). This indicator is used to set price stops and is often called the stop-and-reversal (SAR) indicator.

See page 163 for more information on plotting indicators. See page 190 for more information on the Parabolic SAR parameters.

Interpretation

If you are long (i.e., the price is above the SAR), the SAR will move up every day, regardless of the direction the price is moving. The amount the SAR moves up depends on the amount that prices move.

The Parabolic SAR provides excellent stops. You should close long positions when the price falls below the SAR and close short positions when the price rises above the SAR.

The Parabolic SAR is plotted as shown in Wilder's book (above). Each SAR stop level point is displayed on the day in which it is in effect. Note that the SAR value is today's, not tomorrow's stop level.

Performance

The Performance indicator displays a security's price performance as a percentage. This is sometimes called a "normalized" chart.

See page 163 for more information on plotting indicators. See page 190 for more information on the Performance parameters.

Interpretation

The numeric value of the Performance indicator is the percentage that the security has changed since the first period loaded. For example, a value of 10 would mean that the security's price has increased 10% since the first period loaded on the left side of the chart. Similarly, a value of -10% would mean that the security's price has fallen by 10% since the first period.

Tip

The Performance indicator calculates the percent that prices have changed since the first day loaded in the chart. Therefore, if you want to calculate a security's performance from a specific date (e.g., the day you bought it), you should first use the X-Axis Properties dialog (see page 118) to change the first date loaded.

Point & Figure

Point & figure (P&F) charts differ from "normal" price charts in that they completely disregard the passage of time and only chart changes in prices. Rather than having price on the y-axis and time on the x-axis, P&F charts display price changes on both axes.

P&F charts display an "X" when prices rise by the "box size" and display an "O" when prices fall by the box size. Note that no Xs or Os are drawn if prices rise or fall by an amount that is less than the box size.

Each column can contain either Xs or Os, but never both. In order to change columns (e.g., from an X column to an O column), prices must reverse by the "reversal amount" multiplied by the box size. For example, if the box size is 3 points and the reversal amount is 2 boxes, then prices must reverse direction 6 points (3 times 2) in order to change columns. If you are in a column of Xs, the price must fall 6 points in order to change to a column of Os. If you are in a column of Os, the price must rise 6 points in order to change to a column of Xs. The changing of columns signifies a change in the trend of prices.

Because prices must reverse direction by the reversal amount, each column in a P&F chart will have at least "reversal amount" boxes.

When in a column of Xs or Os, MetaStock Pro will first check to see if prices have moved in the current direction (e.g., rose if in a column of Xs or fell if in a column of Os) before checking for a reversal. MetaStock

Pro uses the high and low prices to decide if prices have changed enough to display a new box.

Indicators calculated on P&F charts use all the data in each column and then display the average value of the indicator for that column.

Interpretation

P&F charts are designed to display the underlying supply and demand of a security. A column of Xs shows that demand is exceeding supply (a rally); a column of Os shows that supply is exceeding demand (a decline); and a series of short columns shows that supply and demand are relatively equal.

There are several chart patterns that appear repeatedly in P&F charts. These include Double Tops and Bottoms, Bullish and Bearish Signal formations, Bullish and Bearish Symmetrical Triangles, Triple Tops and Bottoms, etc. It is beyond the scope of the manual to fully explain all of the possibilities. See page 544 for a list of recommended books.

Polarized Fractal Efficiency

The Polarized Fractal Efficiency indicator (PFE) was developed by Hans Hannula. It was introduced in the January 1994 issue of Technical Analysis of Stocks & Commodities magazine. As an engineer, programmer, and trader with over 30 years market experience, Mr. Hannula developed a unique approach to applying the laws of fractal geometry and chaos to the markets.

See page 163 for more information on plotting indicators. See page 190 for more information on the Polarized Fractal Efficiency parameters.

Interpretation

Drawing upon the pioneering works of mathematician Benoit Mandelbrot, Mr. Hannula developed an indicator to gauge the efficiency that prices travel between two points in time.

The more linear and efficient price movement, the shorter the distance the prices must travel between two points. The more "squiggly" the price movement, the less efficient it's travel.

The primary use of the PFE indicator is as a measure of how trendy or congested price action is. PFE readings above zero mean that the trend is up. The higher the reading the "trendier" and more efficient the upward movement. PFE readings below zero mean that the trend is down. The lower the reading the "trendier" and more efficient the downward movement. Readings around zero indicate choppy, less efficient movement, with a balance between the forces of supply and demand.

Several interesting phenomenon have been observed by Mr. Hannula:

- Indexes (particularly the OEX) tend to have a maximum PFE (both plus and minus) of about 43%.

- The middle region (around zero) is a balance between supply and demand and therefore a congestion point.
- A hooking pattern often occurs right before the end of an efficient period. This pattern occurs when the PFE appears to have maxed out, turns in the opposite direction towards zero, and then makes one last attempt at maximum efficiency. Trades can be entered in the opposite direction, with a stop just beyond the extreme of the hook. Stay with the trade all the way to the other extreme, unless it slows around the zero line. If it slows around zero, exit the trade and wait for a new maximum efficiency entry.

Positive Volume Index

The Positive Volume Index (PVI) relates an increase in volume to the change in the security's price. When volume increases from the previous day, the PVI is adjusted by the percentage change in the security's price.

If (V > ref(V,-1)) then

$$PVI = I + (((C - ref(C,-1)) / ref(C,-1)))$$
If (V <= ref(V,-1)) then

$$PVI = I$$

Where:

| | | |
|------------------|---|--|
| <i>C</i> | = | <i>Today's closing price</i> |
| <i>ref(C,-1)</i> | = | <i>Yesterday's closing price</i> |
| <i>I</i> | = | <i>Yesterday's Positive Volume Index</i> |
| <i>PVI</i> | = | <i>Today's Positive Volume Index</i> |
| <i>V</i> | = | <i>Today's volume</i> |
| <i>ref(V,-1)</i> | = | <i>Yesterday's volume</i> |

The PVI is constructed so it only displays changes on days when volume increases from the previous day. Because rising prices are usually associated with rising volume, the PVI will generally trend upward.

See page 163 for more information on plotting indicators. See page 191 for more information on the PVI parameters.

Interpretation

The interpretation of the PVI is the opposite of the NVI (see page 489). The PVI seeks to show what "uninformed" investors are doing.

Tip

An example custom indicator (see page 310) shows how to calculate the Positive Volume Index.

Price Channel

Price Channels are similar in concept to other types of bands and channels including moving average bands, Projection Bands (see page 503), Envelopes (see page 464), and Bollinger Bands (see page 449). They also have some of the characteristics of channel lines such as Raff Regression Channels (see page 508).

Price Channels are plotted by finding the highest high over the specified number of periods and plotting the result *above* the current price to form the top channel. The bottom channel is formed by plotting the lowest low over the specified number of periods. The resulting plot consists of two lines representing the recent highest and lowest prices.

Price Channels, in essence, are dynamic (or moving) support and resistance levels based. They are constantly adjusted to reflect recent new highs and new lows.

See page 205 for more information on plotting line studies. See page 191 for more information on Price Channel parameters.

Interpretation

Price Channels are used much like other types of channels and bands--they help gauge the ebb and flow of optimism and pessimism. When prices are at or near the upper channel, extreme optimism is indicated--look for prices to meet resistance and to move down to more rational levels. Likewise, when prices are at or near the lower channel, extreme pessimism is indicated--look for prices to find support and move up to more rational levels.

Since Price Channels are calculated from absolute high and low price levels, they tend to provide traditional support and resistance. For example, if prices bounce two or more times off of the bottom channel near the same price level, strong support is indicated. Likewise, if prices rebound two or more times off the top channel near the same price level, strong resistance is indicated.

Interestingly, much like Bollinger Bands, narrow Price Channels often precede significant price moves. Several interesting observations involving the combination of a 20-period Bollinger Band and 20-period Price Channel are noted below:

- Expect a significant upward price move when the Price Channel and Bollinger Bands are very narrow and the closing price exceeds the upper Price Channel. Place a protective stop just below the middle Bollinger Band.
- Expect a significant downward price move when the Price Channel and Bollinger Bands are very narrow and the closing price drops below the lower Price Channel. Place a protective stop just above the middle Bollinger Band.

- Expect a short-term pullback against the prevailing uptrend when the Price Channel and Bollinger Bands are wide and the closing price exceeds the upper Price Channel.
- Expect a short-term pullback against the prevailing downtrend when the Price Channel and Bollinger Bands are wide and the closing price exceeds the lower Price Channel.

Price Oscillator

The Price Oscillator displays the difference between two moving averages of the security's price. The difference between the averages can be expressed in either points or percentages.

See page 163 for more information on plotting indicators. See page 191 for more information on the Price Oscillator parameters.

Interpretation

Moving average analysis often generates buy signals when a short-term moving average (or the security's price) rises above a longer-term moving average. Conversely, sell signals are generated when a shorter-term moving average falls below a longer-term moving average. The Price Oscillator illustrates the cyclical (and often profitable) signals generated by one or two moving average systems.

Tips

For more information on moving average systems and oscillators, refer to Moving Averages (see page 484) and the MACD (see page 478).

An example custom indicator (see page 310) shows how to calculate the Price Oscillator.

Price Rate-Of-Change

The Price Rate-Of-Change (R.O.C.) indicator (percent method) is calculated by dividing the price change over the last x -periods by the closing price of the security x -periods ago. The result is the percentage that the security's price has changed in the last x -periods.

If the security's price is higher today than x -periods ago, the R.O.C. will be a positive number. If the security's price is lower today than x -periods ago, the R.O.C. will be a negative number.

See page 163 for more information on plotting indicators. See page 192 for more information on the R.O.C. parameters.

Interpretation

A long recognized phenomenon of security prices is the fact that prices tend to surge ahead and retract in a cyclical wave-like motion. The Price

Rate-Of-Change indicator illustrates this wave-like motion of a security's price in an oscillator format. As the security's price increases, its R.O.C. will rise; conversely, as its price falls, its R.O.C. will fall. The faster prices rise or fall, the faster the R.O.C. will rise or fall.

MetaStock Pro allows you to select the time period used in the R.O.C. calculation. The time period may range from a very short 1-day R.O.C. (which causes an erratic chart) to a long-term 200-day (or longer) R.O.C. The most popular time periods are the 12-day and 25-day R.O.C. for short to intermediate-term trading and a 1-year (255-day) R.O.C. for long-term analysis.

The 12-day R.O.C. is best used as a short to intermediate-term overbought/oversold indicator. The higher the R.O.C., the more overbought the security; the lower the R.O.C., the more likely a rally. However, as with all overbought/oversold indicators, it is best to wait for the market to begin to correct (i.e., turn up or down) before placing your trade. A market that appears overbought may remain overbought for some time. In fact, extremely overbought/oversold readings usually imply a continuation of the current trend.

The 12-day R.O.C. tends to be very cyclical, oscillating back and forth in a fairly regular pattern. Often, price changes can be anticipated by studying the previous cycles of the R.O.C. and relating the previous cycles to the current market.

The optimum overbought/oversold levels (e.g., +/-5) will vary depending on the security being analyzed and overall market conditions. In strong bull markets, it is usually beneficial to use higher levels, perhaps +10 and -5.

Tips

The predefined Price R.O.C. discussed here displays the R.O.C. as a percentage. The R.O.C. also can be displayed as a ratio using the Momentum indicator (see page 482), or expressed in points by choosing the "periods" button in the properties dialog (see page 192).

An example custom indicator (see page 310) shows how to calculate the Price R.O.C.

Price Volume Trend

The Price Volume Trend (PVT) is similar in concept to On Balance Volume (see page 492) in that it is a cumulative total of volume that is adjusted depending on changes in closing prices. But whereas OBV adds all volume on days when prices close higher and subtracts all volume on days when prices close lower, the PVT adds only a portion of the daily volume. The amount of volume added to the PVT is a function of the amount by which prices rose or fell relative to the previous day's close.

$$PVT = (((C-ref(C,-1)) / ref(C,-1)) * V) + I$$

Where:

| | | |
|------------------|---|---------------------------------------|
| <i>C</i> | = | <i>Today's closing price</i> |
| <i>ref(C,-1)</i> | = | <i>Yesterday's closing price</i> |
| <i>V</i> | = | <i>Today's volume</i> |
| <i>I</i> | = | <i>Yesterday's Price Volume Trend</i> |

The PVT is calculated by multiplying the day's volume by the percentage change of the underlying security and adding this value to a cumulative total. For example, if the security closed up 0.5% and volume was 10,000 shares, we would add 50 (i.e., $0.005 * 10,000 = 50$) to the PVT. If the security had closed down 0.5%, we would have subtracted 50 from the PVT.

See page 163 for more information on plotting indicators. See page 192 for more information on the PVT parameters.

Interpretation

The interpretation of the Price Volume Trend is similar to the interpretation of On Balance Volume (see page 492) and the Volume Accumulation/Distribution Line (see page 446).

Many investors feel that the PVT more accurately illustrates the flow of money into and out of a security than does OBV. This is because OBV adds the same amount of volume to the indicator regardless of whether the security closes up a fraction of a point or doubles in price. However, the PVT adds only a small portion of volume to the indicator when the price changes by a small percentage and adds a large portion of volume to the indicator when prices change by a large percentage.

Tip

An example custom indicator (see page 310) shows how to calculate the Price Volume Trend.

Projection Bands

Projection Bands were developed by Mel Widner, Ph.D. They were originally introduced in the July 1995 issue of Technical Analysis of Stocks & Commodities magazine.

Projection Bands are similar in concept to other types of bands including moving average bands, Price Channels (see page 500), Envelopes (see page 464), and Bollinger Bands (see page 449). They also have some of the characteristics of channel lines such as Raff Regression Channels (see page 508).

Projection Bands are plotted by finding the minimum and maximum prices over the specified number of days and projecting these forward (parallel to a linear regression line). The resulting plot consists of two

bands representing the minimum and maximum price boundaries. Prices will always be contained by the bands, unlike Bollinger Bands.

See page 163 for more information on plotting indicators. See page 192 for more information on the Projection Bands parameters.

Interpretation

Projections Bands are used much like other types of bands--they help gauge the ebb and flow of optimism and pessimism. When prices are at or near the upper band, extreme optimism is indicated--look for prices to move down to more rational levels. Likewise, when prices are at or near the lower band, extreme pessimism is indicated--look for prices to move up to more rational levels.

It is recommended that all band generated signals be confirmed by other indicators, because prices will often ride along a band for an extended amount of time during strong trending markets. During trending markets, you can use bands to trade short-term reactions against the primary trend. In trading range markets, you can use the bands to trade overbought/oversold levels. Indicators like the VHF (see page 533), CMO (see page 454), and r-squared (see page 506) can be used to gauge the trendiness of the market.

Projection Oscillator

Developed by Mel Widner, Ph.D., the Projection Oscillator is a by-product of his Projection Bands (see page 503). The Projection Oscillator is basically a slope-adjusted Stochastic. Where the Stochastic Oscillator (see page 521) shows the relationship of the current price to its minimum and maximum prices over a recent time period, the Projection Oscillator shows the same thing, but the minimum and maximum prices are adjusted up/down by the slope of the price's regression line. This adjustment makes the Projection Oscillator more responsive to short-term price moves than an equi-period Stochastic.

Put another way, the Projection Oscillator shows where the current price is relative to the Projection bands. A value of 50 indicates that the current price is exactly in the middle of the bands. A value of 100 indicates that prices are touching the top band. A value of 0 indicates that prices are touching the bottom band.

See page 163 for more information on plotting indicators. See page 192 for more information on the Projection Oscillator parameters.

Interpretation

The Projection Oscillator can be used as both a short- and intermediate-term trading oscillator depending on the number of time periods used when calculating the oscillator. When displaying a short-term Projection Oscillator (e.g., 10-20 days), it is popular to use a 3-day trigger line.

There are several ways to interpret a Projection Oscillator.

Overbought/oversold. Buy when the oscillator falls below a specific level (e.g., 20) and then rises above that level, and sell when the Oscillator rises above a specific level (e.g., 80) and then falls below that level. High values (i.e., above 80) indicate excessive optimism. Low values (i.e., below 20) indicate excessive pessimism.

However, before basing any trade off of strict overbought/oversold levels, you should first qualify the trendiness of the market using indicators such as r-squared (see page 506) or CMO (see page 454). If these indicators suggest a non-trending market, then trades based on strict overbought/oversold levels should produce the best results. If a trending market is suggested, then you can use the oscillator to enter trades in the direction of the trend.

Crossovers. Buy when the oscillator crosses above its trigger (dotted) line and sell when the oscillator crosses below its trigger line. You may want to qualify your trades by requiring that the crossovers occur above the 70 level or below the 30 level.

Divergences. You may consider selling if prices are making a series of new highs and the oscillator is failing to surpass its previous highs. You may consider buying if prices are making a series of new lows and the oscillator is failing to surpass its previous low. You may qualify your trades by requiring that the divergence occur above the 70 level or below the 30 level.

Qstick Indicator

The Qstick indicator was developed by Tushar Chande. Qstick provides a way to quantify candlesticks. The distance between the open and close prices lies at the heart of candlestick charting. For those unfamiliar with candlestick charting, the body of a candlestick is black if today's close is less than the open; it is white if today's close is greater than the open. A majority of white candlesticks over a specified range is considered bullish. Whereas a majority of black candlesticks over a specified range is considered bearish.

The Qstick indicator is simply a moving average of the difference between open and close prices.

For more information on the Qstick indicator, refer to the book [The New Technical Trader](#) by Tushar Chande and Stanley Kroll.

See page 163 for more information on plotting indicators. See page 193 for more information on the Qstick parameters.

Interpretation

Qstick values below zero indicate a majority of black candlesticks (over the time periods specified) and therefore a bearish bias for the security.

Values above zero indicate a majority of white candlesticks (over the time periods specified) and therefore a bullish bias for the security.

There are several ways to trade the Qstick indicator:

Crossovers. Buy when the indicator crosses above zero. Sell when it crosses below zero.

Extreme Levels. Buy when the Qstick indicator is at an extremely low level and turning up. Sell when the Qstick indicator is at an extremely high level and turning down. You may even want to plot a short-term moving average on the Qstick to serve as a trigger line.

Divergences. Buy when the Qstick is moving up and prices are moving down. Sell when the Qstick is moving down and prices are moving up. You may want to consider waiting for the price to confirm the new direction before placing the trade.

Quadrant Lines

Quadrant Lines are a series of horizontal lines that divide the highest and lowest values (usually prices) into four equal sections.

See page 205 for more information on drawing line studies. See page 220 for more information on the Quadrant Line parameters.

Interpretation

Quadrant Lines are primarily intended to aid in the visual inspection of price movements. They help you see the highest, lowest, and average price over a specified period.

r-squared

The Linear Regression method provides several useful outputs for technical analysts, including the r-squared. R-squared shows the strength of trend. The more closely prices move in a linear relationship with the passing of time, the stronger the trend.

You may find the expert named "Equis - Statistical Analysis" helpful in interpreting r-squared. See page 435 for more information on experts.

See page 163 for more information on plotting indicators. See page 193 for more information on the r-squared parameters.

Interpretation

r-squared values show the percentage of movement that can be explained by linear regression. For example, if the r-squared value over 20 days is at 70%, this means that 70% of the movement of the security is explained by linear regression. The other 30% is unexplained random noise.

It is helpful to consider r-squared in relation to Slope (see page 476).

While Slope gives you the general direction of the trend (positive or

negative), r-squared gives you the strength of the trend. A high r-squared value can be associated with a high positive or negative Slope.

Although it is useful to know the r-squared value, ideally, you should use r-squared in tandem with Slope. High r-squared values accompanied by a small Slope may not interest short term traders. However, high r-squared values accompanied by a large Slope value may be of huge interest to traders.

One of the most useful way to use r-squared is as a confirming indicator. Momentum based indicators (e.g., Stochastics, RSI, CCI, etc.) and moving average systems require a confirmation of trend in order to be consistently effective. R-squared provides a means of quantifying the “trendiness” of prices. If r-squared is above its critical value and heading up, you can be 95% confident that a strong trend is present.

When using momentum based indicators, only trade overbought/oversold levels if you have determined that prices are trendless or weakening (i.e., a low or lowering r-squared value). Because in a strong trending market, prices can remain overbought or oversold for extended periods.

Therefore, you may want to reconsider trading on strict overbought/oversold levels used by many indicators. An “overbought” market can remain overbought for extended periods in a trending market. However, a signal generated by a moving average crossover system may be worth following, since these systems work best in strong trending markets.

To determine if the trend is statistically significant for a given x-period linear regression line, plot the r-squared indicator and refer to the following table. This table shows the values of r-squared required for a 95% confidence level at various time periods. If the r-squared value is less than the critical values shown, you should assume that prices show no statistically significant trend.

| Number of Periods | r-squared Critical Value (95% confidence) |
|--------------------------|--|
| 5 | 0.77 |
| 10 | 0.40 |
| 14 | 0.27 |
| 20 | 0.20 |
| 25 | 0.16 |
| 30 | 0.13 |
| 50 | 0.08 |
| 60 | 0.06 |

| | |
|-----|------|
| 120 | 0.03 |
|-----|------|

You may even consider opening a short-term position opposite the prevailing trend when you observe r-squared rounding off at extreme levels. For example, if the slope is positive and r-squared is above 0.80 and begins to turn down, you may consider selling or opening a short position.

There are numerous ways to use the linear regression outputs of r-squared and Slope in trading systems. For more detailed coverage, refer to the book [The New Technical Trader](#) by Tushar Chande and Stanley Kroll.

Raff Regression Channel

Developed by Gilbert Raff, the regression channel is a line study that plots directly on the price chart. The Regression Channel provides a precise quantitative way to define a price trend and its boundaries.

The Regression Channel is constructed by plotting two parallel, equidistant lines above and below a Linear Regression trendline. The distance between the channel lines to the regression line is the greatest distance that any one high or low price is from the regression line.

For more detailed information on using the Raff Regression Channel, we recommend the book [Trading the Regression Channel](#) by Gilbert Raff (available directly from Equis International).

See page 205 for more information on drawing line studies. See page 220 for more information on the Raff Regression Channel parameters.

Interpretation

Raff Regression Channels contain price movement, with the bottom channel line providing support and the top channel line providing resistance. Prices may extend outside of the channel for a short period of time. However, if prices remain outside the channel for a long period of time, a reversal in trend may be imminent.

Random Walk Index

In an effort to find an indicator that overcomes the effects of a fixed look-back period and the drawbacks of traditional smoothing methods, Michael Poulos developed the Random Walk Index. The Random Walk Index is based on the basic geometric concept that the shortest distance between two points is a straight line. The further prices stray from a straight line during a move between two points in time, the less efficient the movement.

See page 163 for more information on plotting indicators. See page 194 for more information on the Random Walk Index parameters.

Interpretation

Mr. Poulos found significant evidence during his research that the "dividing line" between short- and long-term time frames for most futures and stocks is right around eight to 10 days. Therefore, he feels an effective trading system using the RWI can be devised using two different time frames—a short-term RWI (two to seven periods) for the market's frantic, random side and a long-term RWI (eight to 64 periods) for the market's steady, trending side.

Peaks in the short-term RWI of highs tend to coincide with price peaks. Peaks in the short-term RWI of lows tend to coincide with price troughs.

Readings of the long-term RWI of highs above 1.0 provides a good indication of a sustainable uptrend. Readings of the long-term RWI of lows above 1.0 provide a good indication of a sustainable downtrend.

Therefore Mr. Poulos feels that an effective trading system could be built that opens trades (after short-term pull-backs against the direction of the long-term trend) using the following guidelines:

- Buy Order (or close short) when the long-term RWI of the highs is greater than 1.0, and the short-term RWI of lows peaks above 1.0.
- Sell Short Order (or Sell Order) when the long-term RWI of the lows is greater than 1.0, and the short-term RWI of highs peaks above 1.0.

Range Indicator

The Range Indicator was developed by Jack Weinberg. It was introduced in the June 1995 issue of Technical Analysis of Stocks & Commodities magazine. Mr. Weinberg developed this indicator based on his observation that changes in the average day's intraday range (high to low) as compared to the average day's interday range (close to close) precede the start of a new trend or the end of the current trend.

See page 163 for more information on plotting indicators. See page 194 for more information on the Range Indicator parameters.

Interpretation

The Range Indicator shows when the intraday high to low ranges exceed the interday close to close ranges.

This approach proves useful in identifying the start and end of trends. When the intraday ranges are dramatically higher than the interday ranges, the market is considered "out of balance," and the Range Indicator will be at a high level. When at a high level, look for the current trend to end. Conversely, when the Range Indicator is at a low level (below 20 for example), look for the emergence of a new trend.

Mr. Weinberg found that the Range Indicator improves many momentum and trend-following trading systems. For example, he found that the results of a basic two moving average crossover system on the four major

currencies were dramatically improved by filtering the signals with the Range Indicator. By waiting to enter a long position until the Range Indicator crossed above a defined low level and then waiting to exit until the indicator crossed above a defined high level, profits, number of trades, and risk were dramatically improved.

Relative Momentum Index

The Relative Momentum Index (RMI) was developed by Roger Altman. Impressed with the Relative Strength Index's insensitivity to the number of lookback periods, yet frustrated with its inconsistent oscillation between defined overbought and oversold levels, Mr. Altman added a momentum component to the RSI. The RMI was first introduced in the February 1993 issue of Technical Analysis of Stocks & Commodities magazine.

As mentioned, the RMI is a variation of the RSI indicator. Instead of counting up and down days from close to close as the RSI does, the RMI counts up and down days from the close relative to the close x-days ago (where x is not necessarily 1 as required by the RSI). So as the name of the indicator reflects, "momentum" is substituted for "strength."

See page 163 for more information on plotting indicators. See page 194 for more information on the Relative Momentum Index parameters.

Interpretation

As an oscillator, the RMI exhibits the same strengths and weaknesses of other overbought/oversold indicators. During strong trending markets the RMI will remain at overbought or oversold levels for an extended period. However, during non-trending markets, the RMI tends to oscillate predictably between an overbought level of 70 to 90 and an oversold level of 10 to 30.

Since the RMI is based on the RSI, many of the same interpretation methods can be applied. In fact, many of these "situations" are more clearly manifest with the RMI than they are with the RSI.

Tops and Bottoms. The RMI usually tops above 70 and bottoms below 30. The RMI usually forms these tops and bottoms before the underlying price chart.

Chart Formations. The RMI often forms chart patterns (such as head and shoulders or rising wedges) that may or may not be visible on the price chart.

Failure Swings. (Also known as support or resistance penetrations or breakouts.) This is where the RMI surpasses a previous high (peak) or falls below a recent low (trough).

Support and Resistance. The RMI shows, sometimes more clearly than the price chart, levels of support and resistance.

Divergence. As discussed above, this occurs when the price makes a new high (or low) that is not confirmed by a new RMI high (or low).

Note that a 20,1 parameter RMI is equivalent to a 20-period RSI. This is because the 1-day momentum parameter is calculating day-to-day price changes, which the standard RSI does by default. As the momentum parameter is increased, the oscillation range of the RMI becomes wider and the fluctuations become smoother.

Relative Strength Comparative

The Relative Strength Comparative indicator compares two securities to show how the securities are performing relative to each other. Be careful not to confuse Comparative Relative Strength with the Relative Strength Index.

Comparative Relative Strength is calculated by dividing one security's prices by a second security's price. The result of this division is the ratio, or relationship, between the two securities.

Another way to display the Comparative Relative Strength of two securities, is to create a composite security using The DownLoader (see The DownLoader User's Manual for more information.)

See page 163 for more information on plotting indicators. See page 195 for more information on the Relative Strength Comparative parameters.

Interpretation

A Comparative Relative Strength chart compares a security's price with that of another security. When the indicator is moving up, it shows that the security (the one displayed in the chart) is performing better than the selected security. When the indicator is moving sideways, it shows that both securities are performing the same (i.e., rising and falling by the same percentages). When the indicator moves down, it shows that the security is performing worse than the selected security (i.e., not rising as fast or falling faster).

Stock and mutual fund traders may find it helpful to track the Comparative Relative Strength between the stocks and funds you are following and an index such as the NASDAQ Composite or the Dow Industrials. Or you may want to do a comparison with a closely tied industry group. For example, if you were following Ford, a Comparative Relative Strength between Ford and the S&P Auto Index would be helpful to show how Ford is performing relative to the entire auto industry.

Futures Traders may find it helpful to compare futures with the CRB index. Or perhaps one future with another. For example, Gold and Silver, the Yen and the Pound, Bonds and the Dollar, etc.

Tip

When using a composite security to create a Relative Strength Comparative, the value is stored in the price fields (rather than the indicator field). This enables you to easily display indicators of Relative Strength Comparatives.

Relative Strength Index

The Relative Strength Index (RSI) is a popular oscillator used by commodity traders. It was first introduced by J. Welles Wilder in an article in Commodities (now known as Futures) magazine in June, 1978. Step-by-step instructions on calculating and interpreting the RSI are also provided in Mr. Wilder's book, New Concepts in Technical Trading Systems (see page 544).

The name "Relative Strength Index" is slightly misleading as the RSI does *not* compare the relative strength of two securities, but rather the internal strength of a single security. A more appropriate name might be "Internal Strength Index."

The RSI is a fairly simple formula, but is difficult to explain without pages of examples. The basic formula is:

$$RSI = 100 - \left[\frac{100}{1 + \left(\frac{U}{D} \right)} \right]$$

Where:

U = An average of upward price change.

D = An average of downward price change.

MetaStock Pro prompts you to enter the number of time periods in the averages.

See page 163 for more information on plotting indicators. See page 195 for more information on the RSI parameters.

Interpretation

When Wilder introduced the RSI, he recommended using a 14-day RSI. Since then, the 9-day and 25-day RSIs have also gained popularity. Because you can vary the number of time periods in the RSI calculation, we suggest that you experiment to find the period that works best for you. (The fewer days used to calculate the RSI, the more volatile the indicator.)

The RSI is a price-following oscillator that ranges between 0 and 100. A popular method of analyzing the RSI is to look for a divergence in which the market index is making a new high, but the RSI is failing to surpass its previous high. This divergence would be an indication of an

impending reversal. When the RSI then turns down and falls below its most recent trough, it is said to have completed a failure swing. The failure swing would be considered a confirmation of an impending reversal.

In Mr. Wilder's book, he discusses five uses of the RSI in analyzing commodity charts (these apply to indices as well):

Tops and Bottoms. The RSI usually tops above 70 and bottoms below 30 (MetaStock Pro automatically draws horizontal lines at these levels). The RSI usually forms these tops and bottoms before the underlying price chart.

Chart Formations. The RSI often forms chart patterns (such as head and shoulders or rising wedges) that may or may not be visible on the price chart.

Failure Swings. (also known as support or resistance penetrations or breakouts): This is where the RSI surpasses a previous high (peak) or falls below a recent low (trough).

Support and Resistance. The RSI shows, sometimes more clearly than the price chart, levels of support and resistance.

Divergence. As discussed above, this occurs when the price makes a new high (or low) that is not confirmed by a new RSI high (or low).

For additional information on the RSI, refer to Mr. Wilder's book.

Relative Volatility Index

The Relative Volatility Index (RVI) was developed by Donald Dorsey. It was originally introduced in the June 1993 issue of Technical Analysis of Stocks and Commodities magazine (TASC). A revision to the indicator was covered in the September 1995 issue.

The RVI is used to measure the direction of volatility. The calculation is identical to the Relative Strength Index (RSI) (see page 512) except that the RVI measures the standard deviation of daily price changes rather than absolute price changes.

See page 163 for more information on plotting indicators. See page 196 for more information on the RVI parameters.

Interpretation

When developing the RVI, Dorsey was searching for a confirming indicator to use with traditional trend-following indicators (such as a dual moving average crossover system). He found that using a momentum-based indicator to confirm another “repackaged” momentum-based indicator is usually ineffective.

Dorsey made this clear in the June 1993 TASC article:

“Technicians are tempted to use one set of indicators to confirm another. We may decide to use the MACD to confirm a signal in Stochastic... Logic tells us that this form of diversification will enhance results, but too often the confirming indicator is just the original trading indicator repackaged, each using a theory similar to the other to measure market behavior... Every trader should understand the indicators being applied to the markets to avoid duplicating information.”

When testing the profitability of a basic moving average crossover system, Dorsey found that the results could be significantly enhanced by applying the following RVI rules for confirmation. Similar rules are likely to be effective for other momentum or trend following indicators.

- Only act on buy signals when $RVI > 50$.
- Only act on sell signals when $RVI < 50$.
- If a buy signal is ignored, enter long if $RVI > 60$.
- If a sell signal is ignored, enter short if $RVI < 40$.
- Close a long position if RVI falls below 40.
- Close a short position if RVI rises above 60.

Because the RVI measures a different set of market dynamics than other indicators, it is often superior as a confirming indicator. As Dorsey states:

“There is no reason to expect the RVI to perform any better or worse than the RSI as an indicator in its own right. The RVI’s advantage is as a confirming indicator because it provides a level of diversification missing in the RSI.”

Renko

The Renko charting method is thought to have acquired its name from "renga" which is the Japanese word for bricks. Renko charts were introduced by Steve Nison (a well-known authority on the Candlestick charting method).

Renko charts are similar to Three Line Break charts except that in a Renko chart, a line (or brick as they are sometimes called) is drawn in the direction of the prior move only if a fixed amount (i.e., the box size) has been exceeded. The bricks are always equal in size. For example, in a five unit Renko chart, a 20 point rally is displayed as four equally sized, five unit high Renko bricks.

To draw Renko bricks, today's close is compared with the high and low of the previous brick (white or black). When the closing price rises above the top of the previous brick by the box size or more, one or more equal height, white bricks are drawn in the next column. If the closing price falls below the bottom of the previous brick by the box size or more, one or more equal height, black bricks are drawn in the next column.

If the market moves up more than the amount required to draw one brick, but less than the amount required to draw two bricks, only one brick is drawn. For example, in a two unit Renko chart, if the base price is 100 and the market moves to 103, then one white brick is drawn from the base price of 100 to 102. The rest of the move--from 102 to 103--is not shown on the Renko chart. The same rule applies anytime the price does not fall on a box size divisor.

Indicators calculated on renko charts use all the data in each column and then display the average value of the indicator for that column.

Interpretation

Basic trend reversals are signaled with the emergence of a white or black brick. A new white brick indicates the beginning of a new uptrend. A new black brick indicates the beginning of a new downtrend. Since the Renko chart is a trend following technique, there will be times when the market induces whipsaws. However, a trend following technique is intended to allow traders to ride on the major portion of the trend.

Since a Renko chart isolates the underlying trends by filtering out the minor ups and downs, Renko charts are excellent for helping determine support and resistance levels.

For more in-depth coverage of the Renko charting method, we recommend the book Beyond Candlesticks by Steve Nison (see page 544).

Speed Resistance Lines

Speed Resistance Lines, also called 1/3 - 2/3 lines, are a series of trendlines that divide a price move into three equal sections. They are similar in construction and interpretation to Fibonacci Fan Lines (see page 466).

See page 205 for more information on drawing line studies. See page 220 for more information on the Speed Resistance Line parameters.

Interpretation

Speed Resistance Lines are used to define price support levels. For example, if a security is in a rising trend, its price will usually stay above the 2/3 Speed Line. If prices do penetrate the 2/3 line, they will generally fall all the way to the 1/3 line before regaining support.

Spread

Spreads compare two securities to show how the securities are performing *relative* to each other. Spreads are normally calculated using futures.

A spread is calculated by subtracting the value of one security from the value of another security. To display a spread of two securities, you can create a composite security using The DownLoader (see page 60 in this manual), or you can plot the Spread indicator.

When creating the composite with The DownLoader, be sure to select *Subtract* as the operator type. Enter the appropriate *Weighting Factor*. Certain futures spreads require that one future have more or less weight than the other. The Weighting Factor may be used to specify the weight for each future in the spread (e.g., a Weighting Factor of 0.40 multiplies the future's prices by 0.40). Entering a Weighting Factor of 1.00 for both futures in the composite gives each equal weight.

See page 163 for more information on plotting indicators. See page 196 for more information on the Spread parameters.

Interpretation

A Spread involves buying one security and selling another with the goal of profiting from the narrowing or expanding of the spread between the two items. For example, you might buy gold and sell silver short with the expectation that the price of silver will fall faster (or rise slower) than the price of gold.

Tip

When using a composite security to create a spread, the value of the spread is stored in the price fields (rather than the indicator field). This enables you to display indicators of Spreads.

Standard Deviation

Standard Deviation is a statistical measurement of volatility. It is derived by calculating an x -time period simple moving average of the data item (i.e., the closing price or an indicator); summing the squares of the difference between the data item and its moving average over each of the preceding x -time periods; dividing this sum by x ; and then calculating the square root of this result.

See page 163 for more information on plotting indicators. See page 196 for more information on the Standard Deviation parameters.

Interpretation

Standard Deviation is typically used as a component of an indicator, rather than as a stand-alone indicator. For example, Bollinger Bands (see page 449) are calculated by adding a security's Standard Deviation to a moving average.

High Standard Deviation values signify high volatility: the data item being analyzed is deviating from its moving average significantly.

Similarly, low Standard Deviation values signify low volatility; the data item is remaining close to its moving average.

Typically, low Standard Deviation values (i.e., low volatility) tend to come before significant upward price changes.

Many analysts agree that major tops are normally accompanied with high volatility and major bottoms are generally calm with low volatility.

Tips

An example custom indicator (see page 310) shows how to calculate Standard Deviation.

The ODDS Probability Cones are calculated using standard deviation-based volatility (see page 490).

Standard Deviation Channel

Standard Deviation Channels are calculated by plotting two parallel lines above and below an x-period linear regression trendline. The lines are plotted x standard deviations away from the linear regression trendline.

See page 205 for more information on drawing line studies. See page 221 for more information on Standard Deviation Channel parameters.

Interpretation

Price movements are characterized by swings from one extreme to the other. Markets reflect the collective mood of its participants. When market participants are overly optimistic, prices are driven up at an unsustainable rate. Likewise, when market participants are overly pessimistic, prices are beaten down at an unsustainable rate. The keywords here are "extreme" and "unsustainable." Even the most raging bull markets or violent bear markets will either pause for a breather or reverse temporarily.

Markets tend to have an equilibrium point (i.e., a point towards which prices tend to be drawn). Linear regression analysis is helpful in determining where this "balancing point" lies. On the other hand, standard deviation analysis is helpful in determining where the "extremes" lie.

Elementary statistical analysis states that approximately 67% of future price movement should be contained within one standard deviation and approximately 95% within two standard deviations. However, this assumes random, trendless data. Since most markets show overwhelming evidence of non-random, trending behavior, these 67% and 95% values are not as accurate. Standard Deviation channels, however, incorporate the trend (as measured by the middle linear regression plot). Therefore, they provide a trend-biased assessment of expected price movement.

Standard Deviation Channels can be used to enhance several types of technical analysis techniques. Here are some ideas:

- **Validate candlestick patterns.** Enter long on bullish engulfing lines only if they form below the bottom channel line.
- **Validate overbought/oversold signals.** Close long (or enter short) when the Stochastic falls below 80, volume is above average, and prices have recently fallen below the top channel line.
- **Validate support/resistance breakouts.** If prices have broken above a long-term resistance level, yet volume is suspiciously light, wait until the prices break above the upper channel on above average volume.

Standard Error

Standard Error measures how closely prices congregate around a linear regression line. The closer prices are to the linear regression line, the higher the r-squared value and the stronger the trend.

For example, if each day's closing price was equal to that day's regression line value, then the standard error would be zero. The more variance or "noise" around the regression value, the larger the standard error and the less reliable the trend.

See page 163 for more information on plotting indicators. See page 197 for more information on the Standard Error parameters.

Interpretation

High standard error values indicate that the security's prices are very volatile around the regression line. Changes in the prevailing trend (over the number of time periods specified) are usually preceded by a rapidly increasing standard error.

Standard error can be used effectively in combination with the r-squared indicator (see page 506). Changes in trend are often signaled by a high downward moving r-squared, a low upward moving standard error, or a low upward moving r-squared and a high downward moving standard error. In other words, when the two are at extreme levels and begin to converge, look for a change in trend.

Note that a change in trend does not necessarily mean that an upward trend will reverse to a downward trend. Sideways movement is also considered a "change."

Standard Error Bands

Standard Error Bands are a type of envelope (see page 464) developed by Jon Andersen. They are similar to Bollinger Bands in appearance, but they are calculated and interpreted quite differently. Where Bollinger

Bands are plotted at *standard deviation* levels above and below a *moving average*, Standard Error Bands are plotted at *standard error* levels above and below a *linear regression* plot. See page 518 for a definition of standard error.

See page 163 for more information on plotting indicators. See page 197 for more information on Standard Error Bands parameters.

Interpretation

When displaying Standard Error Bands, you are prompted to enter the number of periods in the bands and the number of standard errors between the bands and the linear regression line (see page 197). Mr. Andersen recommends default values of "21" for the number of periods, a 3-day simple moving average for the smoothing, and "2" standard errors. He also notes that very short time frames tend to produce unreliable results.

MetaStock Pro plots Standard Error Bands on the security's prices or indicator. These interpretational comments refer to bands on the security's closing price.

Because the spacing between Standard Error Bands is based on the standard error of the security, the bands widen when the volatility around the current trend increases, and contract when volatility around the current trend decreases.

Since Standard Error Bands are statistically based, other statistical indicators such as r-squared, Standard Error, Linear Regression, etc. work well for trade confirmation.

Mr. Andersen notes the following characteristics of Standard Error Bands.

- Tight bands are an indication of a strong trend.
- Prices tend to bounce between the bands when the bands are wide.
- Tight bands followed by a widening of the bands may indicate the exhaustion of a trend and a possible reversal.
- When the bands reverse direction after an exhausted trend, prices tend to move in the direction of the bands.
- The r-squared indicator works well in combination with Standard Error Bands. A high r-squared value combined with tight bands confirms a strong trend. A low r-squared value combined with wide bands confirms that prices are consolidating.

Standard Error Channel

Standard Error Channels are calculated by plotting two parallel lines above and below an x-period linear regression trendline. The lines are plotted a specified number of standard errors away from the linear regression trendline.

See page 205 for more information on drawing a line studies. See page 221 for more information on Standard Deviation Channel parameters.

Interpretation

Price movements are characterized by swings from one extreme to the other. Markets reflect the collective mood of its participants. When market participants are overly optimistic, prices are driven up at an unsustainable rate. Likewise, when market participants are overly pessimistic, prices are beaten down at an unsustainable rate. The keywords here are "extreme" and "unsustainable." Even the most raging bull markets or violent bear markets will either pause for a breather or reverse temporarily.

Markets tend to have an equilibrium point (i.e., a point towards which prices tend to be drawn). Linear regression analysis is helpful in determining where this "balancing point" lies. On the other hand, standard error analysis is helpful in determining where the "extremes" lie.

Standard Error Channels can be used to enhance several types of technical analysis techniques. Here are some ideas:

- **Validate candlestick patterns.** Enter long on bullish engulfing lines only if they have formed below the bottom channel line.
- **Validate overbought/oversold signals.** Close long (or enter short) when the Stochastic falls below 80, volume is above average, and prices have recently fallen below the top channel line.
- **Validate support/resistance breakouts.** If prices have broken above a long-term resistance level, yet volume is suspiciously light, wait until the prices break above the upper channel on above average volume.

Stochastic Momentum Index

The Stochastic Momentum Index (SMI) was developed by William Blau. It incorporates an interesting twist on the popular Stochastic Oscillator. While the Stochastic Oscillator provides you with a value showing the distance the current close is relative to the recent x-period high/low range, the SMI shows you where the close is relative to the *midpoint* of the recent x-period high/low range. The result is an oscillator that ranges between +/- 100 and is a bit less erratic than an equal period Stochastic Oscillator.

The SMI was introduced in the January 1993 issue of Technical Analysis of Stocks & Commodities magazine.

An example formula (see page 311) illustrates the calculation of the Stochastic Momentum Index.

See page 163 for more information on plotting indicators. See page 197 for more information on the Stochastic Momentum Index parameters.

Interpretation

When the close is greater than the midpoint of the range, the SMI is positive. When the close is less than the midpoint of the range, it is negative.

The interpretation of the SMI is virtually identical to the Stochastic Oscillator. Three popular methods include:

- Buy when the SMI falls below a specific level (e.g., -40) and then rises above that level, and sell when the Oscillator rises above a specific level (e.g., +40) and then falls below that level. However, before basing any trade off of strict overbought/oversold levels it is recommended that you first qualify the trendiness of the market using indicators such as r-squared (see page 506) or CMO (see page 454). If these indicators suggest a non-trending market, then trades based on strict overbought/oversold levels should produce the best results. If a trending market is suggested, then you can use the oscillator to enter trades in the direction of the trend.
- Buy when the SMI rises above its signal line (dotted) line and sell when the SMI falls below the signal line.
- Look for divergences. For example, where prices are making a series of new highs and the SMI is failing to surpass its previous highs.
- Mr. Blau also notes that a 1-day SMI (with large smoothing periods such as 100) is very sensitive to the close relative to the high and low of the day. These type of parameters make the RMI useful as a sentiment, or trend identification indicator, thereby providing a better sense of the overall direction of the market.

Stochastic Oscillator

Stochastic (st kas'tik) *adj.* 2. *Math.* designating a process having an infinite progression of jointly distributed random variables.-- Webster's

The Stochastic Oscillator compares where a security's price closed relative to its trading range over the last *x*-time periods.

The formula for the %K parameter of the Stochastic is:

$$\frac{(today's\ close) - (lowest\ low\ \%K\ periods)}{(highest\ high\ \%K\ periods) - (lowest\ low\ \%K\ periods)}$$

For example, to calculate a 10-day %K: First, find the security's highest high and lowest low over the last 10 days. For this example, let's assume that during the last 10 days the highest high was 46 and the lowest low was 38--a range of 8 points. If today's closing price was 41, %K would be calculated as:

$$\frac{41 - 38}{46 - 38} = 3/8 = 0.375$$

The 0.375 in this example shows that today's close was at the level of 37.5% relative to the security's trading range over the last 10 days. If today's close was 42, the Stochastic Oscillator would be 0.50. The 0.50 would show that the security closed today at 50%, or the mid-point, of its 10-day trading range.

The above example used a %K Slowing Period of 1 day (no slowing). If you use a Slowing Period of greater than 1 period, you would total the value of the numerators for the number of Slowing Periods, then total the value of the denominators for the number of Slowing Periods, and then perform the division. For example, to calculate a 10-day %K with 3-period slowing, you would sum the value of the numerators (i.e., today's close minus the lowest low in the last 10 periods) for each of the last three periods, then sum the value of the denominators (i.e., the highest high in the last 10 periods minus the lowest low in the last 10 periods) for each of the last three periods, and finally divide the sum of the numerators by the sum of the denominators.

A moving average of %K is then calculated using the number of time periods you specified in the %D Periods. This moving average is called %D.

Finally, MetaStock Pro multiplies all stochastic values by 100 to change decimal values into percentages for better scaling (e.g., 0.375 is displayed as 37.5%).

The Stochastic Oscillator always ranges between 0% and 100%. A reading of 0% shows that the security's close was the lowest price that the security has traded during the preceding x -time periods. A reading of 100% shows that the security's close was the highest price that the security has traded during the preceding x -time periods.

You may find the expert named "Equis - Stochastic Oscillator" helpful in interpreting the Stochastic Oscillator. See page 435 for more information on experts.

See page 163 for more information on plotting indicators. See page 198 for more information on the Stochastic Oscillator parameters.

Interpretation

Stochastic Oscillators can be used as both short- and intermediate-term trading oscillators depending on the number of time periods used when calculating the oscillator. When displaying a short term Stochastic Oscillator (e.g., 5-25 days), it is popular to slow the %K value by 3-days.

There are several ways to interpret a Stochastic Oscillator. Three popular methods include:

- Buy when the Oscillator (either %K or %D) falls below a specific level (e.g., 20) and then rises above that level, and sell when the

Oscillator rises above a specific level (e.g., 80) and then falls below that level. However, before basing any trade off of strict overbought/oversold levels it is recommended that you first qualify the trendiness of the market using indicators such as r-squared (see page 506) or CMO (see page 454). If these indicators suggest a non-trending market, then trades based on strict overbought/oversold levels should produce the best results. If a trending market is suggested, then you can use the oscillator to enter trades in the direction of the trend.

- Buy when the %K line rises above the %D (dotted) line and sell when the %K line falls below the %D line.
- Look for divergences. For example, where prices are making a series of new highs and the Stochastic Oscillator is failing to surpass its previous highs.

MetaStock Pro's System Tester (see page 319) can be used to automatically generate buy/sell signals based on methods #1 and #2 (above).

Tip

An example custom indicator (see page 311) shows how to calculate the Stochastic Oscillator.

Support and Resistance Levels

Think of security prices as the result of a head-to-head battle between a bull (the buyer) and a bear (the seller). The bulls push prices higher and the bears push prices lower. The direction prices actually move reveals who is winning the battle.

Using this analogy, consider the following chart of Motorola. Between August of 1989 and February of 1990, Motorola rose to the price level of 15.75 several times where it encountered upside resistance. Also note how when the price dropped to 13.25 it encountered downside support.



Savvy investors could see that Motorola was locked in a trading range (between 13.25 and 15.75) and knew that it would have to break out of this range. What direction? Who knows! The fact was that the security was bound to break out. The longer it remained in its trading range, the more powerful the anticipated breakout.

The price breakout finally occurred in March 1990 when prices rose above their resistance level. Once the upside resistance line was penetrated on a *closing* basis, the price of the security rose rapidly. (The penetration of support/resistance levels is usually accompanied with an increase in volume.)

After the quick rise, the price dropped downward once again. When the price reached the line that had previously been upside resistance, it encountered downside support and was unable to fall further. This is a well-documented phenomena. Once penetrated, resistance lines become support lines. Similarly, when prices fall below support lines, the support lines usually provide price resistance.

Swing Index

The Swing Index seeks to isolate the "real" price of a security by comparing the relationships between the current prices (i.e., open, high, low, and close) and the previous period's prices.

The Swing Index requires opening prices.

Step-by-step instructions on calculating the Swing Index are provided in Wilder's book, [New Concepts In Technical Trading Systems](#) (see page 544).

See page 163 for more information on plotting indicators. See page 199 for more information on the Swing Index parameters.

Interpretation

Wilder notes the following characteristics of the Swing Index.

- It provides a numerical value that quantifies price swings.
- It defines short-term swing points.
- It cuts through the maze of high, low, and close prices and indicates the real strength and direction of the market.

Refer to the Accumulation Swing Index (see page 446) for additional interpretational information regarding the Swing Index and the "limit move."

TEMA

TEMA is a unique smoothing indicator developed by Patrick Mulloy. It was originally introduced in the January 1994 issue of Technical Analysis of Stocks & Commodities magazine.

As Mr. Mulloy explains in the article:

"Moving averages have a detrimental lag time that increases as the moving average length increases. The solution is a modified version of exponential smoothing with less lag time."

TEMA is an acronym that stands for Triple Exponential Moving Average. However, the name of this smoothing technique is a bit misleading in that it is not simply a moving average of a moving average of a moving average. It is a unique composite of a single exponential moving average, a double exponential moving average, and a triple exponential moving average that provides less lag than either of the three components individually.

See page 163 for more information on plotting indicators. See page 199 for more information on the Stochastic Oscillator parameters.

Interpretation

TEMA can be used in place of traditional moving averages. You can use it to smooth price data or other indicators. Some of Mr. Mulloy's original testing of TEMA was done on the MACD. Oddly, he found that the faster responding TEMA-smoothed MACD produced fewer (yet more profitable) signals than the traditional 12/26 smoothed- MACD. A custom indicator named "MACD (TEMA-smoothed)" is included with MetaStock Pro.

This type of smoothing is certainly not limited to the MACD. You may want to experiment on other indicators as well.

See page 459 for information on DEMA, a similar smoothing method developed by Mr. Mulloy.

Three Line Break

Three Line Break charts originate from Japan and were introduced to the western world by Steve Nison (a well-known authority on the Candlestick charting method). The Three Line Break charting method gets its name from the default number of line blocks typically used.

Using the closing price, a new white block is added in a new column if the previous high price is exceeded. A new black block is drawn if the close makes a new low. If there is neither a new high or low, nothing is drawn.

With a default Three Line Break, if a rally is powerful enough to form three consecutive white blocks, then the low of the last three white blocks must be exceeded before a black block is drawn. If a sell-off is powerful enough to form three consecutive black blocks, then the high of the last three black blocks must be exceeded before a white block is drawn.

To draw line break blocks, today's close is compared to the high and low of the previous block. A block is drawn only when today's close exceeds the high or low of the previous block. If today's close is higher than the top of the previous block, a new white block is drawn in the next column from the prior high to the new high price. If today's close is lower than the bottom of the previous block, a new black block is drawn in the next column from the prior low to the new low price. If the close fails to move outside the range of the previous blocks high or low, then nothing is drawn.

With the default Three Line Break chart, a downside reversal (i.e., white blocks change to black blocks) occurs when the price moves under the lowest price of the last three consecutive white blocks. A black reversal block is drawn from the bottom of the highest white block to the new price. An upside reversal (i.e., black blocks change to white blocks) occurs when the price moves above the highest price of the last three consecutive black blocks. A white reversal block is drawn from the top of the lowest black block to the new high price.

Indicators calculated on Three Line Break charts use all the data in each column and then display the average value of the indicator for that column.

Interpretation

There are many ways to trade with Three Line Break charts. The most basic method involves buying when a white block emerges after three prior black blocks, or selling when a black block appears after three white blocks.

An advantage of the Three Line Break chart is that there is no arbitrary fixed reversal amount. It is the market's action which gives the indication of a reversal. Reversal signals in Three Line Break charts are sent well after the new trend has started. However, many traders are comfortable

with this insofar as they believe that it is safer to be in for the major part of the trend rather than trying to pick a top or bottom.

To adjust the sensitivity of the reversal criteria, traders can adjust the number of blocks that need to be broken before a reversal is drawn. Thus, two line or four line break charts can be used instead of the standard Three Line Break charts. Shorter time frame traders should use shorter reversal amounts (e.g., two or three), whereas longer term investors should use longer reversal amounts (e.g., five or even 10). The most popular line break chart in Japan is the Three Line Break chart.

For more in-depth coverage of the Three Line Break charting method, we recommend the book Beyond Candlesticks by Steve Nison (see page 544).

Time Series Forecast

The Time Series Forecast indicator is based on the trend of a security's price over a specified time period. The trend is determined by calculating a linear regression trendline using the "least squares fit" method. The least squares fit technique fits a trendline to the data in the chart by minimizing the distance between the data points and the linear regression trendline.

Any point along the Time Series Forecast is equal to the ending value of a Linear Regression trendline plus its slope. For example, the ending value of a Linear Regression trendline (plus its slope) that covers 10 days will have the same value as a 10-day Time Series Forecast. This differs slightly from the Linear Regression indicator (see page 475) in that the Linear Regression indicator does not add the slope to the ending value of the regression line. This makes the TSF a bit more responsive to short term price changes. If you plot the TSF and the Linear Regression indicator side-by-side, you'll notice that the TSF hugs the prices more closely than the Linear Regression indicator.

Rather than plotting a straight Linear Regression trendline, the Time Series Forecast indicator plots the ending values of multiple Linear Regression trendlines. The resulting Time Series Forecast indicator is sometimes referred to as a "moving linear regression" study or a "regression oscillator."

See page 163 for more information on plotting indicators. See page 199 for more information on the Time Series Forecast parameters.

Interpretation

The interpretation of a Time Series Forecast is similar to a moving average. However, the Time Series Forecast indicator has two advantages over moving averages.

Unlike a moving average, a Time Series Forecast does not exhibit as much "delay." Since the indicator is "fitting" a line to the data points

rather than averaging them, the Time Series line is more responsive to price changes.

As the name suggests, the indicator can be used to forecast the next period's price. This estimate is based on the trend of the security's prices over the period specified (e.g., 20 periods). If the trend continues, the last point of the trendline (the value of the Time Series Forecast) is forecasting the next period's price.

Tirone Levels

Tirone Levels are a series of horizontal lines that identify support and resistance levels. They were developed by John Tirone.

See page 205 for more information on drawing line studies. See page 223 for more information on the Tirone Level parameters.

Interpretation

Tirone Levels can be drawn using either the Midpoint 1/3-2/3 method or the Mean method. Both methods are intended to help you identify potential support and resistance levels based on the range of prices over a given time period. The interpretation of Tirone Levels is similar to Quadrant Lines (see page 506).

Trade Volume Index

The Trade Volume Index (TVI) is designed to calculate on intraday securities with "minutes per bar" set to zero (i.e., a tick chart). It is calculated by adding each trade's volume to a cumulative total when the price ticks up by a specified amount, and subtracting the trade's volume when the price ticks down by a specified amount. It's based on the premise that trades taking place at the higher "ask" price are buy transactions (from market maker or specialist to trader) and trades at the lower "bid" price are sell transactions (from trader to market maker or specialist). The TVI oscillates around zero. Values above zero indicate net buying pressure, whereas values below zero indicate net selling pressure.

The TVI is similar to On Balance Volume, except the TVI continues to cumulate the volume (be it on the buy or sell side) if the price is unchanged. Tick charts (especially of stock prices) will often display trades at the bid or ask price for extended periods without changing (creating a flat spot). The TVI continues to assign the trade volume during these extended flat periods to either the buy or sell side (depending on its last price change). The On Balance Volume indicator only assigns volume when price changes occur. This works well for daily charts but not for tick charts.

MetaStock Pro prompts you to enter the "Minimum Tick Value." The Minimum Tick Value controls when volume switches from the buy side

to the sell side. If the absolute value of the uptick or downtick is less than the Minimum Tick Value, MetaStock Pro will continue to assign the volume to the current side (i.e., buy or sell side). If the absolute value is greater than the Minimum Tick Value and the price changes direction, MetaStock Pro will switch and begin assigning volume to the opposite side.

Although the TVI will plot on any chart, it was originally designed to analyze intraday tick charts. Therefore, you may want to use On Balance Volume for non-tick charts (i.e., 5-minute, hourly, daily, weekly, monthly). However, the TVI can be used with non-tick data by increasing the Minimum Tick Value. For example, you could set the Minimum Tick Value to a large value (e.g., 1, 2, 3, 4 points or more) on a daily stock chart. This produces a smoothing effect when compared to On Balance Volume. Volume will cumulate in the direction of the trend until the price reverses by the specified number of points from a previous trough or peak. When this occurs, volume will then begin to cumulate in the opposite direction.

See page 163 for more information on plotting indicators. See page 200 for more information on the Trade Volume Index parameters.

Interpretation

The TVI helps identify whether buyers or sellers are in control. If the TVI is trending up, it indicates that buyers are in control. If the TVI is trending down, it indicates that sellers are in control. If the TVI is above zero, it indicates that net buying has taken place over the time period displayed. If the TVI is below zero, it indicates that net selling has taken place over the time period displayed.

If a large number of trades are taking place at a specific price level (i.e., a flat spot forms on the tick chart) and the TVI is rising (falling), look for the price to break out on the upside (downside).

Trendlines

It's difficult, if not impossible, to provide information on a topic as complex and multifaceted as trendlines in the small area available here. The best source to learn about trendlines and chart patterns is the book Technical Analysis of Stock Trends, by Edwards and Magee (see page 544).

See page 205 for more information on drawing a line studies. See page 224 for more information on Trendline parameters.

General

A trendline is a sloping line drawn between two prominent points on a chart. Rising trendlines are usually drawn between two troughs (low

points) to illustrate price support while falling trendlines are usually drawn between two peaks (high points) to illustrate upside price resistance.

The consensus is that once a trend has been formed (two or more peaks/troughs have touched the trendline and reversed direction) it will remain intact until broken.

That sounds much more simplistic than it is! The goal is to analyze the current trend using trendlines and then either invest with the current trend until the trendline is broken, or wait for the trendline to be broken and then invest with the new (opposite) trend.

The following chart displays two trendlines. The first trendline is a "falling" trendline. Note how it is drawn between successive peaks in the price. The second trendline is rising. It is drawn between successive troughs.



One benefit of trendlines is they can help distinguish intuitive decisions ("I think it's time to sell...") from analytical decisions ("I will hold until the current rising trendline is broken"). Another benefit of trendlines is that they almost always keep you on the "right" side of the market. When using trendlines, it's difficult to hold a security for very long when prices fall just as it's hard to be short when prices rise--either way the trendline will be broken.

Trendline Angles

MetaStock Pro provides two commands that deal with trendline angles: Gann Lines (see page 218), and Trendline by Angle (see page 224). The following discussion explains how these commands function and their differences.

There are basically two ways to quantify the angle of a line drawn on a chart. The first method is relative to the computer screen (or the piece of

paper). If you draw a line at 45 degrees using a protractor on the screen, the line should rise by one inch for each inch it extends (runs) to the right. This 45 degree angle also could be expressed as a slope of 1.

1 inch rise

1 inch run

The Trendline by Angle commands work in this manner--relative to the computer screen. We say it is relative to the computer screen because we are discussing *inches*, not prices, on the screen. Regardless of how many days are displayed or what the x- and y-axes of the chart are set to, a 45 degree angle will slope up and to the right at 45 degrees relative to the computer screen.

A second way to quantify the angle of a line drawn on the chart is relative to the x- and y-axes of the chart itself.

A 45 degree angle relative to the x- and y-axes would rise one y-axis unit (point) for each x-axis unit (day) that the line extends (runs) to the right.

1 point rise

1 period run

This is how Gann Lines are drawn: relative to the x- and y-axes of the chart. The difference between these two methods, i.e., relative to the screen (inches) or to the axes (points), is substantial.

Gann Lines specifically ask for the ratio, i.e., the periods (run) and the points (rise). If you enter 1 x 1, you will get a line that rises one point for each day it travels to the right. The line may or may not appear to rise at 45 degrees relative to the screen, depending on how many periods you have loaded and how the left scale (y-axis) is set.

If you want a 1 x 1 Gann Line to appear to rise at 45 degrees relative to the computer screen, you will have to use the X- and Y-Axis Parameters dialog (see page 118 and page 123) to manually adjust the x- and y-axis.

The Trendline by Angle command draws trendlines relative to the computer screen. Changing the x- and y-axes will have no effect on the angle of the trendline.

TRIX

TRIX displays the percent rate-of-change of a triple exponentially smoothed moving average of the security's closing price.

It is the 1-period percent change of an x -period exponential moving average of an x -period exponential moving average of an x -period exponential moving average of the closing price.

An article on the TRIX indicator appears in Volume One of Technical Analysis of Stocks & Commodities magazine (TASC). The TRIX indicator presented in the TASC article uses a slightly different method to calculate the exponential moving averages and displays the 1-period

change in "points multiplied by 1,000" (whereas MetaStock Pro displays the change as a percentage).

See page 163 for more information on plotting indicators. See page 200 for more information on the TRIX parameters.

Interpretation

The TRIX indicator oscillates around a zero line. Its triple exponential smoothing is designed to filter out "insignificant" cycles (i.e., those that are shorter than x -periods).

Trades should be placed when the indicator changes direction. You also can plot a 9-period moving average of the TRIX to create a "signal" line (similar to the MACD indicator, see page 478) and then buy when the TRIX rises above its signal line, and sell when it falls below its signal line.

Typical Price

The Typical Price indicator is calculated by adding the high, low, and closing prices together, and then dividing by three. The result is the average, or typical price.

$$\text{Typical Price} = \frac{\text{High} + \text{Low} + \text{Close}}{3}$$

See page 163 for more information on plotting indicators. See page 201 for more information on the Typical Price parameters.

Interpretation

The Typical Price indicator provides a simple, single-line chart of the day's average price. You may find it helpful when testing moving average penetration systems to display moving averages of the Typical Price indicator, rather than of the security's closing price.

Ultimate Oscillator

Oscillators typically compare a security's (smoothed) price with its price x -periods ago. Larry Williams notes that the value of this type of oscillator can vary greatly depending on the number of time periods used during the calculation. Thus, he developed the Ultimate Oscillator that uses weighted sums of three oscillators, each of which uses a different time period.

The three oscillators are based on Williams' definitions of buying and selling "pressure."

See page 163 for more information on plotting indicators. See page 201 for more information on the Ultimate Oscillator parameters.

Interpretation

Williams recommends that you trade following a divergence and a breakout in the Ultimate Oscillator's trend.

A bullish divergence occurs when the security's price makes a lower low that is not confirmed by a lower low in the Oscillator. A bearish divergence occurs when the security's price makes a higher high that is not confirmed by a higher high in the Oscillator.

Vertical Horizontal Filter

The Vertical Horizontal Filter (VHF) determines whether prices are in a trending phase or a congestion phase. The VHF compares the sum of a one period rate-of-change to the range between high and low prices over the specified period.

The age-old problem for many trading systems is their inability to determine if a trending or trading range market is at hand. Trend-following indicators such as MACD and moving averages, tend to be whipsawed as markets enter a non-trending congestion phase. On the other hand, oscillators (which work well during trading range markets) tend to overreact to price pull-backs during trending markets. The VHF indicator attempts to remedy this by measuring the "trendiness" of a market.

MetaStock Pro prompts you to enter the number of periods to use in the calculation. The default value is 28.

See page 163 for more information on plotting indicators. See page 201 for more information on the VHF parameters.

Interpretation

There are three ways to use the VHF indicator:

- VHF values above or below certain levels indicate the degree of trending. The higher the VHF, the higher the degree of trending.
- The direction of the VHF can be used to determine whether a trending or congestion phase is developing. A rising VHF indicates a developing trend; a falling VHF indicates that prices may be entering a congestion phase.
- The VHF as a contrarian type indicator. Expect congestion to follow high VHF values. Low VHF values may indicate a trending phase will soon follow.

Volatility, Chaikin's

The Volatility indicator compares the spread between a security's high and low prices. This is done by first calculating a moving average of the

difference between the daily high and low prices and then calculating the percent rate-of-change of that moving average.

Before calculating the Volatility indicator, you are asked to enter the number of time periods in the moving average and the number of time periods in the R.O.C. The author of this indicator (Marc Chaikin) recommends 10-periods for both the moving average and the R.O.C.

See page 163 for more information on plotting indicators. See page 201 for more information on the Volatility indicator's parameters.

Interpretation

This indicator quantifies volatility as a widening of the range between the highs and the lows (i.e., wider price swings during the day).

There are two ways to interpret this measure of volatility. One method assumes that market tops are generally accompanied by increased volatility and that market bottoms are generally accompanied by decreased volatility. An opposing method (Mr. Chaikin's) assumes that an increase in the Volatility indicator over a short time period indicates that a bottom is near (e.g., a panic sell-off) and that a decrease in volatility over a longer time period indicates an approaching top (e.g., a mature bull market).

Tips

Mr. Chaikin recommends that investors do not rely on any one indicator and suggests using a moving average penetration or trading band system to confirm this (or any) indicator.

Because this indicator uses high and low prices in its calculation, it will not work on securities that only have a closing price (e.g., most mutual funds).

An example custom indicator (see page 311) shows how to calculate Chaikin Volatility.

Volume

Volume is the number of units (i.e., shares or contracts) traded during a specific time period. The analysis of volume is a basic yet very important element of technical analysis. Volume helps measure the intensity of price movement.

Often, the y-axis scale for volume is displayed in multiples of 10s or 100s rather than the actual number (i.e., 500 = 500,000 shares). If there is a scaling multiple, it will be displayed at the bottom of the y-axis scale. Volume is normally displayed in a histogram line style below the prices (see page 114).

Some real-time data vendors do not provide volume with every tick. If this is the case, MetaStock Pro will automatically assign a volume value

of "1" for every incoming tick. This allows you to at least see the number of "ticks" that have come in during a specified period. In other words, if the volume on a 1-minute bar is 22, then you know that 22 trades came in during that minute.

If your real-time data vendor does not supply trade volume with updates, and a symbol is added during a trading session, the first tick will contain the total volume up to that point in the trading session. MetaStock Pro will then calculate the trade volume for all subsequent ticks.

See page 163 for more information on plotting indicators. See page 202 for more information on Volume parameters.

Interpretation

Volume is important to many techniques and systems used in technical analysis. In brief, volume provides clues to the intensity level of a given price move.

Generally speaking, volume tends to be a leading indicator of price. Volume usually drops off before prices peak, and it usually picks up before prices rise from a market bottom.

Low volume levels are characteristic of the indecision that typically accompanies consolidation periods (i.e., periods where prices move sideways in a narrow range). Low volume is often found at market bottoms.

High volume levels are characteristic of market tops and the beginning of new trends (i.e., when prices break out of a trading range). Just prior to market bottoms, volume will often increase on panic driven selling.

Volume also helps determine the health of an existing trend. A healthy up-trend should have higher volume on the upward legs of the trend, and lower volume on the downward, corrective legs. After a market top, it is common to have a sharp down day on very heavy volume. A healthy downtrend usually has higher volume on the downward legs of the trend and lower volume on the upward, corrective legs.

Volume Oscillator

The Volume Oscillator displays the difference between two moving averages of a security's volume. The difference between the averages can be expressed in either points or percentages.

See page 163 for more information on plotting indicators. See page 202 for more information on the Volume Oscillator parameters.

Interpretation

As volume levels are increasing, shorter-term volume moving averages will rise above longer-term volume moving averages. This is similar to

how shorter-term price moving averages rise above longer-term price moving averages when prices are increasing.

Thus, the difference between two volume moving averages of varying lengths (i.e., this indicator) can be used to see if overall volume trends are increasing or decreasing. When the Volume Oscillator rises above zero, it signifies that the shorter-term volume moving average has risen above the longer-term volume moving average, or that the short-term volume trend is higher (i.e., more volume) than the longer-term volume trend.

There are many ways to interpret changes in volume trends. One common belief is that rising prices coupled with increased volume, and falling prices coupled with decreased volume, is bullish. Conversely, if volume increases when prices fall, and volume decreases when prices rise, the market is showing signs of underlying weakness.

The theory behind this is straight forward. Rising prices coupled with increased volume signifies increased upside participation (more buyers) that should lead to a continued move. Conversely, falling prices coupled with increased volume (more sellers signifies increased downside participation).

Tip

An example custom indicator (see page 311) shows how to calculate the Volume Oscillator.

Volume Rate-Of-Change

The Volume Rate-Of-Change (R.O.C.) indicator is calculated by dividing the volume change over the last x -periods by the volume x -periods ago. The result is the percent by which the volume has changed over the last x -periods.

If volume is higher today than x -days ago, the R.O.C. will be a positive number. If volume is lower today than x -days ago, the R.O.C. will be negative.

See page 163 for more information on plotting indicators. See page 203 for more information on the Volume R.O.C. parameters.

Interpretation

The Volume R.O.C. is calculated identically to the Price R.O.C. (see page 501), except it displays the R.O.C. of the security's volume, rather than of its closing price. Additional information on the interpretation of volume trends can be found in the discussion on the Volume Oscillator (see page 535).

Tip

An example custom indicator (see page 311) shows how to calculate Volume R.O.C.

Weighted Close

The Weighted Close indicator is calculated by multiplying the close by two, adding the high and the low, and dividing by four. The result is the average price for the day with extra weight given to the closing price.

$$\text{Weighted Close} = \frac{(\text{Close} \times 2) + \text{High} + \text{Low}}{4}$$

See page 163 for more information on plotting indicators. See page 203 for more information on the Weighted Close parameters.

Interpretation

The Weighted Close indicator provides a single line chart of the average price. When testing moving average penetration systems, you may find it helpful to display moving averages of the Weighted Close indicator, rather than of the security's closing price.

Tip

An example custom indicator (see page 312) shows how to calculate Weighted Close.

Wilder's Smoothing

The Wilder's Smoothing indicator was developed by Welles Wilder, best known as the developer of the Directional Movement system (see page 461) and the Relative Strength Index (see page 512).

Wilder used this smoothing indicator as a component of many of his other studies. It is basically a type of moving average, similar to the "exponential" method in that it retains a decreasingly smaller percentage of all historical data in the series.

See page 163 for more information on plotting indicators. See page 203 for more information on the Wilder's Smoothing parameters.

Interpretation

The Wilder's Smoothing indicator should be used just as you would use a moving average. Although similar to the exponential, weighted, and triangular moving average methods in how it has a "memory" of all historical data, the Wilder's Smoothing method seems to be the least responsive of the three.

For more information on the interpretation of moving averages, see page 488.

Williams' %R

The formula used to calculate Williams' %R is similar to the Stochastic Oscillator:

Williams' %R is plotted on an upside down scale with 0 at the top and 100 at the bottom. To show the indicator in this upside down fashion, MetaStock Pro places a minus symbol before the %R values. You should ignore the minus symbol.

See page 163 for more information on plotting indicators. See page 203 for more information on the Williams' %R parameters.

Interpretation

The analysis of Williams' %R is very similar to that of the Stochastic Oscillator (see page 521) except that %R is upside down and the Stochastic Oscillator has internal smoothing.

Readings in the range of 80 to 100% (remember to ignore the minus symbol) indicate that the market is oversold, while readings in the 0 to 20% range suggest that the market is overbought.

As with all overbought/oversold indicators, it is best to wait for the security's price to change direction before placing your trades. For example, if an overbought/oversold indicator (such as the Stochastic Oscillator or Williams' %R) is showing an overbought condition, it is wise to wait for the security's price to turn down before selling the security. (The MACD is a good indicator to monitor change in a security's price.) It is not unusual for overbought/oversold indicators to remain in an overbought/oversold condition for a long time period as the security's price continues to climb/fall. Selling simply because the security appears overbought may take you out of the security long before its price shows signs of deterioration.

An interesting phenomena of the %R indicator is its uncanny ability to anticipate a reversal in the underlying security's price. The indicator almost always forms a peak and turns down a few days before the security's price peaks and turns down. Likewise, %R usually creates a trough and turns up a few days before the security's price turns up.

Tip

An example custom indicator (see page 312) shows how to calculate Williams' %R.

Williams' Accumulation/Distribution

Williams' Accumulation/Distribution is a cumulative total of "X" where:

TRH (true range of highs) =

Yesterday's close or today's high, whichever is greater.

TRL (true range of lows) =

Yesterday's close or today's low, whichever is less.

If today's close is greater than yesterday's close,

X = today's close - TRL,

otherwise, if today's close is less than yesterday's close,

X = today's close - TRH,

otherwise,

X = 0.

See page 163 for information on plotting indicators. See page 204 for information on the Williams' Accumulation/Distribution parameters.

Interpretation

Williams recommends trading this indicator based on divergences.

- Distribution of the security is indicated when the security is making a new high and the A/D indicator is failing to make a new high. Sell.
- Accumulation of the security is indicated when the security is making a new low and the A/D indicator is failing to make a new low. Buy.

Tips

Williams' Accumulation/Distribution indicator is a *price* indicator. The *Accumulation/Distribution* indicator is a *volume* indicator (see page 446).

An example custom indicator (see page 312) shows how to calculate Williams' A/D.

Zig Zag

The Zig Zag indicator filters out changes in the data item (i.e., the security or an indicator) that are less than *x* percent or points. It is used primarily to aid in the visual inspection of a chart--punctuating the significant moves.

See page 163 for more information on plotting indicators. See page 204 for more information on the Zig Zag parameters.

Interpretation

The Zig Zag indicator is useful to filter out "noise" in a security's price and indicators. It is primarily intended to aid in the visual inspection of a chart.

The Zig Zag indicator can be useful for those concerned with Elliot Wave counts since it helps identify significant turning points.

Be forewarned, that the last leg (i.e., segment) of the Zig Zag is dynamic, meaning that it can change. Therefore, be careful when designing system tests, experts, etc. based on the Zig Zag indicator.

For additional information on the Zig Zag indicator, refer to Filtered Waves by Arthur Merrill (see page 544).

Appendices

Information About Your Computer System

Information about your computer system is available from the About MetaStock dialog. Choose About MetaStock from the Help menu.

If you have Microsoft Office installed you can click the System Info button in this dialog to view information about your PC.

Installing and Using MetaStock Pro on a Network

A special installation procedure is required in order for MetaStock Pro to be accessible by multiple network users. Information is provided here for both the network administrator and the workstation users.

***Note.** MetaStock Pro can be accessed simultaneously by multiple users on a network. However, each user of MetaStock Pro must be a licensed owner. Please purchase a licensed copy of MetaStock Pro for each person using the software. If more than one user is accessing a single licensed copy of MetaStock Pro, then you are violating the license agreement and breaking the law.*

Discounts are available if you purchase multiple copies.

Information for the Network Administrator

MetaStock Pro can be installed on a network drive for use by multiple workstations. Choose the "Complete/Custom" option from the MetaStock Pro Setup dialog to install all files to the network drive.

MetaStock Pro data files can also be stored on a network drive for use by multiple workstations.

Each workstation must have full read/write access to the folders containing program and data files.

Information for Workstation Users

In order for MetaStock Pro to access the program's network files from a workstation, each workstation must complete a "Workstation" installation.

Choose the "Workstation" option from the MetaStock Pro Setup dialog to install the necessary files to the workstation drive.

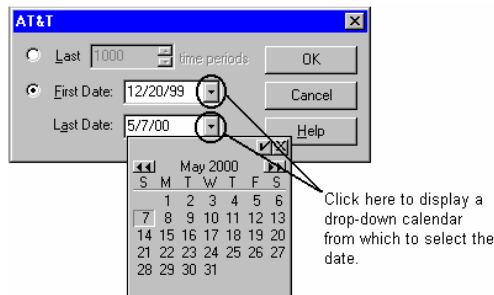
At the beginning of the workstation installation you are prompted to type your user name (unless you have already installed). Be sure that this name is unique in order to avoid conflicts with other network users. You can change the user name after installation from MetaStock Pro's Application Options dialog (see page 35).

During the installation you are also asked to specify the network drive where the MetaStock Pro program files are located. Ask your network administrator for this information. The path to the MetaStock Pro program files on the network is automatically stored in each workstation's Windows registry.

Do not attempt to access a real-time data folder that is in use by another MetaStock Pro user. If you do, the other user will lose "write" privileges to the folder.

Entering Dates in MetaStock Pro

When entering dates in MetaStock Pro, you can type them or use a special drop-down calendar that allows you to easily choose specific dates.



If you choose to type the dates rather than select them from the drop-down calendar, you can enter the year using two or four digits. If you enter only two digits, MetaStock Pro interprets the two digit years 26 through 99 to mean 1926 through 1999. Two digit years 00 through 25 are interpreted to mean 2000 through 2025. This means that in order to enter a date of 1915 or 2036, you would need to type in the four digit year, or MetaStock Pro would not interpret them as you intended.

Converting Custom Formulas, System Tests, Explorations, and Experts

When you installed MetaStock Pro for the first time, the installation program asked if you wanted to transfer your custom indicators, system tests, and explorations from a previous version of MetaStock to MetaStock Pro 8.0. If you answered "yes," you will be asked if you want to update your files to be compatible with MetaStock Pro 8.0. You are

asked this the first time you attempt to access the Indicator Builder, System Tester, The Explorer, and the Expert Advisor.

Also, if you have deleted, moved, or renamed the MS80FORM.DTA, MS80PRFT.DTA, MS80EXPL.DTA, or MS80EXPT.DTA files, you are asked if you want to create new files. The actual formulas, system tests, explorations, and experts (respectively) are stored in these files.

Program Performance

There are several things you can do to speed up MetaStock Pro:

- Close other applications while running MetaStock Pro.
- Only load as much data as you need (see page 80).
- Limit the number of charts you have open.
- Use the status bar (see page 27) to view the date and pointer location rather than the Data Window.
- Increase the amount of RAM in your computer.
- Install a faster CPU.
- Limit the number of calculation-intensive indicators and experts attached to a chart.

Using OptionScope



OptionScope button

OptionScope is a separate program provided with MetaStock Pro that is patterned after a spreadsheet. It is used to analyze options on futures and equities.

You run OptionScope from within MetaStock Pro by choosing OptionScope from the Tools menu or by clicking the OptionScope button on the standard toolbar.

With OptionScope you can:

- calculate the fair market value of put and call options.
- calculate implied volatility to see what the "actual" option's price is implying the volatility should be.
- calculate delta, vega, gamma, and theta (see page 494) to study the sensitivity of the option to changes in market conditions.
- calculate "what-if" scenarios.
- display graphs of option positions.

The folder where the OptionScope program is located is specified in the Application Options dialog (see page 33).

OptionScope includes an on-line help system that explains how to use the program's features. Choose Contents from OptionScope's Help menu.

Suggested Reading

The following books have been used by Equis for the Interpretation of Indicators and Line Studies chapter of the manual. Equis also recommends these books to those needing additional information on technical analysis.

For additional information on books, videos, software and other educational materials, check out the EQUISDirect catalog on our web site at <http://www.equis.com>.

Achelis, Steven B. Technical Analysis from A to Z. Chicago, IL: Probus Publishing Company, 1995.

Written by the president and founder of Equis International. This book contains an introduction to technical analysis, plus a complete reference to over 100 indicators and studies.

Appel, Gerald and Hirschler, Fred. Stock Market Trading Systems. Homewood, IL: Dow Jones-Irwin, 1980.

Takes a thorough look at moving average trading systems, timing market cycles, the 12-day Rate-Of-Change, etc.

Appel, Gerald. The Moving Average Convergence-Divergence Method. Great Neck, NY: Signalart, 1979.

The MACD from its creator.

Arms, Richard W., Jr. Volume Cycles in the Stock Market. Salt Lake City, UT: Equis International, Inc., 1994.

Thoroughly explains the Equivolume charting method, volume cycles, and the ease of movement indicator.

Bookstaber, Richard. The Complete Investment Book. Glenview, Illinois: Scott, Foresman and Company, 1985.

Explains the Black/Scholes option calculations used in MetaStock Pro.

Chande, Tushar S and Stanley Kroll. The New Technical Trader. New York: Wiley, 1994.

A book describing a new statistically- based breed of price-based, and risk control indicators.

Cohen, A.W. How To Use The Three-Point Reversal Method of Point & Figure Stock Market Trading. Larchmont, NU: Chartercraft, 1984.

A detailed book on point & figure chart interpretation.

Dobson, Edward D. Understanding Fibonacci Numbers. Greenville, SC: Traders Press, 1984.

A brief overview of Fibonacci numbers. Contains an extensive bibliography.

Edwards, Robert D. and Magee, John. Technical Analysis of Stock Trends. Sixth Edition. Boston, MA: John Magee, Inc., 1992. (Distributed by New York Institute of Finance.)

Explains trendlines and chart patterns.

Eng, William F. The Technical Analysis of Stocks, Options, & Futures. Chicago, IL: Probus Publishing, 1988.

Granville, Joseph E. New Strategy of Daily Stock Market Timing for Maximum Profit. Englewood Cliffs, NJ: Prentice-Hall, 1976.

A book from the inventor of On Balance Volume. Mr. Granville has earned a bearish reputation, but his technical tools remain valid.

Kaufman, Perry J. Commodity Trading Systems and Methods. New York: Wiley, 1978.

A serious book for the serious technician. While not required, a strong background in mathematics is helpful when reading this book.

Lebeau, Charles, and David Lucas. Technical Trader's Guide to Computer Analysis of the Futures Market. Homewood, IL: Business One Irwin, 1991.

An excellent book that shows the historical performance of popular technical indicators and oscillators.

Leibovit, Mark A. Using the Volume Reversal Survey in Market Analysis (520-282-1275).

This pamphlet provides information on some of the pattern finding functions in the MetaStock formula language (i.e., Inside, Outside, Rally, and Reaction).

Merrill, Arthur A. Filtered Waves-Basic Theory. Chappaqua, NY: The Analysis Press, 1977.

This is an entire book about the Zig Zag indicator. It is available from:
Technical Trends
John R. McGinley, Jr.
P.O. Box 792
Wilton, CT 06897

Murphy, John J. Technical Analysis of the Futures Markets. New York, NY: New York Institute of Finance, 1986.

One of the best single sources of information on technical analysis. You don't have to trade commodities for this book to be valuable.

Natenberg, Sheldon. Option Volatility and Pricing Strategies. Chicago, IL: Probus Publishing Company, 1988.

Explains the Black/Scholes option calculations used in MetaStock Pro.

Nison, Steven. Japanese Candlestick Charting Techniques. New York, NY: New York Institute of Finance, 1991.

Explains how to use and interpret Candlestick charts.

Nison, Steven. Beyond Candlesticks. New York, NY: Wiley, 1994.

Explains how to use and interpret Kagi, Renko, and Three Line Break charts.

Raff, Gilbert. Trading the Regression Channel. Salt Lake City, UT. Equis International, 1996.

Explains how to trade the Regression Channel and objectively draw trendlines.

Pring, Martin J. Technical Analysis Explained. Third edition. New York, NY: McGraw-Hill, 1991.

A complete, well-written book on technical analysis. Recommended.

Wilder, J. Welles. New Concepts in Technical Trading Systems. Greensboro, NC: Trend Research, 1978.

Explains the interpretation and calculation of about a dozen indicators including all of the Directional Movement indicators, the Relative Strength Index, and the Commodity Selection Index.

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