



MapInfo Professional

v7.8

User Guide (Unabridged)

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Introduction

Welcome to the MapInfo family of products! As the field of computer mapping continues to expand, MapInfo leads the way with new products that are designed to fulfill users' computer mapping needs from the most basic to the most specialized with MapMarker, our premier address matching product.

MapInfo Professional[®], our flagship product, is a comprehensive computer mapping tool that enables you to perform complex geographic analysis such as redistricting, accessing your remote data, dragging and dropping map objects into your applications, creating thematic maps that emphasize patterns in your data, and much more.

Among the new features are the inclusion of the Web Map Service Client, the integration of Vertical Mapper, a new 3D graphics charting engine, and major enhancements to the Universal Translator. **What's New in MapInfo Professional 7.8 on page 27** provides a full description of new and enhanced features.

This User Guide contains all of the information you need to learn about and be productive using MapInfo Professional.

Sections in this Chapter:

- ◆ **What is MapInfo Professional and What Does it Do? 17**
- ◆ **Getting Support 22**
- ◆ **What's New in MapInfo Professional 7.8 27**

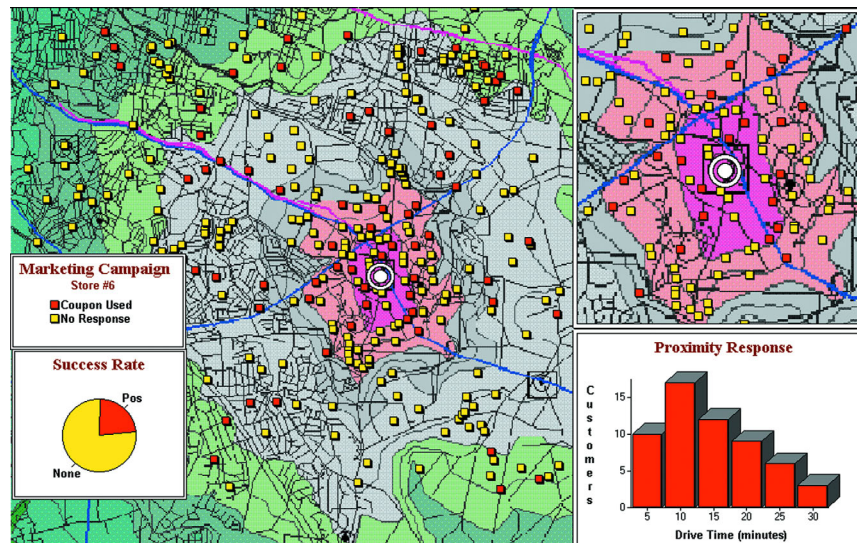
What is MapInfo Professional and What Does it Do?

With MapInfo Professional, the power of computer mapping is at your complete disposal. You can display your data as points, as thematically shaded regions, as pie or bar charts, as districts, etc. You can perform geographic operations such as redistricting, combining and splitting objects, and buffering. You can also make queries against your data and access your remote data directly from MapInfo Professional.

For example, MapInfo Professional can show which branch store is the closest to your biggest customers. It can calculate the distances between customers and stores; it can show you the customers who spent the most last year; it can color-code the store symbols by sales volume. What makes it all come together is a visual display of your data on the map.

Mapping at a Glance

Huge quantities of information are available today, far more than ever before. Data abounds in spreadsheets, sales records, and marketing files. Paper and disk store masses of information on customers, stores, personnel, equipment, and resources. Thematic maps and graphs show distribution of customers for a marketing campaign.



Nearly all of it has a geographic component. An estimated 85 percent of all databases contain some sort of geographic information such as street addresses, cities, states, postal codes, or even telephone numbers with area codes and exchange numbers.

Computer mapping can help you sort through all of this information, and using the geographic components in your data, display your results on a map. This lets you see patterns and relationships in the mass of information quickly and easily without having to pore over your database.

Windows Compatibility

MapInfo Professional is Microsoft Windows 98, Windows 2000, Windows NT 4.0, Windows XP Professional and Windows XP Home and Office compatible, so you will feel right at home with its windowing environment. MI Pro is designed to fit smoothly into your work environment, so it only changes the results you get, not the way you work.

Using Your Own Data

To begin with, you can use the data you already have, in the form it's already in — spreadsheets such as Excel, databases such as Access 2000, popular CAD packages, and other GIS applications, to name just a few. If your data is on a remote database, you can access it directly from MapInfo Professional. If you have data that is not already online, you can create database files right inside the product, or use data supplied by MapInfo — such as census data.

Similarly, you can use any of thousands of maps available from MapInfo, everything from street and highway maps to world maps. You can also create your own maps, either in MapInfo Professional or with a drawing package. You can diagram anything — floor plans, flow charts, even brain anatomy — can be treated as a map and entered into the product.

After you've organized your data visually, you'll save the results to files, or send them to any of the dozens of printers and plotters MapInfo Professional recognizes.

If you have your data on hand and you can read a map, you're just about ready to begin. Soon, we'll show you an example of how easy it is to put MapInfo Professional's power to work for you.

But first, install MapInfo Professional following the instructions in **Installing MapInfo Professional in Chapter 2 on page 68**. Read through **Organization of the User's Guide on page 20** to get a feel for the range of mapping possibilities. If you are new to the product, or new to computer mapping, we suggest you refer to **The Basics of MapInfo Professional in Chapter 3 on page 100** for an overview of basic mapping terms and concepts. Use the web-enabled tutorial to learn about its features, and become accustomed to the more common tasks and functions.

For more product and service information, you can connect directly from MapInfo Professional to our forum (on the **HELP** menu, click **MAPINFO ON THE WEB**). Or, consult our World Wide Web site (<http://www.mapinfo.com>).

Reviewing the MapInfo Professional Features

MapInfo Professional gives you the processing power of databases (including powerful SQL queries) and the visual power of maps, plus charts and graphs. It's an essential business tool for data analysis, sales, and presentations.

Here is a look at some of the things MapInfo Professional offers:

- Direct opening of files created with dBASE or FoxBASE, delimited ASCII, shapefiles, Lotus 1–2–3, Microsoft Excel, and Microsoft Access; importing of graphics files in a variety of formats; a function for creating database files from within the product.
- Multiple views of your data in three formats: Map, Browser, and Graph windows. Hot Views technology allows you to open multiple views of the same data simultaneously and update all views automatically when you make a change to any one view.
- Live ODBC access to remote database data such as Oracle and SQL Server.

- Seamless map layers that allow you to handle several map layers as if they were one layer.
- Cartographic legends, enabling you to create and customize legends for any map layer.
- Thematic maps to create analyses of your data with high visual impact, including grid surface themes, 3DMaps, and Prism maps.
- Use raster underlay capabilities to enhance your work session.
- Querying capabilities ranging from simple selections of data from a single file to complex SQL queries from one or more files.
- Workspaces that save all your settings and views so you can start where you left off at the end of your last work session.
- HotLinks that let you launch files or URLs directly from a Map window.
- OLE embedding of Map windows into other applications
- A comprehensive array of drawing and editing tools and other functions for customizing your maps.
- Thousands of ready-made maps and functions for creating your own maps.
- Crystal Reports, the industry-standard report-writing program, allows you to create reports of your tabular data directly in the product.
- A layout window for preparing output.
- Improved printing and export capabilities for high-quality output
- The ability to change the projection of your map for display or digitizing.
- Object processing functions that help to correct errors in data, set node snap tolerances for different objects, as well as thin nodes and polygons.

When it's time to run MapInfo Professional, you'll feel right at home with its windowing environment. After you've organized your data visually, you'll save the results to files, or send them to your printer or plotter.

Ensuring Your Success

Unquestionably, MapInfo Professional can set your organization apart from competitors; however, it also requires knowledge of the program's basic functionality.

Here is a four-step process you can use to ensure your own success:

1. **Read the documentation.** The User's Guide provides all of the information you need to perform the basic functions of the software. It is also included on the distribution CD as a PDF file.
2. **Get trained.** Get the most out of your MapInfo Professional software. MapInfo Corporation and its partners provide comprehensive training courses throughout the world that is customized to meet your particular business needs. You will learn everything from basic to advanced operations and develop important skills along the way.
3. **Check the Tech Tip Archive.** The Tech Tip Archive on our Web site contains numerous documents from MapInfo Professional's Knowledge Base and a FAQ section. The Tech Tips explain common problems and provide how-to information that can help with specific issues. New documents are added often, so stop by www.mapinfo.com and see what's new.
4. **Join the MapInfo-L community.** The MapInfo-L mailing list is an Internet list server that allows you to share your ideas and insight with other MapInfo Professional users. For subscription information about MapInfo-L refer to <http://www.directionsmag.com>. Contact Bill Thoen <mapinfo-l-owner@lists.directionsmag.com> if you need help. On occasion,

problems with Internet mail result in lost postings. If you are aware of recent postings that are not in the database, please do not re-post to MapInfo-L! Instead, please forward a copy of the posting to either Bill Thoen or the MapInfo Test Drive Center (testdrive@mapinfo.com).

Utilize support along the way. When you're stopped at a critical point, Technical Support is here to help. See **Getting Technical Support on page 23** for details on contacting your local support center.

Organization of the User's Guide

We have organized this User's Guide in the order you might need the information as a beginner. We provide an extensive index for quick access to specific information and a glossary to assist you with terms that may be unfamiliar. The order of the chapters and appendices are as follows:

Chapter 1: Introduction gives you an overview of MapInfo Professional and a description of its capabilities. You will learn how to get support and what is new in the most recent version of the product.

Chapter 2: Installing, Configuring, and Starting MapInfo Professional instructs you in installing the product and configuring it according to your computer environment. You can find the preference settings and the basics of opening and closing the MapInfo Professional product in this chapter.

Chapter 3: The Basics of MapInfo Professional chapter shows you the toolbars and concepts you need to be familiar with to use the product. You may find yourself referring to this chapter often when you are learning MapInfo Professional.

Chapter 4: Putting Your Data on the Map gets your data on a map quickly and easily while explaining the basic concepts of geocoding and creating points. Here, you will learn the details of printing and exporting your maps.

Chapter 5: Enhancing Your Data shows you how to get additional data for your maps, how to create reports and how to access data in remote databases.

Chapter 6: Accessing Remote Data covers the details of accessing and using remote data in MapInfo Professional.

Chapter 7: Drawing and Editing Objects gives you all of the tools you need to enhance your maps by drawing and editing map objects including polylines, polygons, and symbols. This chapter also covers entering and working with text in your maps.

Chapter 8: Selecting and Querying Data shows you how to collect information in a meaningful way from your map or from your data. Your database holds information in patterns you may not be able to see until you query your data -- this chapter shows you how.

Chapter 9: Creating Thematic Maps, Legends, and Other Maps — This chapter reveals the power of the product. Thematic maps and legends allow your maps to show you trends and patterns and helps you reveal those patterns to others as well. Use this chapter to familiarize yourself with the tools you need to make your maps say what you want them to.

Chapter 10: Buffering and Working with Objects brings the power of buffers and advanced object use to your maps. In this chapter you will cover creating territories and grouping regions based on your data and your needs.

Chapter 11: Graphing Your Data shows you the ins and outs of creating effective graphs using the product. Here, you will learn what kind of graphs show your data in the most effective way and how to create those graphs quickly and easily.

Chapter 12: Stylizing Your Map for Presentations and Publishing. If presentations are your goal, this chapter demonstrates the use of Layout windows, which our users say are the most effective way to create presentation materials. We review labeling and changing the styles of your map.

Chapter 13: Registering Raster Images. This chapter shows you how to register raster images so they line up properly with your vector based maps.

Chapter 14: Working with Coordinate Systems and Projections. Because the world is round, you cannot talk about maps without talking about the curvature of the Earth. This advanced chapter discusses the complexities of coordinate systems and projection in easy to understand terms.

Chapter 15: Specialized Topics in MapInfo Professional covers the features that may not pertain to all users but may be vital to helping you get your job done. Topics include: embedding maps in other applications, Internet connectivity, redistricting, creating expressions, and working in the MapBasic window.

Appendix A: Directory of MapInfo Professional Shortcuts lists the shortcuts we have created to make you more efficient in using the product. You will probably want to refer to this directory often as you get started.

Appendix B: Elements of a Coordinate System reviews the more advanced coordinate system information that may not pertain to all customers.

Appendix C: Registering SPOT Images walks you through the use of raster and SPOT images in computer mapping.

Appendix D: MapInfo Map Interchange Format discusses the Map Interchange Format which can assist you in sharing MapInfo Professional maps.

Appendix E: Fill Patterns Used in MapInfo Professional contains the fill patterns used to shade regions in MapInfo Professional.

Appendix F: Custom Datums. Most coordinate systems use one of MapInfo's predefined datums, listed in this appendix. If you are going to create your own coordinate system, you will need to understand the information in this appendix.

Appendix G: Sample Data Copyrights lists the copyrights for the data we use in this manual.

Appendix H: New and Enhanced MapBasic Statements and Functions reviews the new and enhanced MapBasic statements and functions for MapInfo Professional 7.8.

MapInfo Professional Documentation Set

In addition to the *Abridged User Guide*, MapInfo Professional's documentation set includes the MapInfo Professional *Unabridged User Guide*, an online version of this guide which contains more detail about the MapInfo Professional product, online Help, and which exists in .PDF format only.

The *MapBasic[®] Reference* is a complete guide to all MapBasic commands. Review the **New and Enhanced MapBasic Statements and Functions in Appendix H on page 636** for details on the 7.8 release.

We have created the *MapInfo Professional 7.8 User Guide (Unabridged)* to ensure that you receive all of the information you need to use MapInfo Professional successfully. If you cannot find information you are looking for in the Abridged version of this guide, please refer to the MI_UG.PDF file on your installation CD.

Accessing MapInfo Professional Documentation from the CD

You can access the online *MapBasic Reference*, or the Crystal Reports *User Guide* directly from the MapInfo Professional CD, or install the Adobe[®] Acrobat Reader to access the files locally.

Choose to access any of the online manuals directly from the CD.

To install the documentation locally:

1. Install the Acrobat[®] Reader.
2. Copy the files from the [CD_ROM]:\PDF_DOCS folder to a local directory.
 - mi_ug.pdf* is the MapInfo Professional *User Guide (Unabridged)* and requires ~17 MB of disk space.
 - mb_ref.pdf* is the *MapBasic Reference Guide* and requires ~10 MB of disk space.
 - crw_ref.pdf* is the Crystal Reports *User Guide* and requires 13 MB of disk space.
 - arclink3.pdf* contains documentation on ArcLink.
 - easyloader.pdf* contains documentation on the EasyLoader tool.
 - printing.pdf* contains detailed recommendations to get the most of printing MapInfo Professional maps.
 - supplement.pdf* contains a detailed list of the changes in the 7.8 version of MapInfo Professional and how to use them.
3. From Windows Explorer, double-click any file to automatically launch the Acrobat[®] Reader and the online books.

Getting Support

Everyone at MapInfo Corporation is committed to your success and we provide a wide range of support to assist you in getting the results you are working toward. What follows in this section is a statement of the resources we provide.

Using the Status Bar

MapInfo Professional's Status Bar along the lower edge of your screen provides helpful information during your mapping session and allows you to make some changes directly in the Status Bar. On the **OPTIONS** menu, click **SHOW/HIDE STATUS BAR** to control the display of the Status Bar.

- **Status Bar Help:** For instantaneous answers to “What does that command do” simply move the cursor over the command. A brief description of the command displays in the left pane of the Status Bar along the lower edge of your screen.
- **Zoom, Map Scale, Cursor Location:** View any one of these settings in the Status Bar. You can change which one is displayed directly from the Status Bar. Click the arrow on the right side of the box to display a popup list of the three options. Click the setting you want to display. The Status Bar automatically updates. These display settings are also controlled in the Map Options dialog box (on the **MAP** menu, click **OPTIONS**).
- **Editable Layers:** To keep track of which layer is currently editable, review the list of layers that display in the Status Bar. You can change the editable layer directly in the Status Bar. Click the arrow to the right of the box to display a popup list of the layers in the Map window. Click the layer you want to make editable. The Status Bar automatically updates, showing the new editable layer.
- **Selectable Layers:** The Status Bar indicates which layer the current selection is from. If there is nothing selected, the Status Bar reads: “Selecting: NONE.”
- **Browser window Records:** When viewing a table in a Browser, the record count displays in the Status Bar.
- **Snap-to-Node:** This **S**-key toggle feature is in use when SNAP displays in the Status Bar.

Using the Help System

MapInfo Professional's comprehensive Online Help system provides the information you need to learn and use the product more effectively. You can reach the information in several ways:

- Use the Help Contents screen to choose topics from books. Click a book to display its topics, and choose a topic from the list.
- Use the Search feature to search on a specific word. Type the word you want to search for in the first field, select the matching word in the second, and then the topic in the third box. MapInfo Professional displays the topic in the pane on the right.
- Use the Index feature to find a topic quickly. Type the first few letters of the word you are looking for. The index entry that most closely matches your entry is highlighted. Click the index entry you want to display.
- **Context-Sensitive Feature:** Press the **F1** key to receive more information on any menu command or dialog. The Help window for that item displays. Also click the **HELP** button in the MapInfo Professional dialogs to display information on the current dialog.
- **See Also information:** Click the green underlined text in any Help window to bring up information on related tasks or key words and phrases.

Online Help has been designed to display in half of your window so that you can view your maps, Browser windows, and dialogs alongside the Help window. Of course, you can always change the size of the Help window to work the way you are most comfortable. On the **HELP** menu, click **ALWAYS ON TOP** to keep the Help window on your screen so you can continue to work in the product. Or use **ALT-TAB** to toggle between the Help screen and the product's windows.

Getting Technical Support

MapInfo Corporation offers a free support period on all new software purchases and upgrades, so you can be productive from the start. Once the free period ends, MapInfo Corporation offers a broad selection of extended support services for individual, business, and corporate users.

Technical Support is here to help you, and your call is important. This section lists the information you need to provide when you call your local support center. It also explains some of the technical support procedures so that you will know what to expect about the handling and resolution of your particular issue.

MapInfo Corporation provides full technical support for MapInfo Professional for versions 6.0 and later. Please remember to include your serial number, partner number or contract number when contacting Technical Support.

Contact the technical support personnel for your area:

The Americas

Phone: 518.285.7283

Fax: 518.285.6080

E-mail: techsupport@mapinfo.com

Hours: Monday - Friday from 8:00am - 7:00pm EST, excluding MapInfo Holidays. Closed between 10:30am - 11:30 am on Mondays for training.

Asia-Pacific Headquarters

Phone: 61.7.3844.7744

Fax: 61.7.3844.2400

E-mail: ozsupport@mapinfo.com

Hours: Monday - Friday from 9:00am and 5:00pm (EST) Australian Eastern Standard Time, excluding MapInfo Holidays.

Europe/Middle East/Africa

Phone: 44.1753.848229

Fax: 44.1753.621140

E-mail: support-europe@mapinfo.com

Hours: Monday - Friday from 8am to 5pm GMT, excluding MapInfo Holidays.

Germany

Phone: +49 (0) 6142-203-400

Fax: +49 (0) 6142-203-444

E-mail: supportgermany@mapinfo.com

Hours: Monday - Friday from 9 am to 5 pm MEZ, excluding MapInfo Holidays.

To use Technical Support, you must register your product. This can be done very easily during installation. To receive more information on MapInfo's technical support programs, contact a representative in your area or one of our technical support offices.

In the United States, call 1-800-FASTMAP for more information. To purchase MapInfo technical support or renew your current contract, please contact MapInfo Customer Service at 1-800-552-2511, and press 3 at the main menu, or send an e-mail at custserv@mapinfo.com.

Extended support options are available at each of our technical support centers in the United States, United Kingdom, and Australia.

Before You Call

Please have the following information ready when contacting us for assistance on MapInfo Professional.

1. Serial Number. You must have a registered serial number to receive Technical Support.
2. Your name and organization. The person calling must be the contact person listed on the support agreement.
3. Version of the product you are calling about.
4. The operating system name and version.
5. A brief explanation of the problem. Some details that can be helpful in this context are:
 - Error messages
 - Context in which the problem occurs
 - Consistency – is the problem reoccurring or occurring erratically?

The Support Tracking System

The Support Tracking System is used internally by the Technical Support department to manage and track customer issues. The system also provides the ability to track calls with accountability. This system helps Tech Support respond to all customer issues effectively, efficiently, and fairly.

Expected Response Time

Most issues can be resolved during the customer's initial call. If this is not possible, a response will be issued before the end of the business day. A Technical Support representative will provide a status each business day until the issue is resolved.

Support requests submitted by e-mail are handled using the same guidelines as telephone support requests; however, there is an unavoidable delay of up to several hours for message transmission and recognition.

Exchanging Information

Occasionally a Technical Support representative will ask you to provide sample data in order to duplicate your scenario. In the case of our developer tools (such as MapX and MapXtreme), a small subset of sample code may be requested to help duplicate the issue.

The preferred method of exchanging information is either via e-mail or our FTP site. Use the following e-mail addresses:

- United States – techsupport@mapinfo.com
- Europe – support-europe@mapinfo.com
- Australia – ozsupport@mapinfo.com

Accessing the MapInfo FTP site

For information regarding our FTP site, please contact Technical Support.

If information cannot be provided electronically, we also accept information in the following media formats:

- 3.5" Floppy Disks
- Zip Disks (100 MB format only)

- CDs
- Jaz Drives (1 gig format only)

Software Defects

If the issue is deemed to be a bug in the software, the representative will log the issue in MapInfo Corporation's bug base and provide you with an incident number that can be used to track the bug. Future upgrades and patches have fixes for many of the bugs logged against the current version.

Customer Service - Your Non-Technical Support

To receive additional materials such as paper copies of this *User's Guide* or the *MapBasic Reference Guide* or to resolve questions about the accounting of your MapInfo product, contact the Customer Service department. Keep in mind that this is not a technical support resource.

- Hours: Monday through Friday, 8AM to 7PM EST
- Telephone Number: (800) 552-2511, Option 3
- Queue/Voice mailbox: x6329
- Internet address: custserv@mapinfo.com

Getting MapInfo Professional Training

The best way to ensure success with MapInfo Professional software is to make certain that users are trained in the product and version of the software you are using. Since MapInfo recognizes that it is not always possible for the designated contact to be trained immediately, MapInfo offers a 30-day grace period on this requirement. At the end of the 30-day grace period, MapInfo Technical Support reserves the right to withhold support from untrained designated contacts.

Note: Trained contacts can place an unlimited number of support calls during the time period of a valid technical support contract.

Other Resources

Here are some other resources available to you when you need assistance in using or learning to use MapInfo Professional.

In addition to these resources, the following books are available to MapInfo users:

Johnson, Ian. *Understanding MapInfo: A Structured Guide*
Sydney, Australia: Archaeological Computing Laboratory, 1996.

Daniel, Larry, Paula Loree, and Angela Whitener. *Inside MapInfo Professional*. Sante Fe: OnWord Press, 1996.

MapInfo-L Archive Database

MapInfo Corporation, in conjunction with Bill Thoen, provides a web-based, searchable archive database of MapInfo-L postings. The postings are currently organized by Discussion Threads and Postings by Date.

Disclaimer: While MapInfo Corporation provides this database as a service to its user community, administration of the MapInfo-L mailing list is still provided by Bill Thoen.

To subscribe to MapInfo-L, send e-mail to: majordomo@lists.directionsmag.com

The subject should be left blank. The first line of the message should be: subscribe MAPINFO-L

To unsubscribe from MapInfo-L send e-mail to: majordomo@lists.directionsmag.com

The subject should be left blank. The first line of the message should be: unsubscribe MAPINFO-L

To obtain help on MapInfo-L, send e-mail to: majordomo@lists.directionsmag.com

The subject should be left blank. The first line of the message should be: help MAPINFO-L

To post messages to MapInfo-L, send e-mail to: MAPINFO-L@lists.directionsmag.com

Note: Any messages sent to the list can be read by anyone on the list.

Thoen's Web is a web page authored by MapInfo Partner Bill Thoen. There are many links to GIS information in general and specific links to MapInfo resources. You can reach Thoen's Web at:

<http://www.gisnet.com/gis/>

Another Useful Site for MapInfo Users

Marjorie Roswell has organized a site with a wide variety of mapping resource links around the world. There are many MapInfo links as well as general geography links. You can reach Marjorie Roswell's site at:

<http://research.umbc.edu/~roswell/mipage.html>

What's New in MapInfo Professional 7.8

New Major Features of MapInfo Professional 7.8

There are several exciting new features in Microsoft XP Logo Certified MapInfo Professional 7.8. These innovations are the results of requests from many of our customers and are in response to changes and growth in the computer mapping industry.

Adding WFS Client Support

MapInfo Professional 7.8 provides a Web Feature Service (WFS) client to retrieve geospatial GML (Geography Markup Language)2 data using HTTP GET and HTTP POST requests over the Internet or through a private intranet. The WFS client was developed in accordance with the 1.0.0 OpenGIS® Web Feature Service Implementation Specification, which is available online:

<http://www.opengis.org/docs/02-058.pdf>

WFS is similar to WMS (Web Mapping Service), in that both can provide geographic data via the Internet. But while a WMS server provides raster maps, a WFS server provides raw coordinate data that the client uses to produce a map.

A WFS is similar to a Web Map Service, which allows a client to overlay map images from multiple services over the Internet or through a local intranet. For more details on Web Map Services, see the MapInfo Professional v7.8 User's Guide.

Note: The MapInfo WFS client has been developed in accordance with OGC WFS Specification 1.0.0. Using this client you cannot retrieve data from sites that are compliant with earlier or later versions of the OGC specification.

This version of the WFS client supports GML2 (OGC GML V2.1.1). The OGS WFS Specification states that all servers should support GML2, but may also support other formats. The server provides information on the formats available, and the client makes the request for the data in the format it can use. If the server does not support GML2, it will not be supported by the MapInfo WFS client.

GML2 does not contain any style information. You can provide style information to associate with a particular WFS table.

A WFS request contains a description of query operations that can be applied to one or more features. The client generates the request and posts it to a WFS using HTTP. The web feature server then reads and executes the request.

The **GetCapabilities** operation queries the WFS server for capabilities. Then the MapInfo Professional WFS client can generate a query appropriate for the WFS server and table.

Each table in the WFS server can result in a single MapInfo table. The mapping is always 1-to-1 (unlike WMS, which is many-to-1).

The TAB file retrieved from a WFS server resembles a read-only DBMS linked table. It contains a MAP file and a DAT file, and acts like a read-only native table. Information is stored so that the table can be refreshed from the WFS server.

The sequence of actions can be summarized as follows:

1. After sending a **GetCapabilities** request to a WFS server, the server returns a list of WFS layers (FeatureTypes) that it can provide.
2. The user picks a WFS layer to fetch from the server, MapInfo Pro then sends a **DescribeFeatureType** request to the server. This response is an XML schema that describes the feature.
3. The user can then select which columns and/or rows to fetch.
4. MapInfo Pro sends a **GetFeature** request to the WFS. If the user did not select a subset of columns, all columns will be requested by default.
5. The response is a GML document containing the feature collection. Each feature represents one "record" in the MapInfo table.

MapInfo has added a list of WFS servers to the client to help you get started in using this new functionality.

Note: Since the data you retrieve using the WFS is remote, it may change from time to time. You can refresh your WFS data manually using the refresh process. See **Refreshing a WFS Layer on page 34** for these instructions.

Accessing Web Feature Services

If a MapInfo WFS table is open, the user interface automatically enables the refresh process. During the refresh process, users can not change the query that is sent to the WFS server. The data will be refetched from the server using the original query. This refreshed information can then be saved to the table.

Note: You must have a working Internet connection whenever you retrieve WFS data.

Opening a Web Feature Service

To open a Web Feature Service:


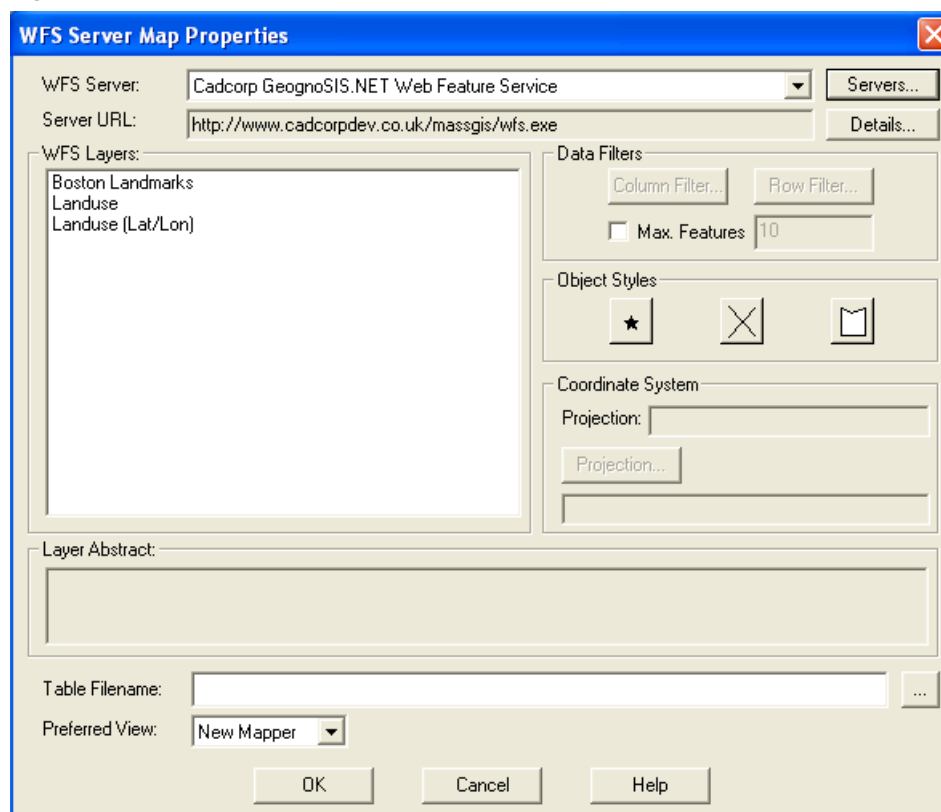
1. On the **FILE** menu, select **OPEN WEB SERVICE > OPEN WFS** or click  to open the **WFS SERVER MAP PROPERTIES** dialog box. This opens the default WFS server.

Figure: WFS Server Map Properties



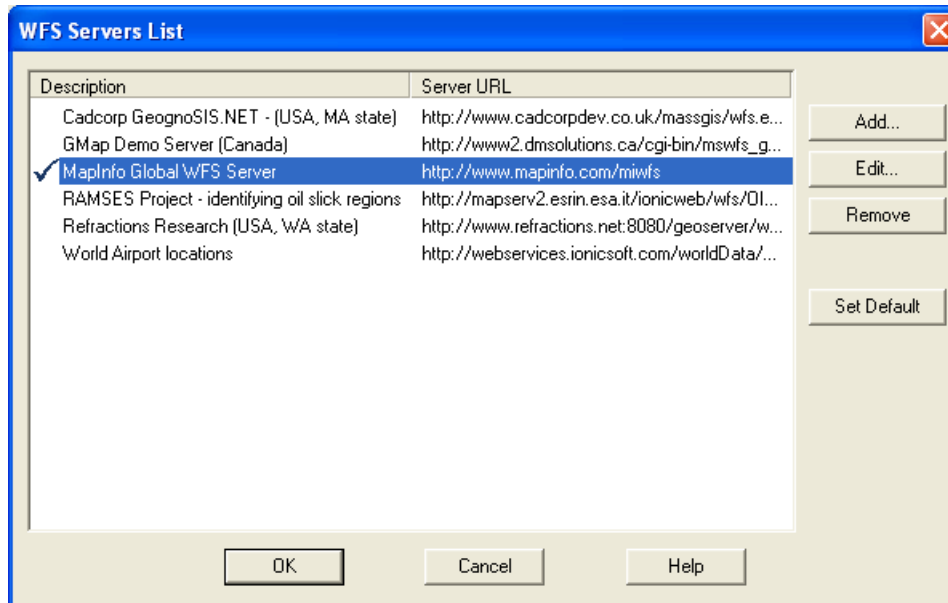
2. Select a server from the **WFS SERVER** drop-down list, then click **OK**.

Note: The WFS Servers that display in the **WFS SERVER** list are based on a list we have compiled for you. MapInfo has no control over the availability of these servers at any given time. The availability of WFS data depends upon the status of the server and the status of the maps on those servers. You can customize this list to suit your needs.

To see the details of a particular WFS Server, including the Server URL, the Server Name, version, and usually a server supplied description, click **DETAILS**.

- If you do not see the server you are looking for in the **WFS SERVER** list, select **SERVERS** to display the WFS Servers List.

Figure: WFS Servers List



A check mark to the left of the Description indicates the default WFS server, which is selected when you first launch **OPEN WFS**.

You can also choose **SET DEFAULT** to change the default WFS server.

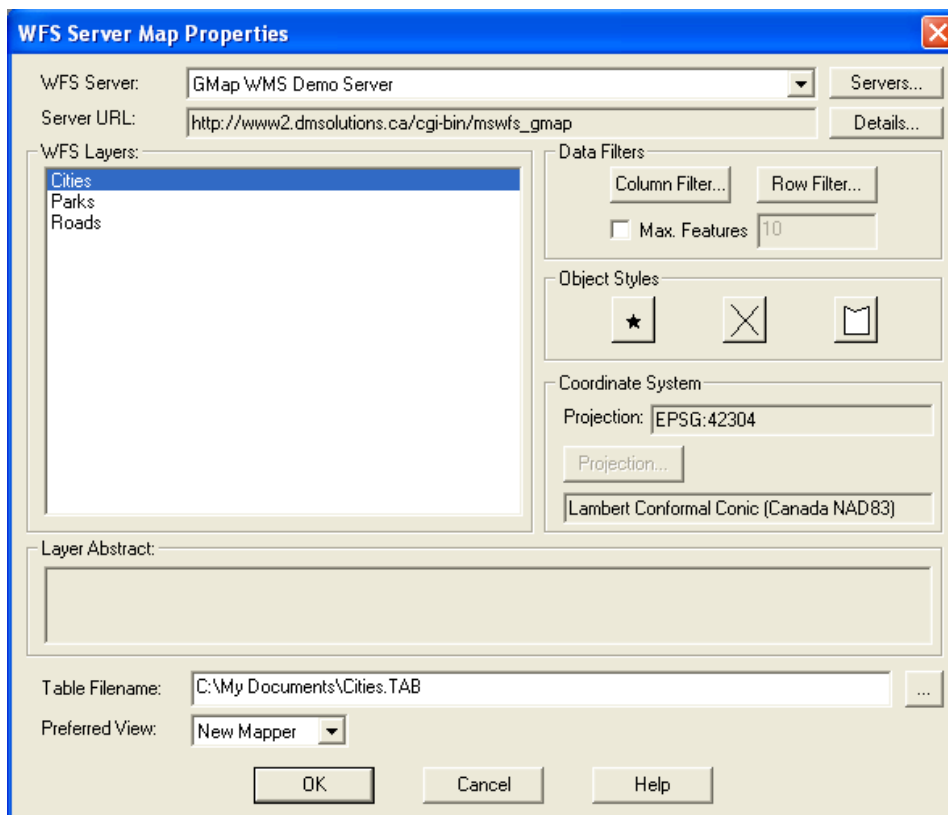
If you do not see the server you are looking for, you can add a server. See **Adding a WFS Server on page 35**.

Note: If you work with a WFS Server that is not the default, MapInfo Professional remembers that new server for the rest of the session and recalls it whenever you return to the **OPEN WFS TABLE** dialog box.

Selecting a WFS Layer

1. After selecting a specific server, select a WFS Layer from the **WFS SERVER** drop-down list.

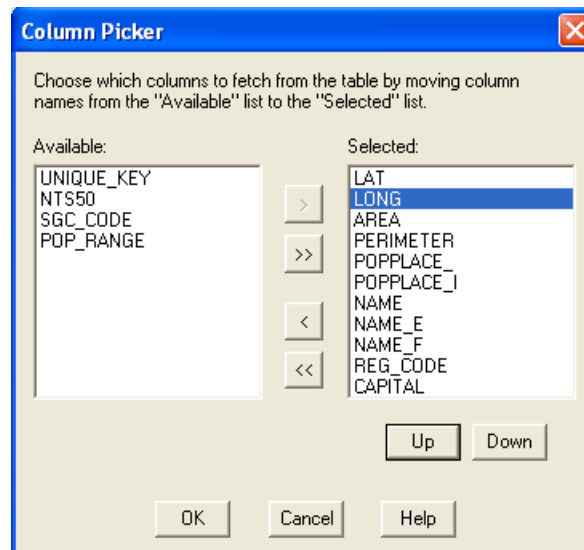
Figure: WFS Server Map Properties with Layer Highlighted



2. To specify which columns of data to retrieve from the table, click **COLUMN FILTER** and click the right arrow to move the column name from Available to Selected. If * is shown in the

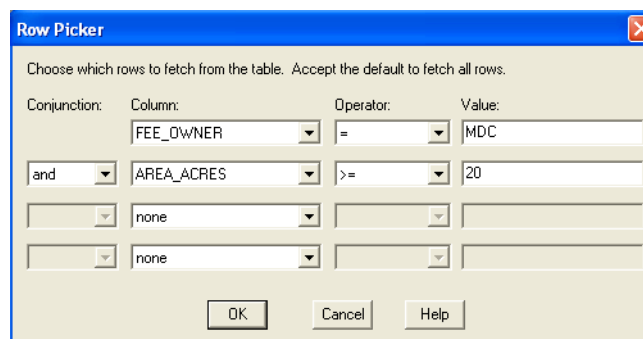
Selected column, all columns of data will be returned. Then click **OK** to return to the **WFS SERVER MAP PROPERTIES** dialog box.

Figure: Column Picker



3. You can use the **UP** and **DOWN** buttons to change the order of the selected columns. As listed from top to bottom, the selected columns will be ordered from left to right order in the new table. For example, you could use the Up arrow to move LAT and LONG to the top of the list, even if they originally were not in that position.
 4. To specify which rows of data to retrieve from the table, click **ROW FILTER**. You can then refine your results using comparison operators based on table data or using spatial operators based on the Geometry object. The default action is to return all rows of data.
- Note:** The name of the Geometry object and the available spatial operators depends entirely on the server. The WFS client has no control over the availability of that content.
5. Assume that you performed a preliminary WFS query that identified environmentally protected areas in the state of Massachusetts. By default, all rows of data will be returned. But you could use the Row Picker to filter the results and target only those areas in which the Fee Owner (FEE_OWNER column) is the Metropolitan District Commission (MDC) with AREA_ACRES equal to or greater than 20 acres. Select the appropriate Comparison operators and optionally, Conjunction operators, from the drop-down lists.

Figure: Row Picker with Comparison Operators

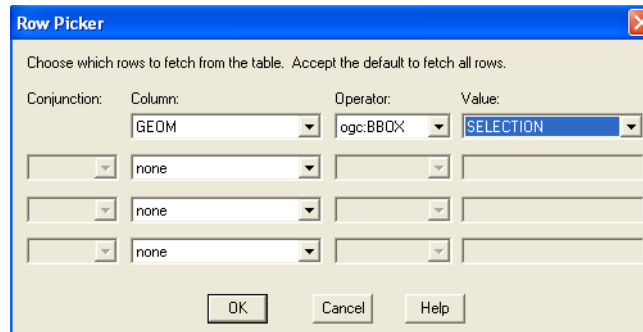


Then click **OK** to return to the **WFS SERVER MAP PROPERTIES** dialog box.

- From the same preliminary query that identified environmentally protected areas in the state of Massachusetts, you could also perform a spatial search based on the Geometry object. For example, after zooming in on the mapper window and selecting several objects, you can filter results based on the BBOX spatial operator. The Value drop-down list always has a choice for ALL and will display CURRENT_MAPPER if one or more windows are open. You will also see a SELECTION choice if one or more objects have been selected from the mapper or browser window.

Note: Note that the name of the Geometry object (for example, GEOM) and the available spatial operators depends on the server.

Figure: Row Picker with Spatial Operators



- Click **OK** to return to the **WFS SERVER MAP PROPERTIES** dialog box.
If this checkbox is not selected, all features (as defined by **ROW FILTER**) will be returned.
- Select an appropriate file name from the **TABLE FILENAME** entry box. See **Handling Retrieved WFS Data on page 34** for detailed information on specifying file names and folders for saved tables.
- From the **PREFERRED VIEW** drop-down list in the **WFS SERVER MAP PROPERTIES** dialog box, select the preferred view for the returned results. New Mapper is the default. Then click **OK** to generate results. The results (filtered by selected column and row names) are displayed in the specified window.

Controlling WFS Maximum Features

To limit the number of features returned by the WFS server, select the Max Features checkbox in the WFS Server Map Properties dialog box and enter a number. By limiting the number of downloaded features, it may take less time to download and display a table than it would for downloading the entire table. This may allow you to quickly judge the value of the data. However, you cannot control which features are downloaded.

Note: While, the OGS WFS Specification mandates that WFS servers must support Max Features, some WFS servers seem not to support it.

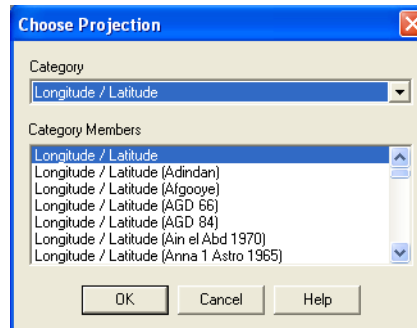
Changing a WFS Coordinate System

The **PROJECTIONS** button is enabled *only if* the projection provided by the WFS server cannot be properly interpreted by the WFS client. If the projection provided by the WFS server can be properly understood, this button will be disabled and can be ignored.

If the **PROJECTIONS** button is active, you must use it to specify a known projection from the list of supported projections so that the GML2 image can be imported correctly. Select the coordinate system that you believe matches to the data returned by the server.

1. After selecting a layer in the **WFS SERVER PROPERTIES MAP** dialog box, click **PROJECTION** (if the button is enabled) to display the **CHOOSE PROJECTIONS** dialog box.




Figure: Choose Projection




2. From the **CHOOSE PROJECTION** dialog box, select the **CATEGORY** and **CATEGORY MEMBER** that corresponds to the projection of the returned data. Click **OK** to return to the **WFS SERVER PROPERTIES MAP** dialog box.

Changing WFS Styles

The styles are initialized to the default object styles, which are set using **OPTIONS > PREFERENCES > STYLES**. You can change the object styles as shown in the following steps. Objects in the created WFS table will use the established styles.

1. From the **WFS SERVER PROPERTIES MAP** dialog box, click  to open the **SYMBOL STYLE** dialog box. From here you can change the font, point size, symbol, color, and other attributes of the symbol.
2. Click  to open the **LINE STYLE** dialog box. From here you can change the style, color, width, and other attributes of the line style.
3. From the **WFS SERVER PROPERTIES MAP** dialog box, click  to open the **REGION STYLE** dialog box. From here you can change the fill and border attributes of the region style.

Handling Retrieved WFS Data

Use the **TABLE FILENAME** field to specify the name and path that you want to save the GML2 data to, once it is retrieved. The default is the selected layer's given name with the .TAB extension. You may wish to change this and give the table a more meaningful file name. The default directory is determined by the preference (**OPTIONS > PREFERENCES > DIRECTORIES > WFS TABLES**). You can select the  button to open a dialog box that allows you to specify a file name and navigate to a folder.

Use the **USE PREFERRED VIEWS** field to indicate where and how you want to display the retrieved data. Options include: Automatic, Browser, Current Mapper, New Mapper, and No View. New Mapper is the default selection.

Refreshing a WFS Layer

To refetch the data for a WFS layer:

1. On the Table menu, click **WFS TABLE REFRESH** to display the **SELECT WFS TABLE** dialog box.

2. From Select WFS Table, select the appropriate WFS table and click **SELECT**. to refresh the WFS layer.
3. Click OK to exit the dialog box.

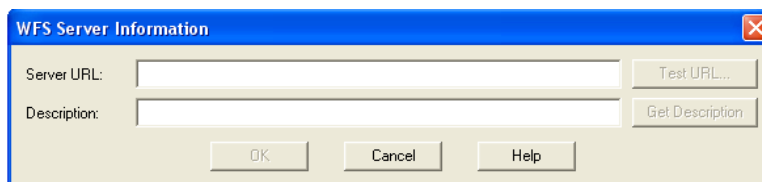
Adding a WFS Server

If you do not see the server you are looking for in the **WFS SERVERS LIST** dialog box, you can add a server.

Note: The servers we display in this document are some examples of servers that worked in our laboratory tests. Please contact your service provider if you have difficulties with WFS server access.

1. From the **WFS SERVERS LIST** dialog box, click **ADD** to display the **WFS SERVER INFORMATION** dialog box. This same dialog box appears when you click the **EDIT** button in the **WFS SERVERS LIST**.

Figure: WFS Server Information



2. Type the URL you want to add in the Server URL field. Click **TEST URL** to ensure that MapInfo Professional can find the server. Click **GET DESCRIPTION** to get the server-provided description, or type in your own description. Click **OK** to return to the **WFS SERVERS LIST** dialog box.
3. In the **WFS SERVERS LIST** dialog box, click **SET DEFAULT** to select a default server in the list. The default server will be selected the first time you open the **WFS TABLE** dialog box. When you set a default WFS server, a check mark displays beside it. If you do not select a default server, MapInfo Professional displays the first server in the list when you begin your WFS Server session.
4. To edit a WFS server, select the server from the **WFS SERVERS LIST** dialog box and click **EDIT** to open the WFS Servers Information dialog box. From here you can test the URL and get detailed information on the server.
5. To remove a WFS server, select the server from the **WFS SERVERS LIST** dialog box and click **REMOVE**. This removes the server from the list.
6. When you have completed your work in the **WFS SERVERS LIST**, click **OK** to return to the Open **WFS SERVER MAP PROPERTIES** dialog box.

Controlling WFS Server Timeout Values

You can set several optional registry entries to control how long the WFS client will attempt to connect to the server before timing out. These are optional entries, and if not set, the indicated default values are used. Server timeout values can *not* be set through the MapInfo application interface.

These registry entries are DWORD values, with the decimal value representing the number of seconds for the timeout. The registry entries reside in:

```
HKEY_LOCAL_MACHINE\SOFTWARE\Mapinfo\MapInfo\Common
```

WFS Server Timeout Entries

Registry Entry	Description	Default Value
DEFAULT_WFS_CONNECT_TIMEOUT	Connect Timeout - the amount of time allowed to establish an Internet connection request. If the request takes longer than this value, a timeout occurs.	60 seconds
DEFAULT_WFS_SEND_TIMEOUT	Send Timeout - the amount of time allowed to send an Internet request. If the request takes longer than this value, a timeout occurs.	60 seconds
DEFAULT_WFS_RECEIVE_TIMEOUT	Receive Timeout - the amount of time allowed to receive a response from an Internet request. If the request takes longer than this value, a timeout occurs.	300 seconds

WFS-Related Error Messages

The MapInfo Pro WFS client will return appropriate error messages. Data returned to the WFS client depends on the availability and status of the WFS server and the characteristics and status of the maps on the WFS server. These conditions are beyond the control of MapInfo.

The following table lists and explains WFS-related error messages.

WFS-Related Error Messages

Error Message	Description and Explanation of Message
The WFS Server issued the following exception: <i><message from server></i>	The raw data following the colon is transmitted by the WFS server. This may help you analyze the problem. The WFS server generated an error. For clarification, contact the service provider of the WFS server.
The following error was issued while attempting to access the WFS server: <i><message from server></i>	There could be a problem with the URL, the server may not be available, or it may have timed out.
The WFS Server returned no data in response to the request.	MapInfo issued a service request, but nothing was received from the server.
Unable to retrieve capabilities from the WFS Server.	The server did not return a list of FeatureTypes in response to the GetCapabilities request. This message usually appears paired with another message in the same window.

WFS-Related Error Messages

Error Message	Description and Explanation of Message
The WFS Server returned HTML data rather than the requested format. The specified address may not be a WFS Server or the server could not process the request: <i><message from server></i>	The raw data following the colon is transmitted by the WFS server. This may help you analyze the problem. The server you are accessing may not be a WFS server. You may see this message <i>after</i> accessing a WFS server and seeing a list of WFS layers. This can occur because the Capabilities document provided by the server may contain additional URLs that redirect you to another server (not the one you explicitly selected). That “redirected” server may be down or have another problem.
The WFS Server returned data which was neither in the requested format nor a recognized WFS service exception: <i><message from server></i>	The raw data following the colon is transmitted by the WFS server. This may help you analyze the problem. The exception message from the server could not be understood. For example, the exception message may not have been in XML format.
Error accessing temporary file.	It is possible that your disk is full or you might have deleted the temp file while MapInfo Pro was running.
In response to a DescribeFeatureType request, the WFS Server returned an invalid feature type.	MapInfo could not interpret the schema returned by the server. This message is usually preceded by either another MapInfo error message or raw data transmitted by the WFS server. This may help you analyze the problem.
Unable to read WFS Table Description XML file.	The most likely cause of this error, is that the user edited the XML file that was created by MapInfo.
Unable to retrieve WFS Server GetFeature.	This message is usually preceded by either another MapInfo error message or raw data transmitted by the WFS server. This may help you analyze the problem.
An error occurred while processing GML returned from the WFS server.	The server provided GML that MapInfo could not interpret.
The WFS Server returned capabilities in an unsupported versions: <i><message from server></i>	The raw data following the colon is transmitted by the WFS server, and identifies the WFS version in the Capabilities document, as reported by the server. This may help you analyze the problem.
The layer is not supported because it has more than one FeatureType.	The MapInfo WFS client expects one FeatureType in the schema. However, the schema returned by the server contained more than one FeatureType.
You need to select a WFS layer.	After selecting a server In the WFS Server Map Properties dialog box, you must also select a WFS layer. If you click OK before selecting a WFS layer, you will get this error message.
Error: Unable to communicate with the WFS server while trying to determine the table structure.	This message can appear when pressing the OK button on the WFS Sever Map Properties dialog. This means that the DescribeFeatureType failed.

WFS-Related Error Messages

Error Message	Description and Explanation of Message
Please select a supported projection.	This message appears if the selected WFS layer has Unsupported Projection, and the user did not select the PROJECTION button to specify a projection.
Error: Unable to create XML file for WFS table.	This message can appear when pressing the OK button on the WFS Sever Map Properties dialog. This means there is a problem creating the XML file used to open a WFS table.
Error: The WFS server does not return data in the required GML2 format.	The user selected a WFS server that does not support GML2 as an output format.

Adding GetFeatureInfo Support to Web Map Service

The Info Tool now provides **GetFeatureInfo** support for Web Map Service (WMS). When you click on the WMS layer with the Info tool, the Info tool window displays information about the features of each layer that you have retrieved from a WMS server.

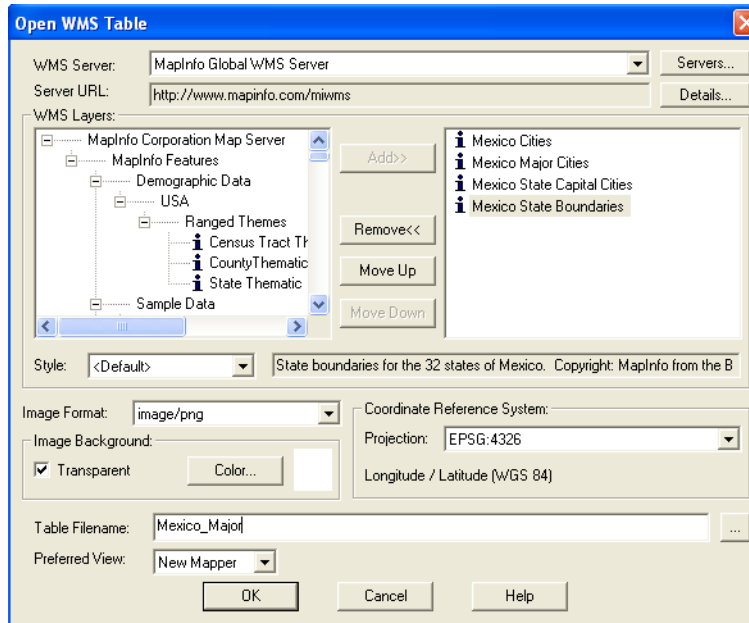
By default, when you open a WMS layer and add it to a map, it is selectable when it meets the following criteria:

- The WMS server must support GetFeatureInfo.
- The WMS server must return GetFeatureInfo data in a format that is supported by MapInfo Professional. These formats are text/plain and the xml and gml formats returned by MapXtreme® Java edition and MapXtreme® 2004, respectively.
- The WMS servers must specify that at least one of the WMS layers within the WMS table can be queried.

The WMS layer can also be made selectable using the MapBasic statement:

```
set map layer layer_id selectable on
```

After making the WMS layer selectable, the Info tool can be used. Information will be returned only from layers that are queryable. The WMS table treeview in the **OPEN WMS TABLE** and **WMS TABLE PROPERTIES** dialog boxes display an Information icon next to queryable layers to indicate that the InfoTool will work on those layers.



The supported GetFeatureInfo formats include:

- text/plain
- text/xml (as returned by WMS servers using MapXtreme® Java Edition)
- application/x-mapinfo-gml3 (as returned by WMS servers using MapXtreme® 2004)
- application/x.cubestor-gml.1 (as returned by WMS servers using CubeWerx CubeSERV® WMS)
- application/vnd.ogc.gml

In some cases, the WMS server may return an error when the user clicks on the map. Error messages are displayed in the info tool window itself. Examples of errors include:

- The WMS Server does not support GetFeatureInfo requests.
- The WMS Server does not return GetFeatureInfo data in a format supported by MapInfo Professional.
- There are no queryable layers in the WMS table for the GetFeatureInfo request
- The WMS Server returned data in *<returned-format>* format rather than the requested format of *<requested-format>*
- Unable to retrieve feature information from the WMS Server.

Controlling WMS Server Timeout Values

You can set several optional registry entries to control how long the WMS client will attempt to connect to the server before timing out. These are optional entries, and if not set, the indicated default values are used. Server timeout values can *not* be set through the MapInfo application interface.

These registry entries are DWORD values, with the decimal value representing the number of seconds for the timeout. The registry entries reside in:

```
HKEY_LOCAL_MACHINE\SOFTWARE\Mapinfo\MapInfo\Common
```

WMS Server Timeout Entries

Registry Entry	Description	Default Value
DEFAULT_WMS_CONNECT_TIMEOUT	Connect Timeout – the amount of time allowed to establish an Internet connection request. If the request takes longer than this value, a timeout occurs.	60 seconds
DEFAULT_WMS_SEND_TIMEOUT	Send Timeout – the amount of time allowed to send an Internet request. If the request takes longer than this value, a timeout occurs.	60 seconds
DEFAULT_WMS_RECEIVE_TIMEOUT	Receive Timeout – the amount of time allowed to receive a response from an Internet request. If the request takes longer than this value, a timeout occurs.	300 seconds

Clearer WMS Error Messages

We have enhanced the error messages that display while using the Web Map Service capabilities to ensure that they are more indicative of the problems.

Data returned to the WMS client depends on the availability and status of the WMS server and on the characteristics and status of the maps on the WFS server. These conditions are beyond the control of MapInfo.

The following table lists and explains WMS-related error messages. Some messages consist of two parts, separated by a colon. The information up to the colon is generated by the MapInfo WMS client. The raw data following the colon comes directly from the WMS server. For clarification on those messages, please contact the service provider of the WFS server.

WMS-Related Error Messages

Error Message	Description and Explanation of Message
XML Parsing Error: <i><message from XML parser></i>	The most likely cause is badly formed XML from the server. The raw data following the colon is transmitted by the MSXML 4.0 parser.
The WMS Server issued the following exception: <i><message from server></i>	The raw data following the colon is transmitted by the WMS server. This may help you analyze the problem. The WMS server generated an error. For clarification, contact the service provider of the WFS server.
The following error was issued while attempting to access the WMS server: <i><message from server></i>	There could be a problem with the URL, the server may not be available, or it may have timed out.
The WMS Server returned no data in response to the request.	MapInfo issued a service request, but nothing was received from the server.
Unable to retrieve capabilities from the WMS Server.	The GetCapabilities request from the server failed. This message usually appears paired with another message in the same message window.

WMS-Related Error Messages

Error Message	Description and Explanation of Message
The WMS Server returned HTML data rather than the requested format. The specified address may not be a WMS Server or the server could not process the request: <i><message from server></i>	The raw data following the colon is transmitted by the WMS server. This may help you analyze the problem. The server you are accessing may not be a WMS server. You may see this message <i>after</i> accessing a WFS server and seeing a list of WFS layers. This can occur because the Capabilities document provided by the server may contain additional URLs that redirect you to another server (not the one you explicitly selected). That "redirected" server may be down or have another problem.
The WMS Server returned data which was neither in the requested format nor a recognized WMS service exception: <i><message from server></i>	The raw data following the colon is transmitted by the WMS server. This may help you analyze the problem. The exception message from the server could not be understood. For example, the exception message may not have been in XML format.
Error accessing temporary file.	It is possible that your disk is full or you might have deleted the temp file while MapInfo Pro was running.
The WMS Server does not return GetFeatureInfo data in a format supported by MapInfo.	The server may not support GetFeatureInfo.
The WMS Server does not support GetFeatureInfo requests.	The server may not provide GetFeatureInfo in a format understood by MapInfo Pro.
There are no queryable layers in the WMS table for GetFeatureInfo request.	The server may not have a queryable layer. It is possible that a queryable layer changed between the time that you first created the WMS table and subsequently reopened the table.
The WMS Server returned data in <i><formatA></i> rather than the requested format of <i><formatB></i> .	MapInfo requested data in the format that the server claims it supports, however the server is returning a different format. For clarification, contact the service provider of the WMS server.
Unable to retrieve feature information from the WMS server.	The GetFeatureInfo request from the server failed. This message usually appears paired with another message in the same message window.

Saving Your Workspace as an XML-Based MWS File

This version of MapInfo Professional enables you to save the maps in your workspace out to an XML format for use with MapXtreme 2004 applications. When saving a workspace to MWS format, only the map windows and legends are saved. All other windows are discarded as MapXtreme 2004 applications cannot read that information. Once your workspace is saved in this format, it can be opened with the Workspace Manager utility that is included in the MapXtreme 2004 installation or with an application developed using MapXtreme 2004. The file is valid XML so can also be viewed using any XML viewer or editor. MWS files created with MapInfo Professional 7.8 can be validated using schemas supplied with MapXtreme 2004.

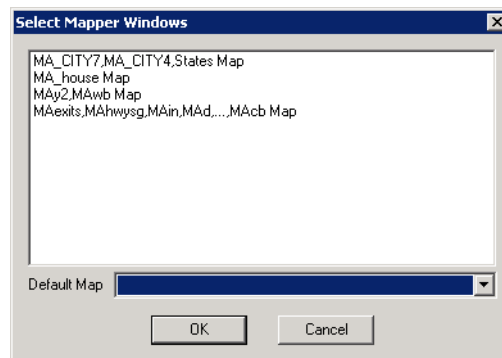
Note: You will not be able to read files saved in MWS format in MapInfo Professional 7.8.

In MapInfo Professional, you can set the visibility of a modifier theme without regard to its reference feature layer, so you can turn the visibility of the main reference layer off but still display the theme. In MapXtreme2004, the modifier themes (Dot Density, Ranges, Individual Value) are only drawn if the reference feature layer is visible. To ensure that modifiers marked as visible in MapInfo Professional display in tools like Workspace Manager, we force the visibility of the reference feature layer so that its modifier themes display.

To save a workspace in the MWS format:

1. Create the workspace you want to save.
2. From the **FILE** menu, select **SAVE WORKSPACE....** The Save Workspace dialog box displays.
3. In the **SAVE AS TYPE** drop-down list, select **MAPINFO WORKSPACE FORMAT (*.MWS)** and type the name of the workspace in the File name field. Click **SAVE** to continue. The Select Mapper Windows dialog displays.

Figure: Select Mapper Windows



Note: The Select Mapper Window dialog box does not display if there is only one window open.

4. Click on the map windows you wish to save and then select one from the drop down list to be the default window. and click **OK**.

Your workspace is now saved and available for use in MapXtreme 2004 applications.

What is Saved

The following information is included in the MWS workspace file:

- Tab files' name and alias
- Coordsys information
- Map center and zoom settings
- Layer list with implied order
- Map size as pixel width and height
- Map resize method
- Style overrides
- Raster layer overrides
- Label and label edit information
- Individual value themes
- Dot density themes
- Graduated symbol themes

- Bar themes
- Range themes
- Pie themes
- Grid themes as MapXtreme 2004 grid layers with a style override
- Themes and label expressions based upon a single attribute column.

What is Not Saved

The following information is not saved in the MWS workspace file:

- Any non-map windows (browsers, charts, redistricters, 3D map windows, Prism maps)
- Distance, area, or XY and military grid units
- Snap mode, autoscroll, and smart pan settings
- Printer setup information
- Any table that is based on a query
- Any theme that is generated from a complex expression

Note: A complex expression includes any operator or multiple referenced tables.

- Any queries
- Export options
- Line direction arrows
- Whether object nodes are drawn or not
- Hot links for labels and objects

Raster Enhancements

We have upgraded the raster handlers in MapInfo Professional to improve the look and performance of your raster files. We have:

- Upgraded the LeadTools to version 13
- Upgraded to a newer version of MrSID SDK (3.2), to provide support for MG3 files
- Updated the current raster handlers to handle multi-threading; specifically for ECW and the Government handlers (ADRG, ASRP, CADRG, CIB, NITF)

Get a Clear Picture of your U.S. Data with the AirPhotoUSA Map Handler 4.0 for MapInfo Professional. AirPhotoUSA provides raster images at different elevations for particular areas in the United States. The AirPhotoUSA map handler allows MapInfo users to open and display the imagery contained in AirPhotoUSA Map files as a layer in MapInfo. These files are treated just like any other raster file in MapInfo Professional. The MAPINFOW.PRJ file has been updated to accommodate the AirPhotoUSA enhancements.

Mapping Enhancements

Removed: 256 Character Limit in Text Boxes

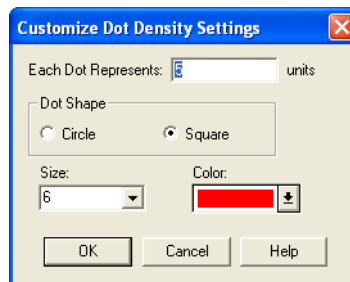
MapInfo Layout or Mapper windows, which were previously limited to 256 characters, can now contain a maximum of 2047 characters. Text object rotation is restricted to under 256 bytes. Labels, however, are still restricted to 256 bytes.

More Dot Density Choices for Thematic Maps

For thematic maps, you can now select Circle or Square dot thematics and specify the dot density width (in pixels) of the square or circle. In general, squares look clearer at small sizes. At larger sizes, it may be more appropriate to use circles.

In the Creating a Thematic Map - Step 3 of 3 dialog box, select the **CUSTOMIZE SETTINGS** button to display the **CUSTOMIZE DOT DENSITY SETTING** dialog box. Here you can change the number of units that each dot represents, and also select the dot shape (square or circle) size, and color. You can specify a circle size from 2 to 25 pixels in width. For a square, the size can range from 1 to 25 pixels.

Figure: Customize Dot Density Settings



Snap and Thin Settings now Saved in Metadata

The Snap and Thin settings remove self-intersections and overlaps in your data based on values you establish. When you complete your selections and entries in the Set Values for Node Snap & Thinning dialog box, MapInfo Professional now saves these values to the table's metadata. This allows the Snap and Thin changes to be retrieved in the dialog after the table is saved or the user has left MapInfo Professional.

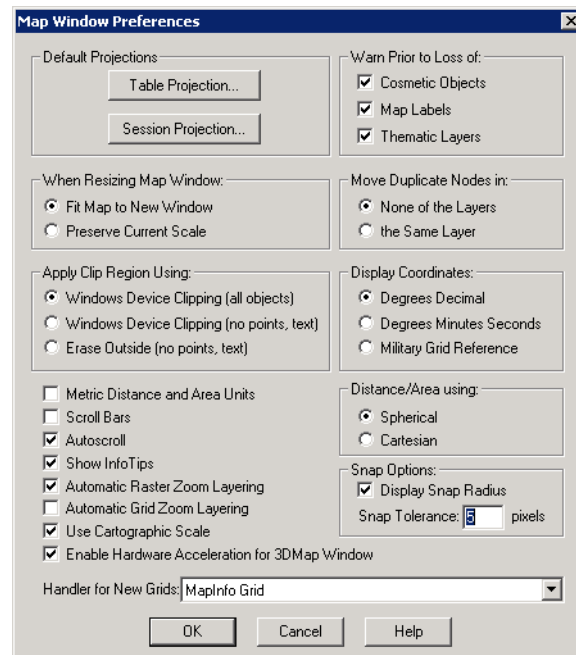
New Preference for Visible Snap Area

The visible snap radius was added in MapInfo Professional 7.5. This snap radius was always visible when Snap mode was on.

The **MAP WINDOW PREFERENCES** dialog box now has a **DISPLAY SNAP RADIUS** checkbox that controls whether or not the snap radius is displayed when Snap mode is on. The snap tolerance (in pixels) can also be selected.

1. From the **OPTIONS** menu, select **PREFERENCES**, then **MAP WINDOW** to display the **MAP WINDOW PREFERENCES** dialog box:

Figure: Map Window Preferences



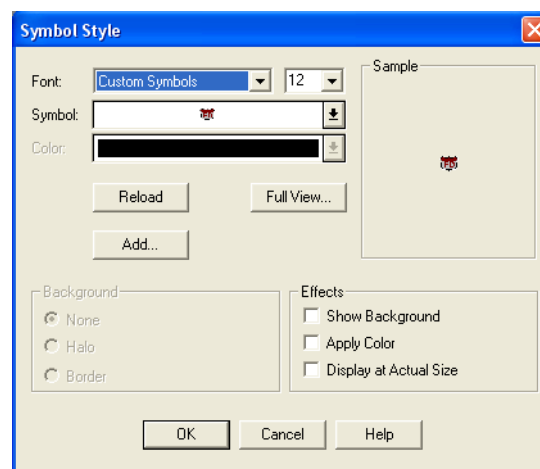
Under the Snap Options section, you can change the Snap Tolerance to make the snap radius larger or smaller (measured in pixels).

If you clear **DISPLAY SNAP RADIUS**, the radius will not be displayed when snap mode is turned on.

Adding User-Defined Custom Symbols

A new button on the **SYMBOL STYLE** dialog box allows users to add new custom symbols to the current collection. After selecting **OPTIONS > SYMBOL STYLE** and **CUSTOM SYMBOLS** from the **FONT** drop-down list, the **ADD** button is activated.

Figure: Symbol Style



When the user clicks the **ADD** button, the **ADD CUSTOM SYMBOLS** dialog box allows the user to navigate to the appropriate directory and select one or more .BMP files.

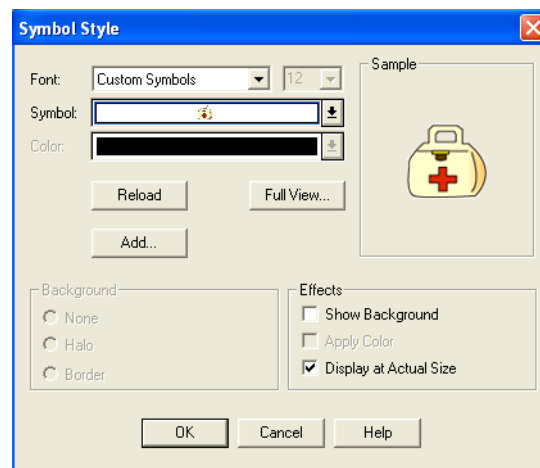
After you click **OK**, the **RESULTS** dialog box confirms where the custom symbols were added. The destination CustSymb directory is determined by the during installation. If you executed the MapBasic command to reload custom symbols from a particular directory, then the **ADD CUSTOM SYMBOLS** dialog box will add to that directory instead. See the Reload Symbols statement in the MapBasic Reference Guide, Version 7.8.

If one or more files cannot be copied, the **RESULTS** dialog box reports the failure. The copy can fail for a number of reasons, including:

- you may have attempted to overwrite an existing .BMP file of the same name.
- the destination file name is too long (greater than MAX_PATH, which is 260 characters for a 32-bit Windows system).
- the destination directory may not exist.
- the security permissions on your system prevent copying.

After the symbols have been copied, they are immediately available in the **SYMBOL** drop-down list.

Figure: Symbol Style with Custom Symbols Selected



New High-Resolution Custom Symbols

MapInfo has added some new high-resolution (24-bit color) custom symbols and updated some existing custom symbols. These are installed along with other custom symbols in the CustSymb directory. The symbols in the Symbol drop-down list are sized to fit into each square cell, so the high resolution images are only approximations of the final image. To change the size of the image, change the font size.

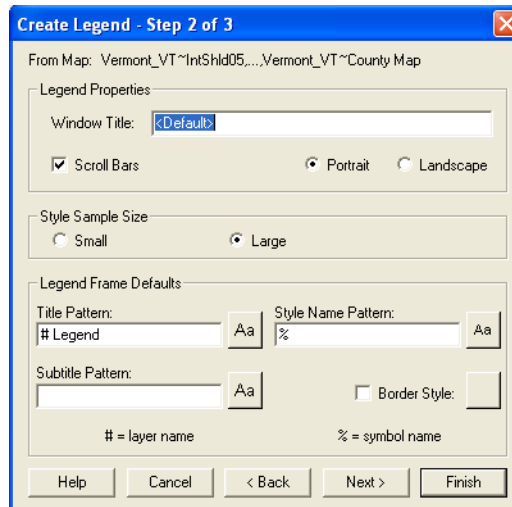
You can see a list of the new high-resolution custom symbols in [High-Resolution Custom Symbols in Appendix B on page 186](#).

Selecting Sample Size for Cartographic Legend Window

You can control the sample legend sizes that appear in Cartographic Legend windows. You can choose the smaller sample sizes that were used with MapInfo version 7.0 and earlier, or choose the larger legend sample sizes that were introduced in MapInfo version 7.5. This feature does **not** affect Thematic Legend windows.

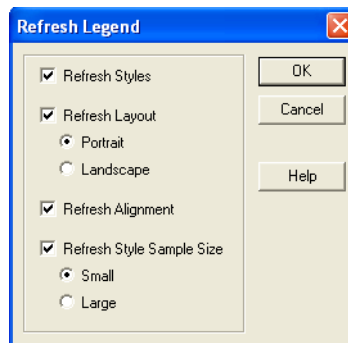
When creating Legends, the Create Legend window - Step 2 of 3 dialog box allows you to select a **SMALL** or **LARGE STYLE SAMPLE SIZE**. When adding frames to a Legend window, the style sample size is indicated. The default is **LARGE**.

Figure: Create Legend - Step 2 of 3



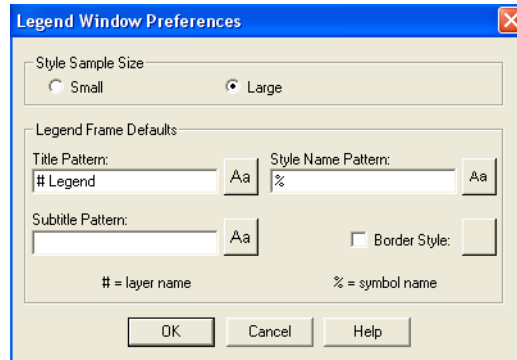
To change the style sample size of an existing Cartographic Legend window, select **Legend > Refresh**, then select **REFRESH STYLE SAMPLE SIZE** from the Refresh Legend window. Then select either **SMALL** and **LARGE** and click **OK** to refresh the legend. (In the following example, the Layout and other Legend Window attributes are also refreshed.)

Figure: Refresh Legend



You can also change the default value for style sample size shown in Create Legend - Step 2 of 3. In the Legend Preferences window (**OPTIONS > PREFERENCES > LEGENDS**), select either Small or Large Style Sample Size. The initial default is Large. After changing the preferences, you can Refresh Styles through the user interface.

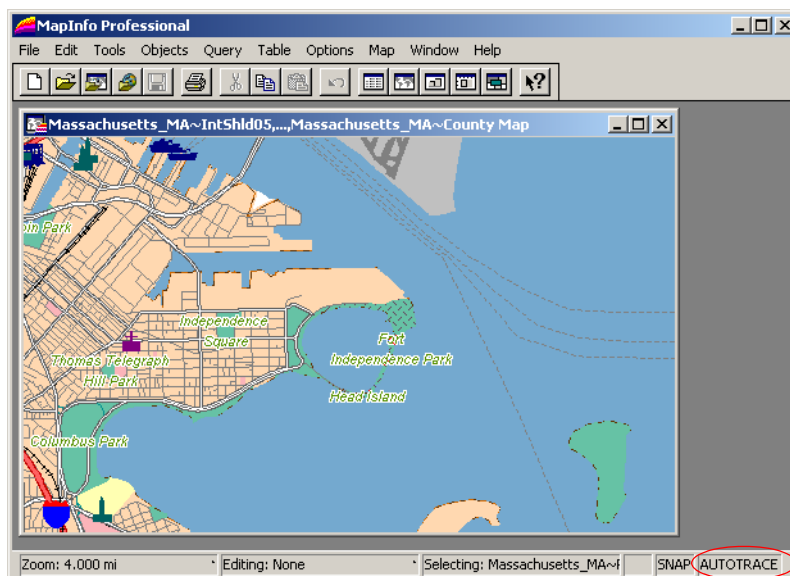
Figure: Legend Window Preferences



Enhancements to the AutoTrace Mode (Toggle Option for Line Following)

We have added a new feature to the AutoTrace line following mode to make it easier to use. You can now turn on the AutoTrace mode, session-wide, by pressing the letter T in any Map or Layout window. A new Status Bar entry displays showing that this mode is enabled.

Figure: AutoTrace Option in Status Bar



AutoTrace entry
in Status Bar

The same rules that applied to AutoTrace previously still apply, specifically:

- To enable the AutoTrace mode, you must be using a “poly” tool such as Add Polygon or Add Polyline
- The Snap feature must be enabled to use the AutoTrace functionality
- We have not disabled the **SHIFT/CTRL** key functionality for this mode. When you AutoTrace a polygon, the path contains the least number of nodes necessary to complete the AutoTrace, which is similar to the **SHIFT** key behavior. If you want to trace the longer path, press the **CTRL** key to override default AutoTrace direction.

Note: When a closed polyline is being AutoTraced, the trace line never crosses the start and end points of the polyline (so the **CTRL** key has no effect).

Sample Data Changes Available

We have upgraded our sample data, specifically States.tab and USA.tab to include the Census 2000 data. Further, we have added a new point ZIP codes file (US_ZIPS.tab) to assist you with more accurate geocoding. This file contains the data from our popular ZipInfo product.

3D Enhancements

Improved PrismMap Lighting. We have corrected a problem that affected the way Prism Maps displayed. When you changed the viewpoint of the Prism Map, the colors might look washed out due to an error in the lighting calculation. We have corrected this issue so that PrismMaps have a consistent look regardless of the viewpoint.

Datum Enhancements

This section describes new and updated coordinate systems for MapInfo Professional version 7.8. The MAPINFOW.PRJ file has been updated to support these changes.

French RGF93 Coordinate System

The French RGF93 Coordinate System has been added.

When converting coordinates from one datum to another, MapInfo Professional has used the Molodensky (3-parameter) and Bursa-Wolf (7-parameter) methods. These are general-purpose methods that can transform coordinates from any datum to any other datum.

In previous versions of MapInfo Professional, we introduced datum conversion programs to support the specialized NADCON (North American Datum Conversion) and JGD2000 (Japanese Geodetic Datum Conversion) Coordinate Systems. With MapInfo Professional version 7.8, we now support the French Lambert RGF93 Coordinate Systems.

The National Geographic Institute (France) recently introduced a new coordinate system, RGF93, which is based on GRS 80 ellipsoid. In order to convert existing data that uses NTF (New Triangulation of France) datum, the National Geographic Institute provides a transformation "grid". This grid contains parameters that are used to transform NTF coordinates to RGF93 coordinates, and vice versa. MapInfo Professional uses a binary version of this grid file (GR3DF97a.bin) to perform this conversion.

For maximum accuracy of 5 cm or better when converting NTF into RGF93 datum, use a Bounded Lambert RGF93 coordinate system. It is especially necessary to use a bounded Long\Lat system when converting Long\Lat (NTF) to or from Lambert RGF93 as MapInfo Professional's accuracy with unbounded Long\Lat defaults to 10 cm or 4 in.

The MAPINFOW.PRJ file includes a Bounded French Lambert RGF93 entry for this conversion. For information on creating Bounded Projections, see *Accounting for Affine Transformations and Explicit Bounds in Projection Types* of the MapInfo Professional 7.8 User Guide (Unabridged) on the Installation CD or use the CoordSysBounds.MBX tool supplied with MapInfo Professional to create bounds in tables.

Note: All transformations are done silently, without any indication of which datum conversion algorithm was used.

Australian Coordinate System Modifications

New Coordinate Systems

The following Australian State Grids coordinate systems have been added:

- VicGrid66 (AGD66), 3, 12, 7, 145, -37, -36, -38, 2500000, 4500000 (this is a renaming of "VIC Standard Grid")
- VicGrid94 (GDA94), 3, 116, 7, 145, -37, -36, -38, 2500000, 2500000

The following "Other Australian Projections", have been added:

- "Australian Lamberts Conformal Conic (AGD66)", 3, 12, 7, 135, -24, -18, -36, 0, 0
- "Australian Lamberts Conformal Conic (AGD84)", 3, 12, 7, 135, -24, -18, -36, 0, 0
- "Australian Lamberts Conformal Conic (GDA94)", 3, 116, 7, 135, -24, -18, -36, 0, 0
- "Australian Antarctic Lambert", 3, 104,7, 70, -50, -68.5, -74.5, 600000, 600000
- "Australian Antarctic Polar Stereographic", 20, 104,7, 70, -71, 0.972769012892, 600000, 600000

Israeli Coordinate System Added

Several Israeli Coordinate Systems have been added.

Swedish Coordinate System Added

Several new varieties of the Swedish RT90 Coordinate System have been added.

New Swedish Coordinate Systems (SWEREF 99) Added

Several new Swedish Coordinate Systems have been added. These are based on a new standard coordinate system for Sweden named "SWEREF 99".

Reordered/Added Danish Coordinate Systems

The Danish Coordinate Systems have been re-ordered in the MAPINFOW.PRJ file so that the UTM Zone32 Euref89 coordinate systems appear at the top.

AirPhotoUSA Conterminous U.S. Coordinate System Now Available

You can now use the "AirPhotoUSA Conterminous U.S." coordinate system without making any changes. However, if you want MapInfo to recognize and give a name to that coordinate system, or to use it for other purposes, this can be added to the MAPINFOW.PRJ. For instructions, see [AirPhotoUSA Conterminous U.S. Coordinate System Now Available on page 50](#).

Printing Enhancements

New Scale Choices when Printing Maps

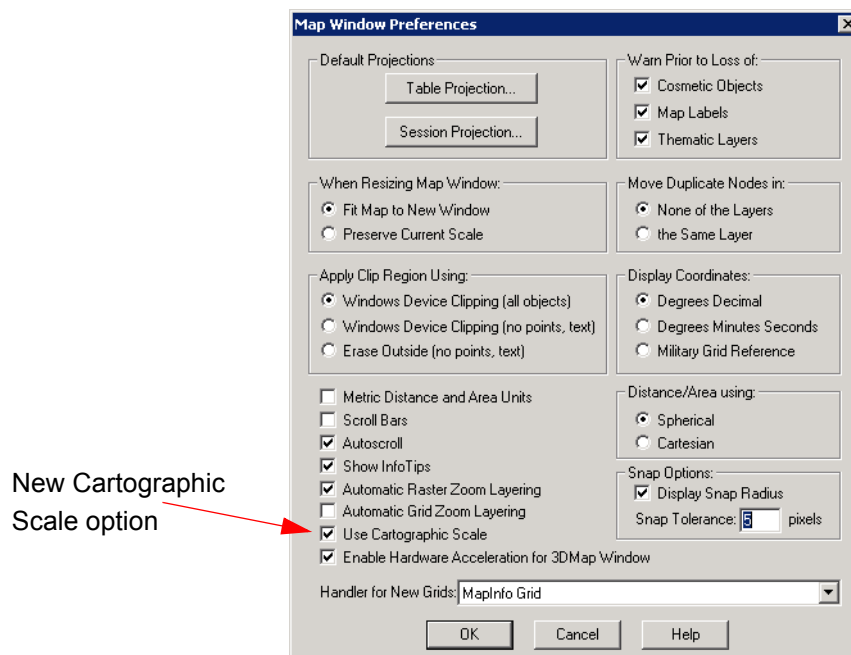
In response to customer requests, we have created a new map window preference to allow you to set the scale options for map printing. You can now set the map scale to display in Cartographic Scale automatically or you can choose your own map scale using this preference. By default, the Use Cartographic Scale option will not be set.

Note: When you select this preference, MapInfo Professional will preset your map printing scale based on the distance scale of the Earth and set the scale for the **CHANGE VIEW**, **MAP PRINT OPTIONS** and **FRAME OBJECT** dialog boxes.

To see the new map window preference:

1. From the **OPTIONS** menu, click **PREFERENCES** to display the **PREFERENCES** list.
2. Click the **MAP WINDOW** option to display the **MAP WINDOW PREFERENCES** dialog box.

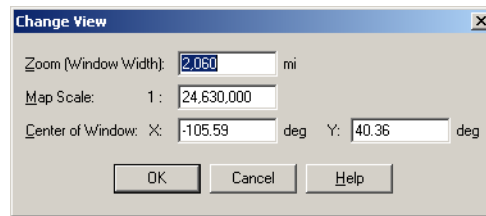
Figure: Map Window Preferences



3. Select the **USE CARTOGRAPHIC SCALE** check box to display your maps in Cartographic Scale automatically.

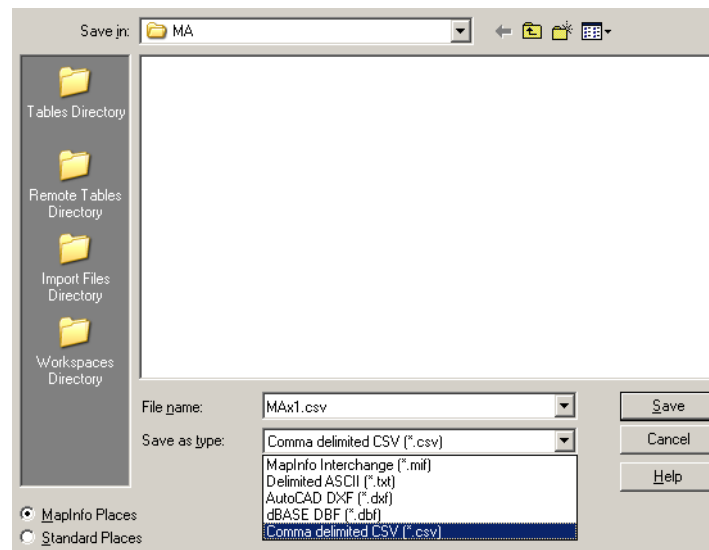
Note: When you make this change, the scale now displays in the Status Bar.

When you make this change, the options that display in the **CHANGE VIEW**, **MAP PRINT OPTIONS** and **FRAME OBJECT** dialog boxes use the cartographic scale on which the selected map is based. For example, the cartographic scale on which the selected map in the next figure is based is 1 : 24,630,000.

Figure: Change View (with the Use Cartographic Scale Selection in Preferences)

Exporting to CSV Format Available

We have added the ability to export files to the popular text file format, CSV. To see this change, open the table you want to export and from the Main Menu select **TABLE > EXPORT > EXPORT** to display the **EXPORT TABLE TO FILE** box. You can select Comma delimited (CSV) format from the **SAVE AS TYPE:** drop-down list.

Figure: Export Table to File

Database Enhancements

Default Range Options When Importing MS Excel File

The default range for data when opening an Excel file is the entire worksheet. However, if the **USE ROW ABOVE SELECTED RANGE FOR COLUMN TITLES** checkbox is selected, the default data range will begin at A2 (row 2). In this case, in the Excel Information window, both the Named Range and Current Value fields will indicate that data starts in row 2.

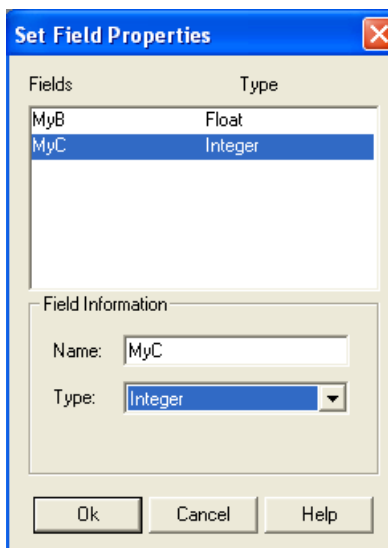
The starting row is changed from the first to the second only if the current starting row is the top row. Otherwise, no change will be made to the values.

If you clear the "Use Row Above Selected Range for Column Titles", both the Named Range and Current Value fields will revert to their previous values on the Entire Worksheet.

Controlling Treatment of Imported Excel Tables

When opening an Excel spreadsheet, you can now specify how each column is imported. For example, the user might want a 'Date' column in Excel to be a Text column in MapInfo Professional.

When you import an Excel spreadsheet into MapInfo, a **SET FIELD PROPERTIES** window allows you to reset the name, type and properties of any field (column) that is imported from the Excel table. The top section of the **SET FIELD PROPERTIES** window shows the Fields (column names) and Type (character, date, etc.) from the Excel spreadsheet. When you select one of these fields, the bottom part of the window allows you to change the MapInfo field name, data type, number of characters (for character and decimal fields) or number of decimals (for decimal fields only).



If you click **CANCEL**, the Excel table importing operation is cancelled.

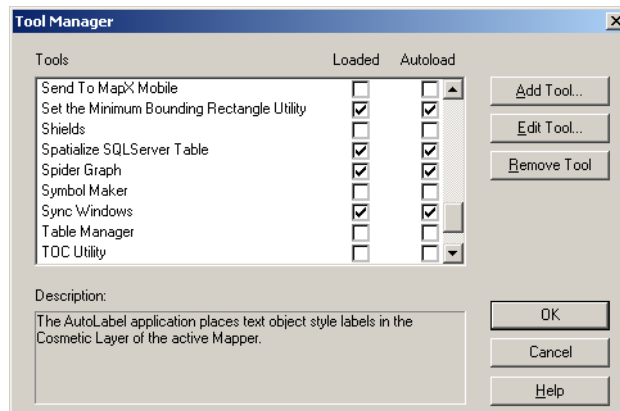
Tool Enhancements

Instructions for Adding New Tools to the Tool Manager

When we add a new tool to the utilities list, you need to add it into the Tool Manager list to ensure that it is loaded when you want to use it. These instructions have not changed; we are providing them as a convenience.

To add a new tool to the Tool Manager list:

1. From the **TOOLS** menu, click **TOOL MANAGER**. The **TOOL MANAGER** list displays:

Figure: Tool Manager with Tools Selected

- To load a tool into the **TOOL MANAGER** list, select the check box beside it in the **LOADED** column. To ensure that the tool you are loading loads every time you open MapInfo Professional, select the check box in the **AUTOLOAD** column.
- When each of the tools you want to load is selected in this manner, click **OK** to save your changes.
- To use the tool, select **TOOLS** from the menu and scroll down to the tool you want to use in the list. Then select the submenu entry to begin using the tools.

Enhanced Split Polyline at Node

A single-section polyline can be split into two polylines at a selected node.

To split a single-section polyline:

- From an editable layer, select a single-section polyline
- Click the **RESHAPE** button from the Drawing Tools.
- Select one node (other than the first or last node).
- Select the **OBJECTS** menu, then **POLYLINE SPLIT AT NODE**
- If a layer is not a cosmetic layer or if the polyline is in the Layout window, the **DATA DISAGGREGATION** dialog box will appear. Here the user can specify how data is disaggregated.
- After selecting the data disaggregation method, click **OK**. The selected polyline will be split at the node into two polylines.

Error messages are displayed under the following conditions:

- You did not select a node of the polyline.
- You selected a beginning or ending node of the polyline.
- You selected more than one node of the polyline.
- The object that you selected is not a polyline object.
- You attempted to split a multisegmented polyline (only single-section polylines can be split).

Using the Spider Graph Tool

The Spider Graph tool draws lines between objects in a single table, or the objects from two tables based on a join. It then creates a new table of lines that connect the objects from the origin table to the destination table based on matching column values. By default, the lines are color-coded based on their table of origin. Also by default, the new table includes a distance column that stores the length of each line.

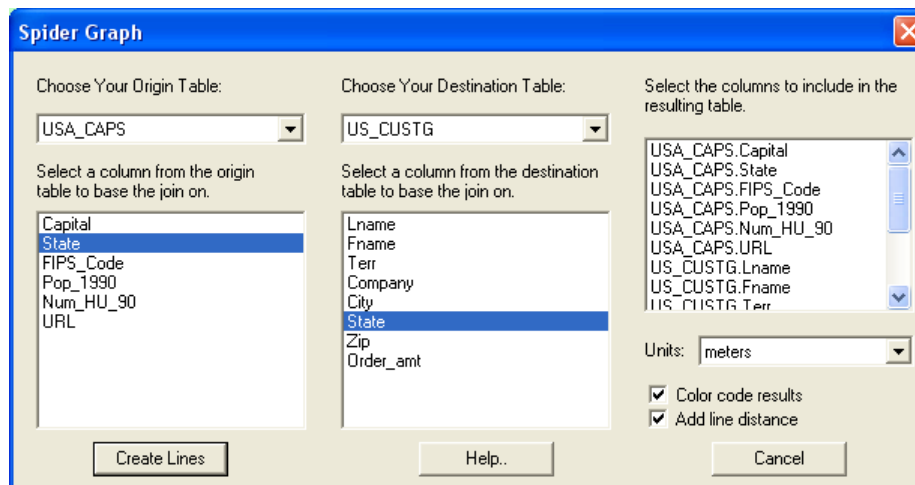
To use the Spider Graph tool:

1. Use the Tool Manager to make sure that the Spider Graph tool is loaded.
2. With the appropriate MapInfo tables open, select **TOOLS > SPIDER GRAPH** to activate the tool.

Note: The Spider Graph tool works with mappable vector tables only. It can not be used with raster images.

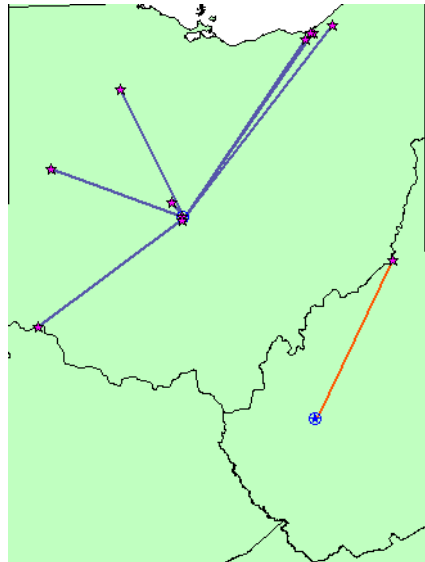
3. From the **SPIDER GRAPH** dialog box, select the origin table from the left drop-down list. Then select the column name that will be used to join the origin table to the destination table.
4. Select the destination table from the right drop-down list. Then select the column name that will be used to join the destination table to the origin table.
5. Select the columns that you want to include in the resulting table. To select multiple columns, hold down the CTRL key while you click. If you do not choose any columns, Spider Graph will automatically include the join column specified for the origin table.
6. By default, the Spider Graph tool will color-code the resulting lines and add a distance column to the new table to record the length of each line. If you do not want these features, clear the appropriate checkbox. The distance lines will use units of miles by default. To change this, select another distance unit from the **UNITS:** drop-down list.

Figure: Spider Graph



7. Click **CREATE LINES** and enter a new name for the resulting table in the **SAVE COPY AS** dialog box.
8. In the **SAVE COPY AS** window, use the **SAVE IN:** drop-down list to select the target folder for the resulting .TAB file. In the File name: area, type a file name for the resulting table.
9. Click **SAVE**.

The following portion of a resulting map window shows the Warehouse to Customer relationships in the Ohio, West Virginia region of the USA.



Using the Distance Calculator Tool

The Distance Calculator tool (DistanceCalc.MBX) can be used to calculate the distance from a selected object (or group of objects) to the closest or farthest object(s). You can also specify criteria to limit the results.

To use the Distance Calculator tool:

1. Use the Tool Manager to make sure that the Distance Calculator tool is loaded.
2. With the appropriate MapInfo table open, select **TOOLS > DISTANCE CALCULATOR** to activate the tool.

Note: The Distance Analysis tool works with mappable vector tables only. Distances can not be calculated for raster images.

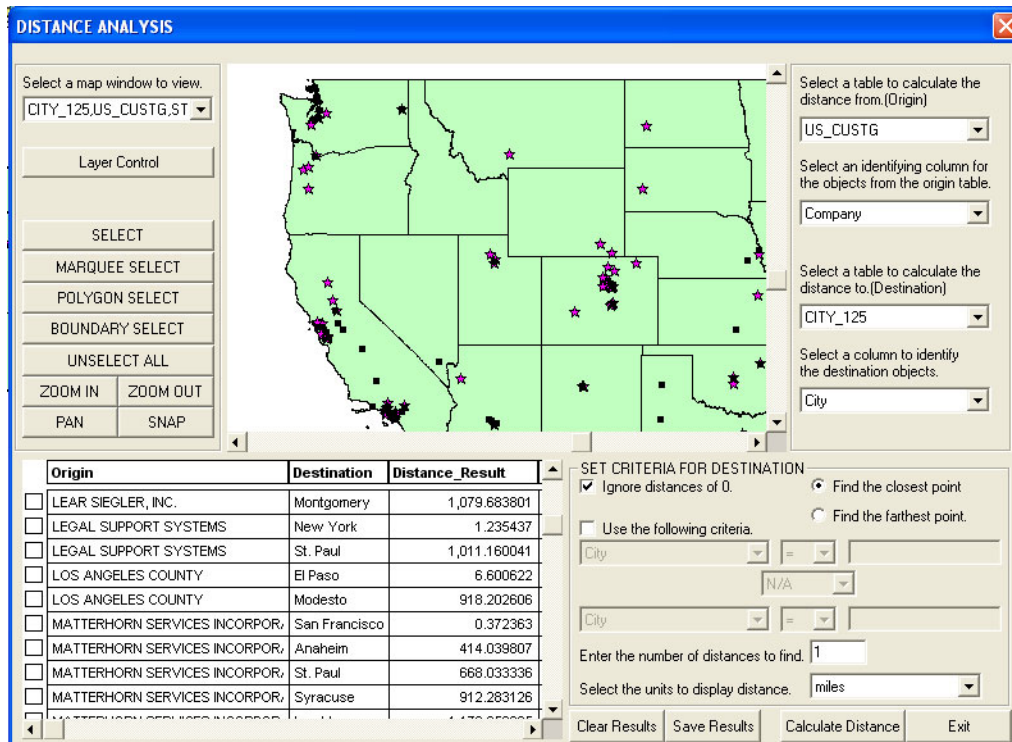
3. From the drop-down lists at the upper right part of the Distance Analysis dialog box, you then specify the origin and destination tables and their unique identifying columns.

For example, you can calculate the distance between each customer site listed in the US_CUSTG table and the nearest big city listed in the CITY_125 table. The accompanying **LAYER CONTROL**, **SELECT**, **ZOOM**, **PAN**, and **SNAP** buttons function just as they do throughout the MapInfo Pro interface.

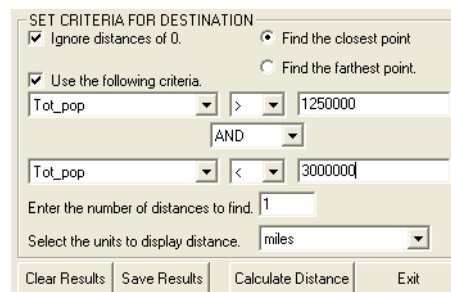
Note: Some of the files used in this example are taken from the MapInfo Professional Tutorial data, which is available on the MapInfo web site: www.mapinfo.com/miprotutorial.

4. When you click **CALCULATE DISTANCE**, the results of the distance query are displayed in the browser window. The results may then be cleared (**CLEAR RESULTS**) saved to a table (**SAVE RESULTS**), or appended to. To discard the current results and generate new results, select **CLEAR RESULTS** before recalculating distances.

To append more results, change table, column, and other criteria as desired, then click **CALCULATE DISTANCE**. The new results will be added to the bottom of the results table.



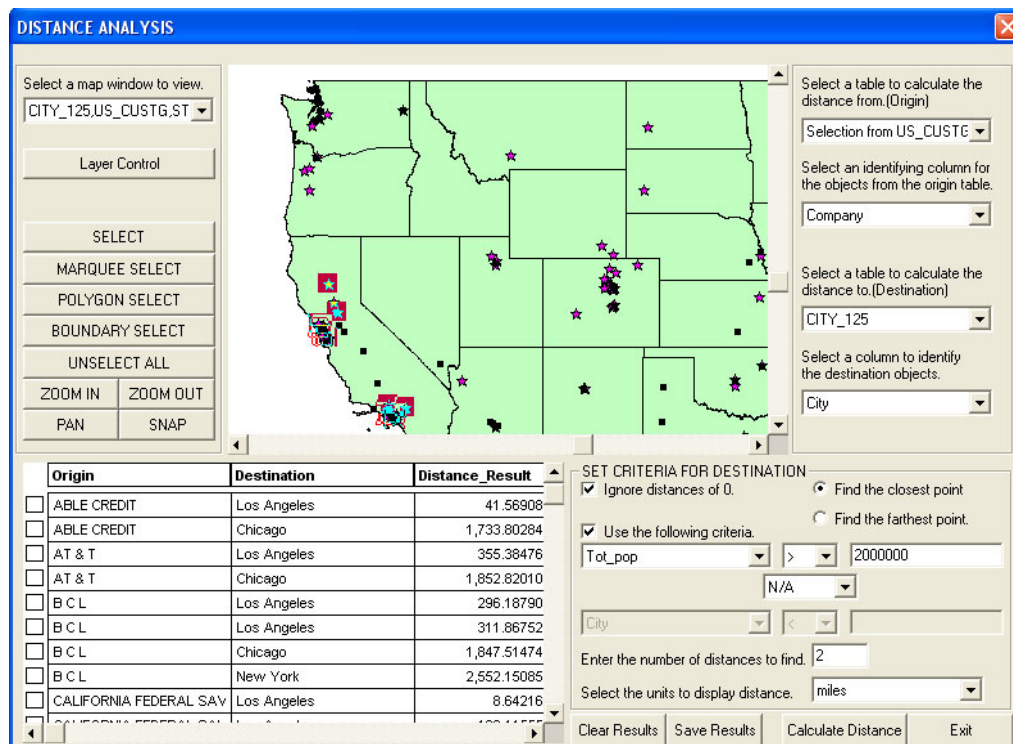
- Optionally, you can also set destination criteria to limit the results. For example, after checking the **USE THE FOLLOWING CRITERIA** checkbox you could restrict your results according to selected criteria (for example, to cities with populations greater than a specified number).
- Optionally, you can restrict the number of destination distances to find for each origin point. The default is 1.
- You can also select the display distance units that are used for calculating distances. The default is miles.



Now when you click **CALCULATE DISTANCE**, the possible destination points are limited to the subset defined by your criteria.

The following example shows the closest distances between California customer sites in the US_CUSTG table and cities with over 2 million population.

1. Select LAYER CONTROL and make sure that the US_CUSTG table is the topmost selectable layer. This may mean that you need to clear the “Selectable” check box for other layers.
2. Use the Boundary Select button to select California. This restricts results to origins (in this example, Customers) within the state of California.
3. Select “Selection from US_CUSTG” from the origin table drop-down list.
4. Select “Company” for the origin table identifying column.
5. Select “CITY-125” for the destination table.
6. Select “City” for the destination table identifying column.
7. After checking “Use the following criteria”, specify Tot_pop > 2000000 to target destination cities with a population greater than 2 million.
8. In “Enter the number of distances to find” the number 2 limits results to two destinations for each origin.
9. Make sure you **CLEAR RESULTS** to clear previous results from the Results Browser window; otherwise the new results would be appended to the previously displayed results.
10. Click **CALCULATE DISTANCE**.



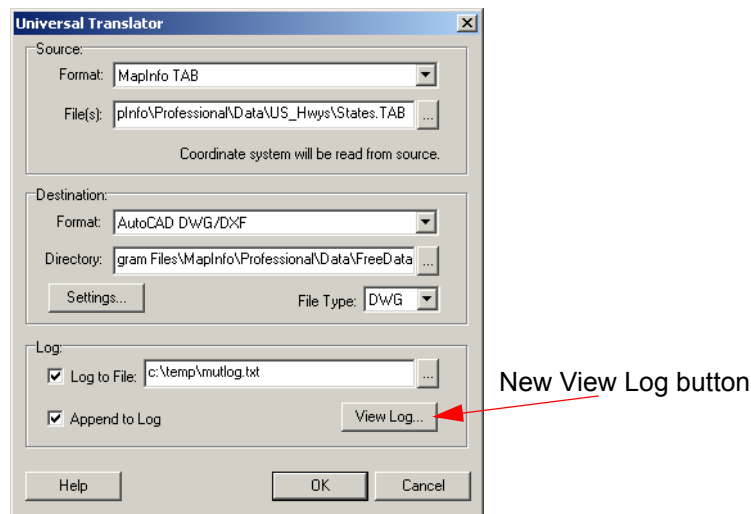
Universal Translator Upgrade Improves Log File Viewing

We have upgraded our user interface for the Universal Translator tool to make it easier to view log files.

To use the new log file viewing features:

1. On the Main Menu, click **TOOLS**, select **UNIVERSAL TRANSLATOR** and select the **UNIVERSAL TRANSLATOR** submenu. The **UNIVERSAL TRANSLATOR** window displays.

Figure: Universal Translator



2. Set up your **SOURCE** and **DESTINATION** entries as appropriate.
3. Click **OK** to perform the translation you selected. When the Universal Translator window redisplay, click the **VIEW LOG** button to display the log file. The entry in the log file that describes the translation is at the bottom of the file.

Figure: mutlog.txt - Notepad

```

mutlog.txt - Notepad
File Edit Format View Help
*****
Universal Translator output from run on Monday, July 12, 2004 7:52:50 AM
(Note: 'FME' in the text below refers to the underlying translation engine.)
*****
Feature Manipulation Engine 2004 (MapInfo UniversalTranslator) (20040611 - Build 1322)

      Machine host name is: nalindsa-w2
Opened native MapInfo file 'C:\Program Files\MapInfo\Professional\Data\US_Hwys\States.tab'
Read coordinate system 'LL-83' from MapInfo data file (parameters are: DT_NAME NAD83 PROJ LL MAP_SCL 1 UNIT
DEGREE )
Opened mapping File c:\temp\fmeE1D.tmp for output
Mapping File Generation was SUCCESSFUL.
Mapping File Generation was SUCCESSFUL.
FME Session Duration: 0.5 seconds.
Feature Manipulation Engine 2004 (MapInfo UniversalTranslator) (20040611 - Build 1322)
Machine host name is: nalindsa-w2
FME Configuration: Reader keyword is 'MAPINFO'
FME Configuration: Writer keyword is 'DWG'
FME Configuration: Writer Group Definition Keyword is 'DWG_DEF'
FME Configuration: Reader type is 'MAPINFO'
FME Configuration: Writer type is 'DWG'
FME Configuration: No destination coordinate system set
FME Configuration: Current working directory is 'C:\Program Files\MapInfo\Professional\Data\FreeData'
FME Configuration: Temporary directory is 'c:\temp'
FME Configuration: FME_HOME is 'C:\Program Files\MapInfo\Professional\Ut\'
System Status: 46180MB of disk space available in the FME temporary directory (c:\temp\
System Status: 1988MB of virtual memory available
AutoCAD writer will produce an AutoCAD R2000 compatible file
No AutoCAD Template file specified.
No AutoCAD font directory specified. All Text and Multi-Text entities will use the default font file
'default.shx'.
Using MapInfo (MFAL) Native Reader $Revision: 14.0 $ ( $Date: 2003/11/07 23:20:27 $ ) to read MapInfo data
from directory 'C:\Program Files\MapInfo\Professional\Data\US_Hwys\
Opened native MapInfo file 'C:\Program Files\MapInfo\Professional\Data\US_Hwys\States.tab'
Read coordinate system 'LL-83' from MapInfo data file (parameters are: DT_NAME NAD83 PROJ LL MAP_SCL 1 UNIT
DEGREE )
Opened native MapInfo file 'C:\Program Files\MapInfo\Professional\data\US_Hwys\States.tab'
Read coordinate system 'LL-83' from MapInfo data file (parameters are: DT_NAME NAD83 PROJ LL MAP_SCL 1 UNIT
DEGREE )
Using AutoCAD writer $Revision: 14.1 $ ( $Date: 2004/02/27 00:47:54 $ ) to write autocad file 'C:\Program
Files\MapInfo\Professional\Data\FreeData\States.DWG'
FME Configuration: Source coordinate system for reader MAPINFO[MAPINFO] set to 'LL-83' as read from input
data
Coordinate system 'LL-83' parameters: CS_NAME='LL-83' DT_NAME='NAD83' MAP_SCL='1.0' PROJ='LL' UNIT='DEGREE'

```

Universal Translator Upgrade Includes Finnish and JDG2000 Projections

To resolve a translation issue, we have added new algorithms for our KKJ datum to the Universal Translator to update the Finnish projection. Additionally the JDG2000 datum has been added to the Universal Translator.

New Tool: The Synchronize Windows

The Synchronize Windows tool provides toolbar icons that allow you to automatically share changes made in one mapper window to all other mapper windows in a given MapInfo Professional session. For example, you might use this tool to look simultaneously at several sets of complex feature data covering the same location. In cases where a single map containing all the data would be more confusing than helpful, several synchronized maps can often display the information more clearly. The ability to embed thematic legends is useful to maintain the understanding of the thematic features.

The icons on the Sync Mapper toolbar are shortcuts to commonly used MapInfo Professional functionality.

Figure: Sync Windows Toolbar



The Synchronize Windows tool consists of nine icons:

CLONE MAP WINDOW icon 

- Provides the same functionality as **MAP > CLONE VIEW**.

RENAME CURRENT MAP WINDOW icon 

- Allows you to rename the currently active Map window.

TILE WINDOWS icon 

- Provides the same functionality as **WINDOW > TILE WINDOWS**.

SYNC ALL MAP WINDOWS icon 

- Provides a way to synchronize multiple map windows and embed thematic legends.

CREATE A SYMBOL ON ALL COSMETIC LAYERS icon 

- Provides a way to draw a symbol in the same location across multiple map windows.

CREATE A POLYLINE ON ALL COSMETIC LAYERS icon 

- Provides a way to draw a polyline in the same location across multiple map windows.

CREATE A RECTANGLE ON ALL COSMETIC LAYERS icon 

- Provides a way to draw a rectangle in the same location across multiple map windows.

CREATE A ELLIPSE ON ALL COSMETIC LAYERS icon 

- Provides a way to draw an ellipse in the same location across multiple map windows.

CLEAR COSMETIC LAYERS icon 

- Clears the Cosmetic layers of all of all synchronized mapper windows.

Note: This removes all features added to the Cosmetic layers, not just the 'synchronized' features added by this tool during this session.

COGOLine (Create Line by Length) Utility Improvements

We have enhanced the COGOLine Utility in response to user requests, particularly in the use of DMS coordinates and the creation of polylines.

In this implementation of the COGOLine tool, the Create Line By Length dialog displays coordinates in the units used by the current map projection (degrees, meters, feet, etc.). For example, if the current map displays degrees as the units, then the COGOLine tool displays the coordinates in decimal degrees, or in DMS coordinates as specified in the Map Options dialog box. Whether the DMS option is selected or not, the new COGOLine tool allows you to enter coordinates in DMS whenever the map has a Long/Lat projection.

Note: On a Longitude/Latitude map, you can type in coordinates using DMS or decimal degrees, even if you did not choose the **DEGREES MINUTES SECONDS** option in the **MAP OPTIONS** dialog box.

Customers asked us for the ability to create more complex lines using the COGOLine tool, so we added the capability to create polylines.

Note: If you do not see the **CREATE LINE BY LENGTH** entry in the **TOOLS** menu, see the instructions in the beginning of the Tool Enhancements section to add it.

To use the new Create Polyline feature in the **PROPERTIES OF NEW LINE** dialog box:


1. To run the COGOLine utility, do one of the following:
 - From the Main Menu, click **TOOLS** and select the **CREATE LINE BY LENGTH** entry and click **RUN COGOLINE** to display the **PROPERTIES OF NEW LINE** dialog box.
 - Select the **CREATE LINE BY LENGTH** icon  from the **TOOLS** toolbar, and click the location in the map where you want the new line to begin. The **PROPERTIES OF NEW LINE** dialog box displays with the coordinate you selected in the **STARTING X** and **STARTING Y** fields.

Figure: Properties of New Line

The initial formatting of these longitude and latitude values depends upon your **DISPLAY COORDINATES** selections in the **MAP OPTIONS** dialog box.

2. Complete the **ANGLE**, **LENGTH**, and **ADVANCED OPTIONS** entries and selections necessary to create the polyline you want in the fields provided.

On a Longitude/Latitude map, the COGOLine utility allows you to type in coordinates using DMS or decimal degrees, even if you did not choose the **DEGREES MINUTES SECONDS** option in the **MAP OPTIONS** dialog box. We use the longitude example of 73 degrees, 30 minutes, 20 seconds West below to illustrate the proper entries.

- Decimal degrees, as in the example:
-73.53
- Standard symbols with a space to separate them, as in the example:
-73° 30' 20"
- Spaces only and no symbols, as in the example:
-73 30 20
- Symbols and no spaces, as in the example:
-73°30'20"

3. To draw a polyline, choose the **CREATE POLYLINE** radio button.
4. Click the **DRAW POLYLINE** button. The **PROPERTIES OF NEW LINE** dialog box redisplay with a new button, **EXTEND POLYLINE**. The end point of the previous line becomes the new starting point for the next segment.
5. Type new entries in the **ANGLE**, **LENGTH**, and **DEGREE** fields and select the **CLOCKWISE** or **COUNTERCLOCKWISE** options as appropriate. You can also enter new coordinates in the **STARTING X** and **Y** fields to create a non-congruous polyline.
6. When you have completed your polyline, click the **CLOSE** button.

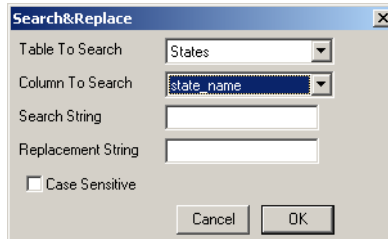
Search and Replace Tool Updates Multiple Column Entries

We have updated a search and replace utility to MapInfo Professional to facilitate the replacement of multiple column entries in a selected table. This tool is particularly useful when names change or specific character data changes. To search a table, the file must be open. To add the Search and Replace Tool to the Tool menu, see [Instructions for Adding New Tools to the Tool Manager on page 53](#).

To use the search and replace tool:

1. Open the table for which you want to search and replace data. MapInfo Professional must be able to read the tables you want to search.
2. From the **TOOLS** Menu, select **SEARCH AND REPLACE** and click the **SEARCH AND REPLACE** submenu option. The **SEARCH & REPLACE** dialog box displays.

Figure: Search & Replace



3. Select the table and columns you want to search from the **TABLE TO SEARCH** and **COLUMN TO SEARCH** drop-down lists.
4. Type the text you want to find in the **SEARCH STRING** field.
5. Type the new text you want to insert into the **REPLACEMENT STRING** field.
6. If the string you entered should be case sensitive, select the **CASE SENSITIVE** check box.
7. Click **OK** to begin the search and replace process.

GeoTracker Upgrade Completed

We have upgraded the GeoTracker Geographic Utility, which is a free utility available on the Installation CD in the Install Products, Free Utilities section. New features of this GPS tool include:

- New support for up to 12 com ports
- Improved error management for Reconnect and Disconnect features
- Upgraded installation and help system with contact and web site information to facilitate communication
- Upgraded communication with MapInfo products by ignoring faulty DDE messages.

Documentation Enhancements

Upgraded the Coordinate Systems Section of the User Guide

Many of our customers have asked for a more in-depth discussion of the fundamentals of the coordinate system. We have consulted our internal geography experts and GIS mathematicians to provide a more thorough discussion of coordinate systems, projections, and affine transformations. See [Working with Coordinate Systems and Projections in Appendix A on page 156](#) for this new resource. This section will also be accessible in the Unabridged User Guide on your installation CD.

Printing Guide 7.8 Updated

We have updated the Printing Guide for MapInfo Professional. You can find it in the PDF_DOCS directory on the Installation CD.

Upgraded ProViewer Documentation Available

We have upgraded our ProViewer documentation to make it easier to use. You can find it at our web site, <http://www.mapinfo.com>.

Enhanced Line Style Editor Documentation Available on MapInfo Web Site

In response to customer requests, we have upgraded our Line Style Editor documentation (MILISTED.PDF) and placed it on the MapInfo web site. It is also in the PDF_DOCS directory on the Installation CD.

MapX Mobile Viewer Documentation To Be Available

You can display MapInfo Professional 7.8 .TAB files and geosets on your MapX Mobile Viewer-enabled portable data assistant (PDA). You can also display workspaces if you save them as geosets using the MapX Geoset Utility. Documentation covering this functionality is available on the MapInfo web site.

MapInfo Professional Tutorial and Data Available on the MapInfo Web Site

You can now retrieve the MapInfo Professional Tutorial and associated data from the MapInfo web site at <http://www.mapinfo.com> or by clicking the MapInfo Tutorial option on the Installation CD. We recommend that you download the tutorial data before you download the tutorial so you can get started right away.

Licensing Enhancements

MapInfo Professional SCP Web License Utility Updated. We have updated the MapInfo Professional SCP to handle MapInfo Professional v7.8 for SCP deployments.

Check for Update in Pro and on Web. When you install MapInfo Professional, you may notice that MapInfo Professional checks the MapInfo web site for any available updates. This ensures that you have the most current software available. This also ensures that users of MapInfo Professional 7.5 are alerted that the 7.8 version is available.

Installing, Configuring, and Starting MapInfo Professional

This chapter helps you install and set the basic preferences for MapInfo Professional®. In addition, there are instructions for fixing problems that come up as part of the installation process. We also cover starting and exiting the product.

Sections in this Chapter:

- ◆ **System Requirements for MapInfo Professional** 67
- ◆ **Before You Install MapInfo Professional 7.8** 68
- ◆ **Installing MapInfo Professional** 68
- ◆ **Setting your Database Connection Preferences** 73
- ◆ **Modifying, Repairing, or Removing MapInfo Professional** 74
- ◆ **Setting the MapInfo Professional Preferences** 81
- ◆ **Starting up and Leaving MapInfo Professional** 97

System Requirements for MapInfo Professional

These are the system requirements for MapInfo Professional 7.8:

Operating Systems	Memory	Disk Space	Monitor
Windows 98 SE, Windows 2000 Professional SP 4, Windows NT 4.0 Workstation SP 6a	32 MB of RAM with a minimum of a Pentium PC	MapInfo Professional 103 MB Data 450 MB	16- or 24-bit color SVGA recommended
Windows XP Professional SP 1a Windows XP Home SP 1a Windows Terminal Server	64 MB of RAM with a minimum of a Pentium PC	MapInfo Professional 103 MB Data 450 MB	16- or 24-bit color SVGA recommended

Note: The Installer requires that your TEMP variable be set to a valid directory.

Handling Database Connectivity

MapInfo Professional supports the following relational database engines:

- SQL Server 2000 (SpatialWare 4.8.1)
- Informix 9.4 (SpatialWare 4.5.2)
- Solaris 32-bit
- Oracle Spatial 10G, 9iR2 and 8.17
- Oracle Locator 9iR2

Further, using ODBC drivers, you can access your data from MapInfo Professional using:

- Oracle ODBC Driver 9.2.0.6
- SQL Server
- Informix 3.82

To make your database work more productive, MapInfo Professional 7.8 provides an interface for opening remote tables called the RDBMS Toolkit. This toolkit gives you the ability to save tables to a remote database using Save Copy As and to create new tables on remote databases.

Additionally it gives you the means to create a new table from existing tables. The RDBMS Toolkit is available on the MapInfo web site.

You can also open tables of data from the following databases and make them mappable but only for point data:

- Oracle 9iR2
- MS Access XP
- MS SQL Server 2000
- Informix 9.4

Before You Install MapInfo Professional 7.8

Before installing MapInfo Professional, record your serial number in an easy-to-remember place, such as the title page of the *User Guide* or *Supplement*. You need a valid serial number to complete an installation or an upgrade. Also, please complete the postage-paid registration card and return it to MapInfo Corporation. Additionally, you can register online by accessing the Contact Info option on the CD Browser.

If the MapInfo Professional 7.8 installer detects an existing version of the product, 6.0 or earlier, or detects that the product had been installed at some time, the installer copies the MAPINFOW.WOR, STARTUP.WOR and MAPINFOW.PRF from the operating system's system directory to <user profile root>\Application Data\MapInfo\MapInfo.

Application data (appdata) files are the non-executable data files that MapInfo Professional uses during operation.

Navigating the MapInfo Professional 7.8 CD Browser

The initial screen of the MapInfo Professional 7.8 CD Browser includes these options:

- *Install Products*: From this option you can install MapInfo Professional (including DBMS support and translators), free data, access to the documentation, and Install Utilities, including: ECW Compressor, GPS, and Metadata Browser.
- *What's New*: Display a list and description of new and enhanced features.
- *Online Reference*: MapInfo Professional 7.8 provides the following online reference documents: The MapInfo Professional *Supplement*, *MapBasic Reference*, *Crystal Reports User's Guide*, the MapInfo Professional *Printing Guide*, as well as the Adobe Acrobat Reader.
- *Run MapInfo Tutorial*: From this option you can access the MapInfo Tutorial from the MapInfo web site to learn more about the basic features of MapInfo Professional.
- *Other Products*: Display information about MapBasic, MapInfo Discovery, and MapInfo Pro for SQL Server.
- *Contact Information*: Where ever you are, MapInfo is there to help you. Contact us at any of these locations or visit us on the world wide web at www.mapinfo.com!
- *Register Online*: We have simplified the registration process. Simply click this entry and the wizard walks you through the registration process quickly.
- *Browse CD*: From this option you can review the contents of the CD. There are additional utilities that may be useful to you that are only available when you browse.
- *Exit*: From this option you can close the CD Browser application.

Installing MapInfo Professional

CAUTION: We strongly recommend that you exit from all Windows programs before beginning the installation process. If you are upgrading from MapInfo Professional 7.5, we recommend that you uninstall 7.5 before upgrading.

You must have Administrator rights to run the Installer on NT/2000 and Windows XP.

If your Windows Start menu does not have a MapInfo program folder, the installation process creates this folder. If your Windows Start menu already has a MapInfo program folder, this process creates a new MapInfo icon within that folder.

MapInfo Professional now provides its application data files to each user. Called a Per-User install, this functionality runs the first time you run MapInfo Professional or MapInfo Professional client on a machine, and each time the MapInfo Professional Installer is run thereafter. The application data files include, among others, the Pen Styles file, Custom Symbols files, Graph Support files, and Thematic Legend templates. These files allow different users to have custom settings.

To install MapInfo Professional:

1. On the **LAUNCHER** menu, click **INSTALL PRODUCTS** from the MapInfo Professional 7.8 CD Browser.
2. Click **MAPINFO PROFESSIONAL INSTALLER**. The Install Shield Wizard dialog box displays. Click **NEXT** to continue the process and display the License Information dialog box.
3. Click **"I ACCEPT THE TERMS IN THE LICENSE AGREEMENT"** to accept the terms and click **NEXT** to continue. The Customer Information screen displays.
4. Type your name, organization name, and serial number in these required fields. Click **NEXT** to continue. The Setup Type dialog box displays.
5. Review the following installation types and determine which instructions are appropriate. Click one of the following and click **NEXT** to continue:
 - **TYPICAL WORKSTATION INSTALLATION.** Click this option if you will be using MapInfo Professional as a desktop application requiring no remote database access or connectivity. See **Typical Workstation Installation on page 69** to continue these instructions.
 - **CUSTOM WORKSTATION INSTALLATION.** Click this option if you require ODBC or Oracle Spatial connectivity support. See **Custom Workstation Installation on page 70** to continue these instructions.
 - **NETWORK INSTALLATION.** Click this option if you are installing or upgrading to a MapInfo Professional network product. See **Network Installation on page 72** to continue these instructions. These instructions are for network administrators only. After you install MapInfo Professional on the network, follow the instructions for installing MapInfo Professional on client equipment in **Setting Up Client Workstations on page 73**.

If you have already upgraded to MapInfo Professional 7.8 or if the product has been previously installed, the Program Maintenance Screen displays. Select **MODIFY**, **REPAIR**, or **REMOVE** to continue. For assistance in completing this process, see **Modifying, Repairing, or Removing MapInfo Professional on page 74**. If you find that you need to install ODBC drivers after installing MapInfo Professional, select the **MODIFY** option to add them.

Typical Workstation Installation

Choose this option to install MapInfo Professional program files, Online Help, Tools, Universal Translator, and Crystal Reports. The ArcLink translation utility is not installed with this option.

CAUTION: Make sure you have completed the directions in **Installing MapInfo Professional on page 68** before beginning these instructions.

To continue installing a typical workstation:

1. In the Setup Type dialog box, click **TYPICAL WORKSTATION INSTALLATION**; the Destination Folder screen displays.
Note: If you have an earlier version (or versions) of MapInfo Professional installed and you do not want to overwrite that version, create a new directory name in the next step.
2. Do one of the following:
 - Click **NEXT** to accept the destination folder indicated
 - Click **CHANGE** to create a new path in the Change Current Destination Folder dialog box. Type the new path in the Folder name field and click **OK** to continue. Click **NEXT** to continue.

The Ready to Install the Program screen displays. Review your selections to ensure that the path is correct before moving on. Click **BACK** to return to the previous screens to make changes.

3. Click **INSTALL** to begin. The Installing MapInfo Professional 7.8 screen displays with a progress bar indicating the status of the process.
4. After the installation is complete, the prompt: "Would you like to check our web site for any current updates to our product?" displays. If you have an Internet connection, check **YES** to be connected to the page of the MapInfo Corporation web site containing information about product updates. This ensures that you have the most up-to-the minute MapInfo Professional product available.
5. When the InstallShield Wizard Complete screen displays, choose **FINISH** to return to the Install Products screen.

Note: When you open MapInfo Professional 7.8 for the first time, the final installation and configuration process takes place. This happens automatically and does not require any additional work.

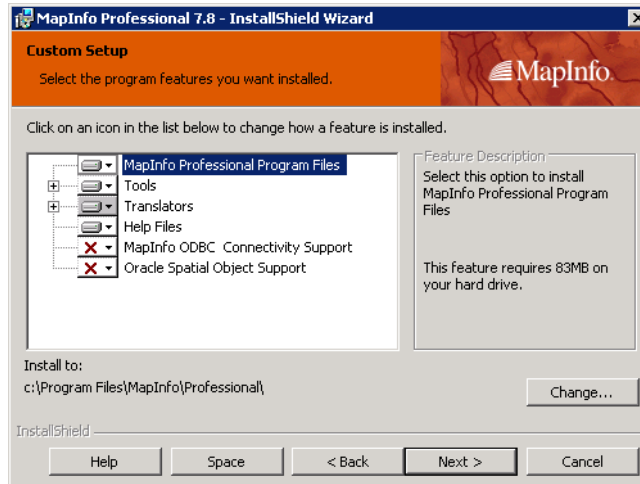
Custom Workstation Installation

Choose this installation type to select components and drivers within the MapInfo Professional 7.8 installation program. This is particularly useful if you need to install MapInfo ODBC Connectivity support and Oracle Spatial Object support.

CAUTION: Make sure you have completed the directions in **Installing MapInfo Professional on page 68** before beginning these instructions.

To continue installing using the custom workstation instructions:

1. In the Setup Type dialog box, click **CUSTOM WORKSTATION INSTALLATION**; the Custom Setup dialog box displays.



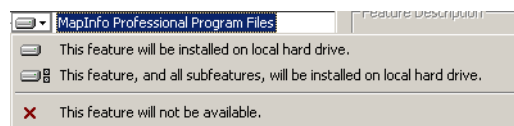
A feature description, and the space required for the feature and its sub-features displays in the Feature Description area.

- In the Custom Setup dialog box you decide what components are to be installed and the directory you want them to install to. Click the feature icon to select the feature for installation.

The options for a Custom Setup include:

- **MAPINFO PROFESSIONAL PROGRAM FILES**
- **TOOLS (WHICH REFER TO THE MAPINFO UTILITY TOOLS, CRYSTAL REPORTS ETC.)**
- **TRANSLATORS (UNIVERSAL TRANSLATORS, ARCLINK)**
- **HELP FILES**
- **MAPINFO ODBC CONNECTIVITY SUPPORT**
- **ORACLE SPATIAL OBJECT SUPPORT**

- To select a feature, click the **DOWN ARROW** beside it; a menu displays.



- For each feature you want to install, select one of the following:
 - This feature will be installed on local hard drive.
 - This feature, and all subfeatures, will be installed on local hard drive
 - This feature will not be available

Note: For some features, there are additional options pertaining to use of the feature from the network. Choose the option that describes your systems implementation of this feature.

When you select the first or second options in the bullets described above, the feature will be installed on your local hard drive in the default folder. This path displays in the **INSTALL TO:** entry below the **CUSTOM SETUP** list pane. To specify another path, select **CHANGE** button to the right of this path. When you do the Current Destination folder dialog box displays allowing you to choose a new path.

To see if you have enough space on your hard drive or other mapped resources, click the **SPACE** button. The Disk Space Requirement dialog box displays the disk size, the amount of available space, and the amount of space the selected install would take.

Note: You can choose to not install a component. To do this, skip the feature entry entirely.

5. After you select all the custom options you want to install, click **NEXT** to display the **READY TO INSTALL THE PROGRAM** dialog box.
6. Click the **INSTALL** button to begin the installation of MapInfo Professional with the features you selected. The **INSTALLING MAPINFO PROFESSIONAL 7.8** screen displays with a progress bar indicating the status.
7. Install MapInfo Professional according to your selections.
8. At the end of the installation, the prompt: "Would you like to check our web site for any current updates to our product?" displays. If you have an Internet connection, click **YES** to access the MapInfo Corporation web site containing information about product updates.
9. When the InstallShield Wizard Complete screen displays, choose **FINISH** to return to the Install Products screen.

Note: When you open MapInfo Professional 7.8 for the first time, the final installation and configuration process takes place. This happens automatically and does not require any additional work.

Adding ODBC Drivers

You add the ODBC drivers as part of the Custom Installation process. You can set your database connection preferences in [Setting your Database Connection Preferences on page 73](#).

Network Installation

Installing MapInfo Professional 7.8 on a network involves two separate procedures:

- Installing the product on a network drive (presumably done by the Network Administrator).
- Setting up users with program manager icons, etc. (presumably done by the user).

Make sure you have completed the directions in [Installing MapInfo Professional on page 68](#) before beginning these directions.

Choose this installation **ONLY** if you are a Network Administrator and have full rights to the network.

To continue installing MapInfo Professional 7.8 on a network:

1. Click **NETWORK INSTALLATION**; the Administrator Selection Screen displays.

The options for a Network Setup include:

- **MAPINFO PROFESSIONAL PROGRAM FILES**
- **TOOLS, TRANSLATORS**
- **HELP FILES**

A feature description, and the space required for the feature, displays in the Feature Description area. Click the option icon to install it.

2. When you select a feature, a menu displays allowing you to choose to install and/or run the feature and its subfeatures from various locations, including your local hard drive or from CD.

If you select the hard drive option, the feature will be installed in the path indicated; on your local hard drive in the folder indicated; to specify a different location, choose **CHANGE** to display the Current Destination folder screen.

If you choose to install an option to your hard drive, the **SPACE** button is enabled; choose this button to display the Disk Space Requirement dialog box.

Note: You can choose to not install a feature by skipping it.

See **Installing MapInfo Professional on a Network Drive on page 73** for additional details.

3. After the installation is complete, the prompt: "Would you like to check our web site for any current updates to our product?" displays. If you have an Internet connection, check **YES** to be connected to the page of the MapInfo Corporation Web site containing information about product updates.
4. When the InstallShield Wizard Complete screen displays, choose **FINISH** to return to the Install Products screen.

Installing MapInfo Professional on a Network Drive

The procedure for installing MapInfo Professional on a network drive is the same as the regular installation procedure except for the following:

- Select Network Installation in the Setup Type screen.
- Continue as in a Workstation Installation, selecting features, destination locations, etc.

The Network Installation alone does not install any files to the local hard drive.

Setting Up Client Workstations

To permit a user to use this network installation of MapInfo Professional, run SETUP.EXE:

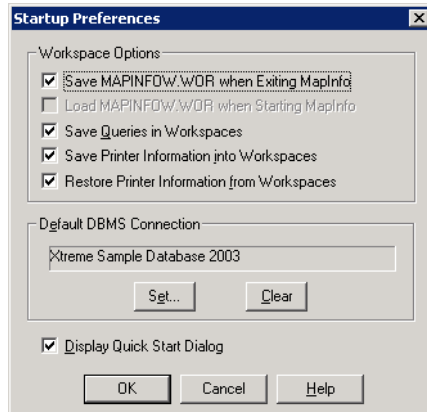
1. Map a drive to the MapInfo Professional Install directory.
2. Select **RUN** from the **START** menu.
3. Run **SETUP.EXE** from the [MapInfo install directory]\AddClient. The MapInfo Professional 7.8 Client Welcome screen displays.
4. Click **NEXT**. The License Information screen displays.
5. Click "**I ACCEPT THE TERMS OF THE LICENSE AGREEMENT**" and select **NEXT**. The Customer Information screen displays with the network install values as the default.
6. Modify for the current instance and select **NEXT**.
7. Click **INSTALL** to continue the installation.
8. Click **FINISH** to complete the client installation.

Setting your Database Connection Preferences

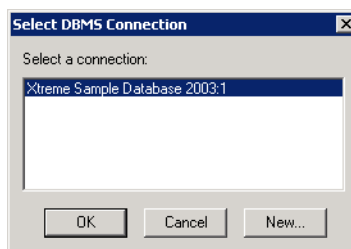
If you have a favorite database connection setting, we have established a Startup preference setting to create that connection automatically at the beginning of your session.

To set Database Connection Startup preference:

1. In the **OPTIONS** menu, click **PREFERENCES** and then **STARTUP** to display the **STARTUP PREFERENCES** dialog box.



2. Click the **SET** button to display the **SELECT DBMS CONNECTION** list.



3. Do one of the following:
 - Select an entry in the list and click **OK** to accept the preference.
 - To establish a new database connection and apply the preference, click the **NEW** button and select the connection type you want to search for.
 - If you select **ODBC**, the Select Data Source dialog box displays and you can search for the database from this dialog box. Select the database connection and click **OK** to return to the Startup Preferences dialog box.
 - If you select **ORACLE SPATIAL**, the **MAPINFO ORACLE CONNECT** dialog box displays and you must enter the user name, password, and server name of the database you are adding. Click **OK** to save your entries and return to the **STARTUP PREFERENCES** dialog box.

Once you have selected a DBMS connection, it displays in the **DEFAULT DBMS CONNECTION** field and is set to connect each time you open MapInfo Professional.

Keep in mind that you can also make a DBMS connection from any of these three dialog boxes: **OPEN**, **CREATE NEW TABLE**, and **SAVE COPY AS**.

Modifying, Repairing, or Removing MapInfo Professional

Use the Program Maintenance feature of the CD Browser to modify, repair, or remove MapInfo Professional 7.8.

To access Program Maintenance:

1. Click **INSTALL PRODUCTS** from the MapInfo Professional CD Browser.
2. Click **MAPINFO PROFESSIONAL**. The Welcome screen displays. Choose **NEXT**.

The Program Maintenance screen displays.

3. Choose modify, repair, or remove MapInfo Professional 7.8 based on your needs.
 - Click **MODIFY** to display the Custom Setup dialog box. See the instructions for **Custom Workstation Installation on page 70** for more about this process.
 - Click **REPAIR** to repair installation errors in the program.
 - Click **REMOVE** to remove an existing copy of MapInfo Professional 7.8 from your system. The installer displays the **REMOVE THE PROGRAM** dialog box. Click **REMOVE** to uninstall the product's programs from your system.

You can also access the Program Maintenance screen from the **START** menu by clicking **CONTROL PANEL** and then **ADD/REMOVE PROGRAMS** and finally **MAPINFO PROFESSIONAL 7.8**.

Controlling Advanced System Settings (7.8)

MapInfo Professional has some advanced system settings—settings that cannot be configured through a dialog box. These settings allow you to control several low-level, technical aspects of how MapInfo Professional runs. Most MapInfo Professional users do not need to worry about these advanced settings.

For example, MapInfo Professional has a Dynamic Data Exchange (DDE) time-out setting, which controls how long MapInfo Professional tries to communicate with other applications during DDE communications. If you run a MapBasic application, and that application encounters time-out errors during DDE, you may want to increase the DDE time-out setting.

If you need to modify one of MapInfo Professional's advanced system settings (such as the DDE time-out setting), use the following procedure.

Modifying the Windows Registry (7.8)

MapInfo Professional stores system settings in the Windows registry. To edit the Windows 98 registry, use the REGEDIT program. To edit the Windows 2000 registry, use the REGEDT32 program.

CAUTION: **Be very careful when editing the registry; damaging the registry can cause serious problems in your operating system.**

For example, to set MapInfo Professional's Dynamic Data Exchange (DDE) time-out setting, locate the following key in the registry:

```
HKEY_LOCAL_MACHINE\SOFTWARE\MapInfo\MapInfo\Common
```

Within that key, edit the DDeTimeout value. If there is no value by that name, create a new value of type string (this data type is referred to as REG_SZ on Windows NT), and assign the name DDeTimeout to the value. Set the value's data to be a number, representing the number of milliseconds (e.g., enter 30000 to specify a time-out of 30,000 milliseconds, or 30 seconds).

For more information on editing the registry, see the online help for REGEDIT or REGEDT32.

Descriptions of Advanced Registry Settings (7.8)

This section describes advanced settings that are stored in the registry.

DDeTimeout = *number*

This setting controls MapInfo Professional's time-out setting in DDE conversations where MapInfo Professional is the client (the application that initiates a conversation). The *number* represents milliseconds. The default value is 10,000 milliseconds (ten seconds). If you run a MapBasic application that attempts to initiate a DDE conversation, but the conversation fails because the server application does not respond within the time-out period, you may need to increase the DDeTimeout number.

OffscreenBitmap = *number*

The *number* is 0 (zero) or 1 (one). A value of 1 (the default) indicates that MapInfo Professional will process off-screen bitmaps when drawing a map. This means that if you cover a Map window, and then bring the Map window to the front again, the map redraws instantly. If you set this setting to zero, MapInfo Professional will not process off-screen bitmaps. This means that when you bring a Map window to the front, you may have to wait as MapInfo Professional redraws the map.

If you are using a video driver that is uncommon or buggy, and if you encounter video problems with Map windows, you may be able to eliminate those problems by setting the OffscreenBitmap number to 0.

MaxFiles = *number*

This setting must be an integer from 10 to 100, indicating how many files MapInfo Professional can open simultaneously. This setting does not limit the number of tables you can open, but it does limit the number of tables you can edit at one time (the number of tables that have unsaved edits). The default value is 29. If you need to work with more files simultaneously, set *number* to 100.

MaxORACLEILES = *number*

A value from 0 = unlimited tiles to infinity.

Improving Performance for MapInfo Professional 7.8

To improve MapInfo Professional's performance, increase the speed of the processor in the machine. A video accelerator card will increase the speed of the redraw. It will not speed up the initial draw of the map, but all subsequent redraws will be faster. A faster disk cache will also improve performance, as will adding memory.

Controlling the Location of Application Data Files During Installation (7.8)

By default, the setup program for MapInfo Professional installs application data files to locations that make sense for the typical user. After installing the product, the user is free to move one or more of the application data files to another predefined location and MapInfo Professional will find that file. For example, the administrator of a machine might move MAPINFOW.PEN from the per user area (its default location) into the install directory so all users on that machine will share the same set of pens.

For IT personnel responsible for a large number of MapInfo Professional installs it is not practical to manually move application data files to realize the desired configuration.

To solve this problem we have developed a solution that allows IT personnel to specify the location of application data files by creating a setting file called MODE.INI prior to installing MapInfo Professional.

1. Copy the installation files to a read-write location.
2. Create a MODE.INI file in the root directory of the installer.

Code	Description	Location
1	per user, roaming	<Current User>\Application Data
2	per user, not roaming	<Current User>\Local Settings\Application Data
3	per machine	<All Users>\Application Data
4	program directory	<Install Dir>

3. Open MODE.INI into any text editor.
4. Edit MODE.INI, modifying the code associated with the application data file/folder whose location you wish to change.
5. Install MapInfo Professional.

The following is a list of predefined locations for application data files supported by MapInfo Professional, and the corresponding numeric code to be used in MODE.INI.

The following is a list of application data files/groups and their default locations:

Filename	Default Location
MAPINFOW.CLR	per user, roaming
MAPINFOW.PEN	per user, roaming
MAPINFOW.FNT	per user, roaming
MAPINFOW.ABB	program directory
MAPINFOW.PRJ	program directory
MAPINFOW.MNU	program directory
CustSymb	per user, roaming
ThmTplt	per user, roaming
GraphSupport	per machine

MODE. INI File Example

Create a text file with the following syntax:

```
GraphSupport = 3
CustSymb = 1
ThmTplt = 1
MAPINFOW.CLR = 1
MAPINFOW.FNT = 1
MAPINFOW.PEN = 1
MAPINFOW.ABB = 4
MAPINFOW.PRJ = 4
MAPINFOW.MNU = 4
```

Installing Data

To help you get started, MapInfo provides you with some United States-based and world-wide maps you can use as a background to your data. Use these instructions to install this free data.

To install the free data provided with MapInfo Professional 7.8:

1. Choose **INSTALL PRODUCTS** from the CD Browser.
2. Choose **FREE DATA** to display the MapInfo Professional Data screen. In this screen, you can also review the data specifications, access new data over the web and learn about what data is available from MapInfo Corporation.
3. Choose **INSTALL FREE DATA**. The Welcome screen displays.
4. Choose **NEXT** to continue. The License Information screen displays.
5. Choose **YES** to accept the terms of the agreement and to continue the installation process. The Choose Destination Location screen displays.
6. Select the product for which you will be installing the data. Select one of the following:
 - MapInfo Professional
 - MapInfo Run TimeClick **NEXT** to continue.
7. Specify the directory where the data will be installed. Use the Browse button to select a directory if necessary or accept the default directory. Click **NEXT** to continue.
8. Choose one of these options:
 - **CUSTOM INSTALL**: Choose which datasets to install. Select the check box beside each dataset you want to install. The size of each dataset displays, as well as space required and space available. To see the subcomponents of the data you selected, click **CHANGE**.
 - **TYPICAL INSTALL**: Install all datasets.Choose **NEXT** to continue. Respond **YES** to the “Would you like setup to display workspace icons” prompt if you want to create an icon for each data set you choose.
9. The Select Program Folder screen displays if you chose to set up Workspace icons. Select the program folder where the icons will be created. Choose **NEXT**.
10. The Start Copying Files screen displays. Review the selections you have chosen and click **BACK** to return to any screen to change your selections. When you are ready to begin the installation, click **NEXT**.
11. The Setup Complete dialog box displays; click **FINISH**.

Getting More Data

To learn more about our data products, click the **GET MORE DATA** option in the MapInfo Professional Data screen during the Data Installation process or click **MAPINFO DATA PRODUCTS ON THE WEB** in the Help Menu. If you have a Browser installed, you will be automatically connected to MapInfo Corporation’s web site, where we provide detailed information about MapInfo’s World Wide Data Products. We have over 350 data products to choose from—products that provide both reliable and current information.

Installing Related Programs, Hardware, and Resources (7.8)

This section contains the instructions for installing the ECW Compressor, the MetaData Browser, the Blue Marble GPS, and the documentation associated with MapInfo Professional. We also include information about the Microsoft IntelliMouse and how to use it.

Installing ECW Compressor (7.8)

The ECW raster handler allows you to open and display raster images compressed in the ECW format. We recommend that you exit all Windows programs before installing.

1. Choose **INSTALL PRODUCTS** from the MapInfo Professional 7.8 CD Browser.
2. Choose **ECW COMPRESSOR**. The Welcome screen displays. Choose **NEXT** to continue the installation process.
3. The Software License screen displays. Choose **YES** to accept the terms of the agreement and to continue the installation process.
4. The Choose Destination Location screen displays. Specify the directory where ECW Compressor will be installed.
5. The Select Program Folder screen displays. Select a folder. Choose **NEXT** to continue.
6. The Setup Complete screen displays: choose to display the ReadMe file and/or create a shortcut on your desktop. Choose **FINISH**.

Installing Metadata Browser (7.8)

The Metadata Browser allows you to search data clearinghouse web sites for data products that meet your geographic analysis needs. We recommend that you exit all Windows programs before installing Metadata Browser.

1. Choose **INSTALL PRODUCTS** from the MapInfo Professional 7.8 CD Browser.
2. Choose **METADATA BROWSER**; the Introduction screen displays.
3. Choose **NEXT** to continue the installation process. The License Agreement screen displays.
4. Choose **YES** to accept the terms of the agreement and to continue the installation process. The Choose Install Folder screen displays.
5. Specify the directory where Metadata Browser will be installed. Select **CHOOSE** to display a list of directories.
6. Choose the Shortcut location. You have the option to put the icon in a new group, into the MapInfo group, in the Start menu, on the Desktop, or to display no icon.
7. Click **INSTALL** to begin the installation.
8. After installation is complete, select **DONE**.

Using the Microsoft IntelliMouse™ to Move Around the Windows (7.8)

MapInfo Professional 7.8 supports the Microsoft IntelliMouse™ as follows:

Document Scrolling: In the Map, Layout, Browser, and MapBasic windows, hold down the **CONTROL** key and move the wheel to scroll the document vertically; the effect is the same as clicking on the arrow at the end of the scroll bar.

Document Panning: In the Map and Browser windows, hold down the wheel button on the IntelliMouse™ and move the mouse to pan the document. Release the button to end the panning. There are three panning speeds. The speed of the panning is based on the cursor's distance from the starting point, indicated by the origin mark. In the Map window, the distance moved at each speed is a percentage of the zoom distance.

For example, the amount to move at slow speed is $.005 * \text{ZoomDistance}$, medium speed is $.01 * \text{ZoomDistance}$, and super speed is $.1 * \text{ZoomDistance}$. In the Browser, the window is scrolled by 1, 3, and 7 lines or columns for slow, medium and super speeds. When the cursor is within 15 pixels of the starting point, there is no panning.

AutoScroll: In the Map and Browser windows, click and release the wheel button to activate AutoScroll. When the mouse cursor is moved away from the starting point the document starts to scroll in whatever direction you move the mouse. When the cursor is returned to the starting point, scrolling stops. AutoScroll is turned off by any mouse click or key stroke. AutoScroll is also turned off when MapInfo Professional loses the focus, for example, when you **ALT-TAB** to another application.

Zoom: In the Map and Layout windows, move the wheel forward to zoom in on the document. Roll back the mouse wheel to zoom out on the document. The wheel has a series of settings; each "click" is the same as one click with a zoom tool. The mouse wheel does not recenter the view. There are other keyboard commands that allow you to zoom in and out more precisely. Review the *MapInfo Professional 7.8 User's Guide (Unabridged)* on your MapInfo Professional 7.8 Installation CD for more information.

Installing Global Positioning Software (GPS) (7.8)

To install Global Positioning Software from Blue Marble:

1. From the CD menu, click **INSTALL PRODUCTS** and then **FREE UTILITIES**.
2. Click **INSTALL GPS SUPPORT**. You will be prompted to exit all applications before installing. Choose **OK**.
3. The MapInfo Special Edition dialog box displays. Choose **OK**.
4. The Select Destination Location screen displays. Specify the directory where GPS will be installed.
5. The Software License screen displays. Choose **YES** to accept the terms of the agreement and to continue the installation process.
6. The Add to the Start Menu dialog box displays: click **YES** to add a shortcut to the **START** menu.
7. The ReadMe displays; choose **OK** to exit the ReadMe.

Installing the Online References

MapInfo Professional 7.8 provides the following online reference documents: MapInfo Professional *Supplement*, *MapBasic Reference Guide*, *Crystal Reports User's Guide*, *Arclink*, and *EasyLoader* documentation, as well as the Adobe Acrobat Reader.

To install the documentation locally:

1. Install the Acrobat Reader.
2. Copy the files from the [CD_ROM]:\PDF_DOCS folder to a local directory.

3. From Windows Explorer, double-click any of the PDF files to automatically launch the Acrobat Reader and the online book.

Note: If you have any questions about the use of the Acrobat Reader, contact Adobe support at www.Adobe.com.

Troubleshooting your Installation

The Installer must be run from a drive with a letter such as G: and not from an explicit UNC path. For example, you might have the MapInfo Professional CD in your computer as USERSPC. Other users may share this device as USERSPC; however, it would not contain a drive letter. The MapInfo Professional Installation program requires a drive letter. To remedy this situation:

1. Right-click the shared directory or CD-ROM and select **MAP NETWORK DRIVE**.
2. Choose a drive letter to map.
3. Run the Installation Program again from the newly mapped drive letter.

Removing MapInfo Professional 7.8 from your System using Control Panel

Remove MapInfo Professional 7.8 by accessing the CD Browser, Program Maintenance screen, or by choosing the Add/Remove Programs option from the Control Panel in Windows, 98, 2000, Windows NT or Windows XP.

Removing MapInfo Professional 7.8 from your System using the CD Browser

To uninstall MapInfo Professional 7.8:

1. Choose **INSTALL PRODUCTS** from the CD Browser.
2. Choose **MAPINFO PROFESSIONAL**. The Welcome screen displays. Choose **NEXT**.
3. The Program Maintenance Screen displays. Choose **REMOVE**.

Setting the MapInfo Professional Preferences

Preferences allow you to change a number of default settings, enabling you to customize certain aspects of the program's behavior. Preference files are stored on a per-user basis. As you gain experience with MapInfo Professional®, you will probably want to change some of these settings. This chapter discusses the various preferences and what they control.

Accessing the Preferences

Here is a brief description of the preference categories:

System Settings – Controls what information is copied to the clipboard, color defaults, aspect ratio, paper and layout units, the number of Undo objects permitted, how symbol types used prior to version 4.0 are drawn, and how MapInfo Professional handles 2-digit years.

Map Window – Controls settings for resizing a Map window; moving duplicate nodes; snap tolerance; units for distance and area; display of scroll bars in the Map window; display of degrees in either decimal or degrees, minutes, seconds form; and the display of InfoTips.

Legend Window – Controls the legend frame default settings.

Startup – Controls whether the program saves the MAPINFOW.WOR upon exiting and loads it upon start up; whether queries are saved in workspaces; and the display of the Quick Start dialog box upon startup.

Address Matching – Controls the house number placement when specifying street addresses.

Directories – Specifies default directories for opening and saving tables, workspaces, MapBasic programs, import files, ODBC SQL queries, theme templates, graph support files, saved queries, new grids, and Crystal Report files. Also specifies the directories MapInfo Professional searches for tables without fully qualified paths referenced in workspaces or MapBasic programs.

Output Settings – Controls the on-screen display of a raster file, the printer output, and exporting choices.

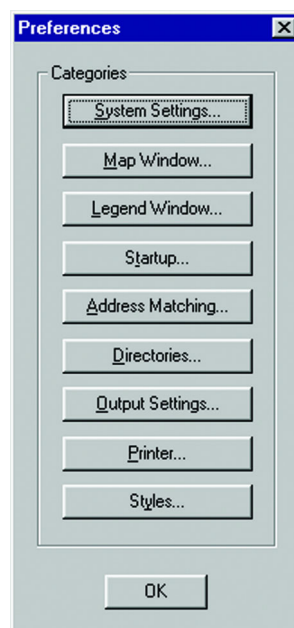
Printer – Controls which printer information is used for all new windows. This printer can be the Windows default printer, or a printer you designate as your MapInfo Preferred printer. This choice can be overridden on a per window basis using either the Print or Page Setup dialog boxes.

Styles – Designate highlighting for selected and targeted objects, as well as designating default object styles for region, line, symbol, and text.

Setting the Preferences

To set a preference:

1. On the **OPTIONS** menu, click **PREFERENCES** to display the Preferences dialog box.



2. Click one of the preference buttons to display the specified preferences dialog box.
3. Set your preferences in that dialog box and click **OK** to save them and return to the Preferences dialog box.
4. Click **OK** to close the Preferences dialog box.

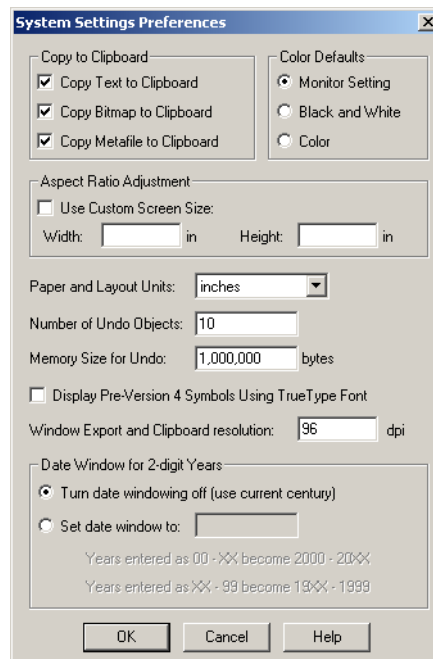
What follows in this section are details to assist you in setting your preferences.

Setting your System Preferences

Use the System Settings Preferences dialog box to control the default settings that affect how MapInfo Professional interacts with your system.

To set your system settings preferences:

1. On the **OPTIONS** menu, point to **PREFERENCES** and click **SYSTEM SETTINGS** to display the System Settings Preferences dialog box.



2. Select the appropriate system preferences for your implementation of MapInfo Professional and click **OK** to save them.
 - **COPY TO CLIPBOARD** — Click the Copy to Clipboard check boxes to specify what items you want to copy to the Clipboard: text, bitmaps, or metafiles. MapInfo Professional now copies metafiles in Enhanced Metafile format (EMF). All three are copied to the Clipboard by default. Clear the appropriate check box(es) to prevent the item from being copied to the clipboard.
 - **COLOR DEFAULTS** — Select one of the Color Defaults preferences described below to control how MapInfo Professional shades thematic map layers.
By default, **MONITOR SETTING** is selected. MapInfo Professional uses the color settings of the monitor to shade the map when this option is selected.
Click the **BLACK & WHITE** radio button if you are using a color monitor and want to shade your thematic map in gray-scale.

Click the **COLOR** radio button if you are using a black and white monitor and want to print a thematic map in color on a color printer.

- **ASPECT RATIO ADJUSTMENT** — Select the Aspect Ratio Adjustment options so that your map maintains the appropriate aspect ratio on your screen. Enter the dimensions of your screen in these fields.
- **PAPER AND LAYOUT UNITS** — Specify the Paper and Layout Units used when you measure the size of objects in a Layout window and the size of paper in the Print dialog boxes. The default is set to inches. You can choose: inches, picas, points, millimeters, and centimeters.
- **NUMBER OF OBJECTS** — You can only undo the last action. Set this option to the number of objects in the last action you want the system to undo. For example, if you moved 10 objects at the same time and enter 10 in this field, MapInfo Professional restores all 10.

Note: You cannot use the Undo capability for the following operations: Revert, Save, Save As, or Modify Table, or any operations whose effects are primarily cosmetic.

The default is 10 objects. You can set it from 0 to 800. Setting the number of objects to 0 deactivates the system. After you use the Undo option, the system toggles to **REDO**.

- **MEMORY SIZE FOR UNDO** — Type the number of bytes of memory you want to set aside for the Undo feature. This entry is set to 1,000,000 bytes by default. You can enter up to 10,000,000 bytes into this field. Increasing this entry may result in slower response time.
- **DISPLAY PRE-VERSION 4 SYMBOLS USING THE TRUE TYPE FONT** — Select this check box to indicate how you want to draw symbols from versions of MI Pro earlier than 4.0. Select this check box to draw vector symbols with characters from the MapInfo Professional Symbols font. By default, vector symbols are drawn.
- **WINDOW EXPORT AND CLIPBOARD RESOLUTION** — To set the image resolution for exporting and Clipboard purposes, type the resolution in this field. MapInfo Professional uses this preference whenever you copy windows to the Clipboard, export your work to metafile and raster formats and the Save Window As export process as well. If you do not set this resolution manually, the product assumes 96 DPI. The maximum setting for this field is 1200 DPI.
- **DATE WINDOW FOR 2 DIGIT YEARS** — Select the appropriate Date Window for 2-Digit Years option for your purposes:

Click the **TURN DATE WINDOWING OFF** radio button to use the current century for all 2-digit years. This option is selected by default.

Click the **SET DATE WINDOW TO** radio button to refer to dates in both the current century and the previous century. You need to use this setting if your data uses dates in the 1900s.

For example, if you type the number 30 in the Set Date Window field, 2-digit years from 00–29 are set in the 21st century (2000–2029), and 2-digit years from 30–99 are set in the 20th century (1930–1999).

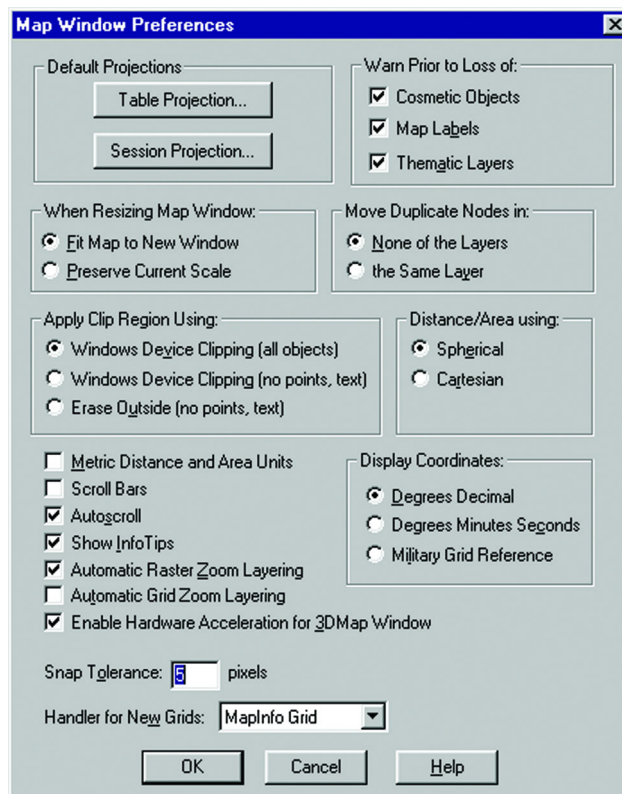
3. Click **OK** to close the Preferences dialog box.

Setting your Map Window Preferences

The Map window preferences control the default settings for any new Map window created in MapInfo Professional. You can override some of these preference settings for the current Map window in the Map Options dialog box (on the **MAP** menu, click **OPTIONS**). These include the settings for resizing Map windows, specifying distance/area calculations, and displaying coordinates in degrees, minutes, seconds.

To set the Map Window preferences:

1. On the **OPTIONS** menu, point to **PREFERENCES** and click **MAP WINDOW** to display the Map window preferences.



2. Make your Default Projections selections based on these options:
 - **TABLE PROJECTION** — To set the Default Projections for the current map, designate a default table projection for creating new tables, importing MIF, MBI, and IMG files, and for Choose Projection options in dialog boxes. Override the defaults by accessing the Choose Projection option. This feature is not available for Universal Translator, ArcLink, or Importing DXF files.
 - **SESSION PROJECTION** — To set the option to designate a default MapBasic projection for returning coordinate values using a MapBasic window or Update Column. Compiled MapBasic applications are not affected by this preference.
3. Set the **WARN PRIOR TO LOSS** options to display warning messages before you leave the currently open map window and lose cosmetic objects, map labels, and thematic layers you have created. After the warning, you can save these objects, labels and layers as part of a table or workspace. These boxes are selected by default.
You can turn off the display of these warning messages by clearing the desired check boxes from the Warn Prior to Loss of group.

4. Set the **WHEN RESIZING MAP WINDOW** options to control the default behavior of Map windows when you resize them. Select one of these options:
 - Click the **FIT MAP TO NEW WINDOW** to draw the map to fit the resized window. You see the same view of the map that you saw before you resized the window. This is the default setting.
 - Click the **PRESERVE CURRENT SCALE** button to change the view of the map when the Map window is resized. As you shrink or enlarge the window, you will see a smaller or larger area of the map.

This setting does not affect Map windows that are already open.

To override the preference settings for the currently open Map window, make different selections in the Map Options dialog box.
5. Select the **MOVE DUPLICATE NODES IN** settings to specify whether MapInfo Professional will move duplicate nodes when you use the Reshape command (on the **EDIT** menu, click **RESHAPE**) to edit objects that are adjacent to each other, such as regions. Select one of these options:
 - Select the **NONE OF THE LAYERS** button to prohibit the product from moving duplicate nodes. This is the default setting
 - Select the **SAME LAYER** button to move duplicate nodes that are in the same layer when one of the connected nodes is moved.
6. Select the **APPLY CLIP REGION USING** settings to specify how you want the product to clip regions. Select one of these three choices:
 - **WINDOWS DEVICE CLIPPING (ALL OBJECTS)** – The clipping is controlled by the Windows Device Display. All objects (including points, labels, text, raster and grid images) will be clipped at the Clip Region boundary. This is the default setting.
 - **WINDOWS DEVICE CLIPPING (NO POINTS, TEXT)** – Use this method to emulate the Erase Outside clipping method used in previous versions of MapInfo Professional. All objects are clipped using Erase Outside except points and labels. Points and labels will be completely displayed only if the point or label point lies inside the Clip Region object. Text objects, raster files, and grid files are always displayed and never clipped.
 - **ERASE OUTSIDE (NO POINTS, TEXT)** – This method uses the Erase Outside functionality. This clipping method is used in all versions prior to MapInfo Professional 6.0. The Clip Region object is the Cutter object, and all other objects are Target objects for this operation. All objects are clipped using Erase Outside, excepts points and labels. In addition, points and labels will be completely displayed only if the point or label point lie inside the Clip Region object. Text objects are always displayed and never clipped.
7. Select the **DISTANCE/AREA CALCULATIONS** settings to specify the default type of distance/area calculation that MapInfo Professional uses for new Map windows.
 - **SPHERICAL** — The Spherical calculations measure distance according to the curved surface of the Earth. Spherical is the default. The data is first converted to Latitude/Longitude and then a calculation is produced. Lat/Long data will always use spherical calculations.
 - **CARTESIAN** — The Cartesian method performs calculations on data projected onto a flat plane. Cartesian coordinates (x,y) define the position of a point in two-dimensional space by its perpendicular projection onto two axes which are at right angles to each other. Long/Lat projections cannot use Cartesian calculations.

To specify a calculation method for the currently active Map window, use the Map Options dialog box (on the **MAP** menu, click **OPTIONS**).
8. Select the following check boxes as appropriate. You may select as many as are appropriate.

- **METRIC DISTANCE AND AREA UNITS** — To use metric units, such as kilometers and square kilometers, select this check box. By default, MapInfo Professional displays distance in miles and area in square miles (or kilometers and square kilometers).
 - **SCROLLBARS** — To display scrollbars, select the Scroll Bars check box. By default, MapInfo Professional does not display scrollbars in Map windows.
 - **AUTOSCROLL** — To scroll the layout automatically, select the Autoscroll check box.
 - **INFOTIPS** — To display one or two word tips when you cursor over a button, select the InfoTips check box. By default, MapInfo Professional displays InfoTips. Clear the Show InfoTips check box to deactivate their display.
 - **AUTOMATIC ZOOM LAYERING FOR RASTER AND GRID LAYERS** — To choose the default mode for automatic zoom layering for raster layers, select this check box. Raster zoom layering is turned on by default.
 - **AUTOMATIC GRID ZOOM LAYERING** — To choose the default mode for automatic grid zoom layering when adding a grid layer to the map, select this check box. Automatic Grid Zoom Layering is turned off by default.
 - **3D MAP WINDOW HARDWARE ACCELERATION** — This check box controls whether to use your video card acceleration capability to display 3D Maps. Clear the box to display the 3D Map without using your video card acceleration capability. Turning the acceleration off will reduce performance, but it will avoid failure with certain graphic adapters and drivers.
9. To change the format in which coordinates display, select one of the options in the Display Coordinates group. You can select only one:
- **DECIMAL DEGREES** — By default, MapInfo Professional displays coordinates in decimal degrees. MapInfo Professional displays coordinates of objects in the Object Info dialog boxes, and of the cursor location in the status bar if that display option is selected.
 - **DEGREES, MINUTES, SECONDS** — Choose this option to display your Map using the degree, minute, seconds format.
 - **MILITARY GRID REFERENCE SYSTEM** — Choose this option to display your Map using the Military Grid Reference System format. Coordinates are converted to the Military Grid Reference System format using the World Geodetic System (WGS) of 1984 Ellipsoid.
- To override this preference in individual maps, use the Map Options dialog box (on the **MAP** menu, click **OPTIONS**). Overrides to the default coordinate setting will be saved to your workspace.
- Selected in either the Map window preferences or the Map Options dialog boxes, the format will display in the status bar, but not in the Object Info dialog boxes. If you display any Object Info dialog box for an object on a map that uses the Military Grid Reference System, the coordinates will be displayed in decimal degrees.
10. Type the appropriate **SNAP TOLERANCE** setting to specify the default tolerance in pixels within which Snap to node operates when you are drawing objects (click the **S** key to turn Snap to node on).
- The default is 5 pixels. Type in a smaller value to obtain a tighter snap tolerance, so that you do not snap to other objects' nodes as you draw. Type in a larger value to obtain a looser snap tolerance, when you want to snap to a node even though you are relatively far away from it. For more information about Snap Tolerance, see **Using “Snap To” to Select Nodes and Centroids in Chapter 7 on page 268**.
11. Select a **GRID HANDLER** to allow you to select the output grid file format. By default, MapInfo Professional uses the MapInfo Professional handler (*.MIG). The available

formats depend on which grid handlers are installed. When you change the grid file format, the file extension on the grid file name changes to reflect the selected format.

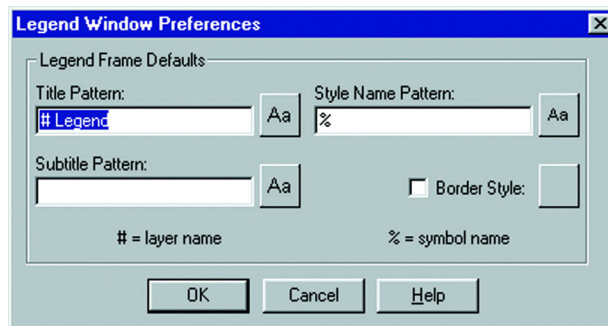
12. Click **OK** to save these settings and return to the Preferences dialog box.
13. Click **OK** to close the Preferences dialog box.

Setting your Legend Window Preferences

These settings control the defaults for how titles are specified for all legend frames in the legend window, as well as the default text style attributes such as font and size. The settings correspond to the settings displayed in Step 2 of the legend wizard. MapInfo Professional uses these defaults if there are no metadata keys in the table on which the legend frame is based. If metadata keys are present, the metadata defaults override the settings in Step 2 of the wizard and the Legend preferences.

To set the Legend window preferences:

1. On the **OPTIONS** menu, point to **PREFERENCES** and click **LEGEND WINDOW** to display the Legend window preferences.



For more information on legends, see [Working with Legends in Chapter 9 on page 335](#).

2. Use the options in this window to set the Legend Frame Defaults.
 - To set the **TITLE PATTERN**, type the text that you want to display at the top of each legend frame in this box.
By default, the Title Pattern is “# Legend”, where ‘#’ is the name of the layer on which the frame is based. So, if the frame is based on the States layer, the default Pattern title would be “States Legend.” You can change this pattern to “Legend of #” or simply “#.”
You may wish to have no default pattern. In that case, leave the box blank.
Choose a title pattern default that suits your needs. The # character can be used in any of the pattern text boxes as a shortcut key for the layer name.
 - To set the **SUBTITLE PATTERN**, type the subtitle text you want in this box. The entry in this box is blank by default, but you can set your own default title pattern for subtitles.
 - To set the **STYLE NAME PATTERN**, type the text you want to display beside each symbol in this box. The default pattern is the ‘%’ character. The Style Name is the text that describes each symbol in a legend frame. The % character is used as a placeholder for the type of object the legend symbol corresponds to: point, line, or region.

You can type in your own default Style Name Pattern, either using the % character or not. For example, in a legend frame based on the States layer, a Style Name Pattern that reads “% of #” will display as “Region of States” next to the symbol in the legend. The % character can only be used in the Style Name Pattern box.

- To set the **BORDER STYLE**, select this check box to place a border around the legend and select the appropriate style by clicking the X box beside the Border Style option.
3. To change the defaults of the style attributes for the titles, the style name, or the legend frame border, click the desired style box to display the corresponding style dialog box and make your changes.
 4. Click **OK** to save these settings and return to the Preferences dialog box.
 5. Click **OK** to close the Preferences dialog box.

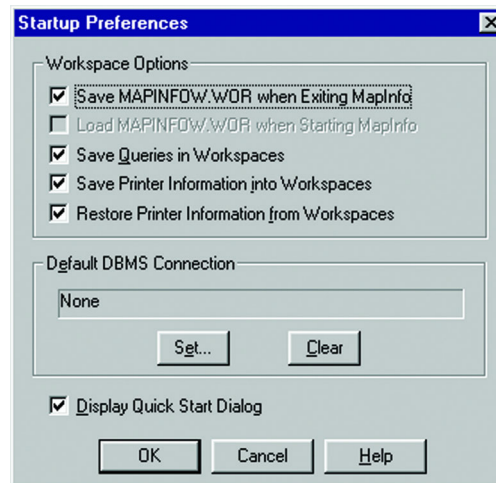
Setting the Startup Preferences

In general, the Startup preferences control:

- How MapInfo Professional behaves when you startup
- The MAPINFOW.WOR workspace properties such as whether printer information and queries are saved to workspaces

To set your startup preferences for MapInfo Professional:

1. On the **OPTIONS** menu, point to **PREFERENCES** and click **STARTUP** to display the startup preferences.



2. Select the following boxes to enable the indicated functionality; clear the check box to disable this functionality. You may select all that apply.
 - **SAVE MAPINFOW.WOR WHEN EXITING MAPINFO** — Select this check box to save your setup to the MAPINFOW.WOR workspace when you exit MapInfo Professional. When you clear this check box, MapInfo Professional does not save the MAPINFOW.WOR unless you save it explicitly.
 - **LOAD MAPINFOW.WOR WHEN STARTING MAPINFO** — To display MAPINFOW.WOR when you enter MapInfo Professional, select this check box.

Note: To enable this check box, you must clear the Display Quick Start Dialog check box.

- **SAVE QUERIES IN WORKSPACES** — To save the queries you create during a mapping session in the workspace.
- **SAVE PRINTER INFORMATION INTO WORKSPACES** — To save the printer information in the workspace, select this check box.

The Save printer information into Workspaces check box saves the printer name, paper orientation, paper size, and the number of copies from your printer settings into the workspace. This also includes any overrides you might have made to the default printer settings in the Printer preferences.

When this preference is on, the workspace is written as a version 6.0 workspace. We recommend that you leave this preference on. However, if you will be sharing workspaces with other users, particularly if they are using earlier versions of MapInfo Professional, you may want to leave the preference turned off.

- **RESTORE PRINTER INFORMATION TO WORKSPACES** — To restore printer information from a workspace, check this check box. When you open the workspace, the printer name, paper orientation, paper size, and the number of copies are restored. This is useful if you are sharing workspaces with other MapInfo Professional (6.0 or later) users who are also using the same printers.

Note: If this preference is turned off, or if the printer indicated is not available, the printer settings for the workspace revert back to the default printer set in the Printer preferences.

- **DBMS CONNECTION** — To save a default DBMS Connection, specify a DBMS connection that will be opened each time you begin a MapInfo Professional session. Click **SET** to set this connection.
- **DISPLAY QUICK START DIALOG** — Select this check box to display the Quick Start dialog box automatically when you start MapInfo Professional. This check box is selected by default.

Clear the Display Quick Start Dialog check box to prevent it from displaying when you start subsequent MapInfo sessions.

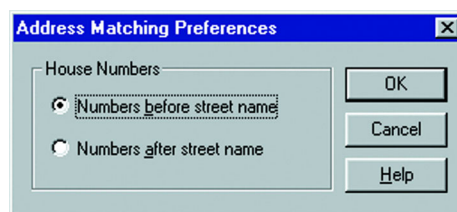
3. Click **OK** to save these settings and return to the Preferences dialog box.
4. Click **OK** to close the Preferences dialog box.

Setting your Address Matching Preferences

Use the Address Matching preferences to specify the placement of the house number in addresses. The default setting is for house numbers to come before the street name. You can change it so that the house number comes after the street name.

To set your address matching preferences:

1. On the **OPTIONS** menu, point to **PREFERENCES** and click **ADDRESS MATCHING** to display the Address Matching Preferences dialog box.



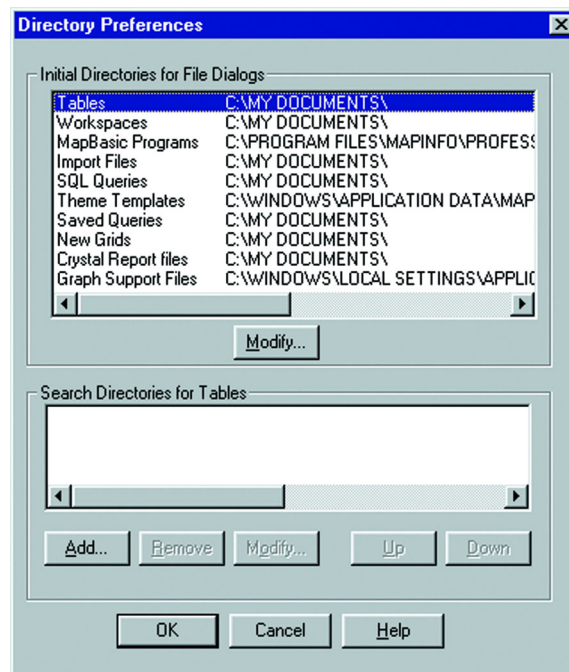
2. Click **OK** to save the Address Matching preference and return to the Preferences dialog box.
3. Click **OK** to close the Preferences dialog box.

Setting your Directory Preferences

The Directory preferences enable you to control in what directories MapInfo Professional looks for files.

To set your directory preferences:

1. On the **OPTIONS** menu, point to **PREFERENCES** and click **DIRECTORIES** to display the Directory Preferences dialog box settings.



2. To set a preferred directory for each type of file, highlight the file dialog type and click the **MODIFY** button. The Choose Directory dialog box displays.
3. Select the appropriate directory for the file type you highlighted and click **OK**.
4. Repeat this process until you have specified all of the directories you need to.
5. Click **OK** to save these settings and return to the Preferences dialog box.
6. Click **OK** to close the Preferences dialog box.

Use this setting to specify the default directories that display in the File menu dialog boxes when you open or save different files. You can specify directories for:

- Tables
- Remote Tables
- Workspaces
- MapBasic programs
- Import files
- DBMS SQL queries
- Theme templates

- Saved queries
- New grids
- Crystal Report files
- Graph support files
- Shapefile Tables

When you click **OPEN**, you can select an icon from the MapInfo Places Bar. click the Workspace Directory icon to display the workspace directory you designated in this preference.

Additionally, use this preference to search for raster and grid tables. If you open a *.tab file for a raster or grid image and the image file cannot be found an attempt is made to find the image in the same location as the .tab. If the image file is not found, it will then use the Search Directories.

Use the Search Directories for Tables and Workspaces to specify search paths that MapInfo will use to look for tables referenced in workspaces or MapBasic programs that do not have fully qualified paths.

To search directories for tables and workspaces:

1. To specify a search path, in Search Directories for Tables group, click **ADD**.
Note: You can use the **ADD** and **REMOVE** buttons to add or remove paths from the list.
2. Specify a drive and directory in the Choose Directory dialog box and click **OK**.
You can set up to four paths. Use the **UP** and **DOWN** keys to change the search order.
3. Click **OK** to save these settings and return to the Preferences dialog box.
4. Click **OK** to close the Preferences dialog box.

Setting your Output Setting Preferences

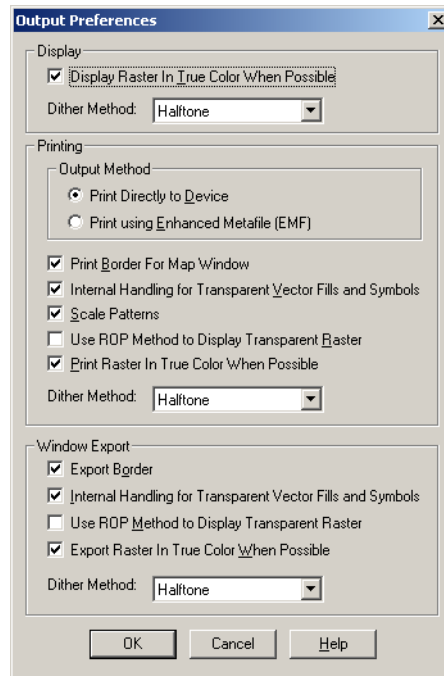
The Output Settings allow you to control raster and grid file color settings for on-screen display, printed output, and file export settings. In addition, you can also specify how you want to handle transparency in vector and raster files in both your printed output and exported files. Other printer settings enable you to specify an output method, map scaling, and whether to print a border around a Map window.

You can override the settings in the Output settings preferences in the Advanced Printing dialog box. These preferences represent the default settings used in the Advanced Printing dialog box. These new settings can then be saved in a workspace.

Note: You can get additional printer advice in the MapInfo Professional *Printing Guide* on the installation CD.

To set your output preferences:

1. On the **OPTIONS** menu, point to **PREFERENCES** and click **OUTPUT SETTINGS** to display the Output Preferences dialog box.



2. The **DISPLAY** settings control the on-screen display of a raster or grid file. Click the appropriate output settings based on your output requirements.

These entries explain the display settings, the printing options, and window export options in this dialog. Some of the options appear in more than one dialog so we have grouped all of the like explanations together.

- **DISPLAY RASTER IN TRUE COLOR WHEN POSSIBLE** — Click this check box to display your 24-bit raster or grid file images in true color (make sure your display settings are set to greater than 256 colors). Clear this check box if you only want your images to display using 256 colors. This box is checked by default.
- **DITHER METHOD** — Dithering is a technique that blends pixels electronically to improve the look of an image. Click a dither method when you are converting a 24-bit image to 256 colors.

Dithering creates the illusion of complex colors by using a pattern of finite (fixed) color dots. For example, to create the color green using dithering, the color would consist of a pattern of yellow and blue dots.

HALFTONE dithering calculates a series of half tone differences in color between high-contrast elements in your image to create a smooth transition of color. This option is selected by default for display, print, and export options.

ERROR DIFFUSION dithering calculates an interim color between contrasting colors and shades the surrounding pixels to blend evenly toward that interim color.

Note: You can select dither method options in the display, printing, and exporting sections of this dialog box. The same definitions apply to each area.

3. The **PRINTING** settings control the printing options for Map windows, Layout windows and all other output file types. Select the appropriate printing settings based on your output requirements. Remember that resetting these printer options locally overrides these preferences.

- **OUTPUT METHOD/PRINT DIRECTLY TO DEVICE** — Click this option to print your image file directly from MapInfo Professional as you did when you were using MapInfo Professional 6.0 or earlier. This check box is checked by default.
- **OUTPUT METHOD/PRINT USING ENHANCED METAFILE** — Click this option to generate an enhanced metafile of your MapInfo Professional image before sending it to the printer. This setting takes advantage of current printer technology to shrink the spool size and print your file quicker without sacrificing quality.

Note: You must use this setting if you are printing a map containing a translucent raster or grid layer. If you do not use this setting, the image will not print translucently.

- **PRINT BORDER FOR MAP WINDOW** — Click this check box to print a black border around the image you are printing. Clear this check box to leave the image unbordered. This check box is checked by default.
- **INTERNAL HANDLING FOR PRINTING TRANSPARENT VECTOR FILLS AND SYMBOLS** — Special programming has been added to handle transparent fill patterns and bitmaps for vector images when printing or exporting. Click this check box to use this functionality or clear it to let the printer or Windows export functions to handle this. This check box is checked by default.
- **SCALE PATTERNS** — Select this check box to match the non-transparent fill patterns in your print output to more closely match what you see on your screen. This check box is checked by default. Clear this check box to let the printer driver have exclusive control over rendering the pattern fills.

Note: The Scale Patterns check box does not affect transparent fill patterns because transparent fill patterns are always scaled.

- **USE ROP METHOD TO DISPLAY TRANSPARENT RASTER** — Click this check box to allow the internal ROP (Raster Overlay by Pixel) to manage the transparent pixel display and printing in raster images. Since the ROP Method is largely a display method, not all printers, plotters, and export programs can use it. We recommend that you either check with the printer manufacturer before using this setting or try a few test prints or exports to get the results you want. This check box is cleared by default.
Using the ROP method may not produce problems unless you print the metafile.
- **PRINT/EXPORT RASTER IN TRUE COLOR WHEN POSSIBLE** — Click this check box to print and export your 24-bit raster or grid file images in true color (make sure your printer settings are set to greater than 256 colors). Clear this check box if you are not working with a color printer. This check box is checked by default.

Note: See the Dither Method setting above for details about this option.

4. The **WINDOW EXPORT** settings control the export options for Map windows, Layout windows and all other output file types. Select the appropriate window export settings based on your output requirements. Remember that resetting these options locally overrides these preferences.
 - **EXPORT BORDER** — Click this check box to include a black border on images you are exporting. Clear this check box to export the image without a border. This check box is checked by default.

Note: The preference setting definitions for Internal Handling for Transparent Vector Fills and Symbols, Use ROP Method to Display Transparent Raster, Print Raster in True Color When Possible, and Dithering Methods are the same for export as for printing above.

5. Click **OK** to save these settings and return to the Preferences dialog box.
6. Click **OK** to close the Preferences dialog box.

Recommendations for Effective Pattern Scaling

When you are printing, find out what type of printer driver you are using. Many PCL6 and some HPGL drivers handle fill pattern scaling and give you control over this feature. Turning off their scaling may be the difference between what you see in print and what you see on your monitor. We recommend that you try turning off your driver's scaling options and try ours first, because we have enhanced our method to better meet your Map and Layout window requirements. To turn our pattern scaling options on, check the **SCALE PATTERNS** check box in the Output Preferences dialog box. Then try turning off our scaling and turn theirs back on and see what you like better. Our tests show that our scaling seems to produce color output that more closely matches your screen's display.

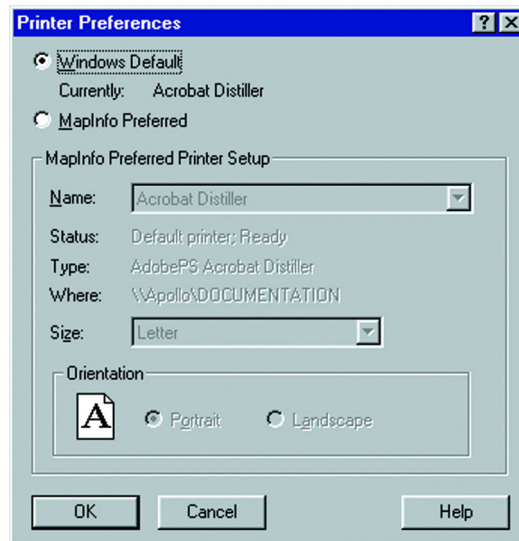
Setting your Printer Preferences

You can use the printer preferences to select a printer for MapInfo Professional output, which can be separate from your default Windows printer.

Note: You can get additional printer advice in the MapInfo Professional *Printing Guide* on the installation CD.

To set your printer preferences:

1. On the **OPTIONS** menu, point to **PREFERENCES** and click **PRINTER** to display the Printer Preferences dialog box.



2. Complete your selections using these instructions.
 - **WINDOWS DEFAULT** — This entry displays the path to the default printer specified for your operating system. This button is selected by default.
 - **MAPINFO PREFERRED** — Click this button to select a different default printer when printing while using MapInfo Professional. This can be a printer or a plotter. After you select this option you can specify the size of the paper that is appropriate for this printer.
 - **SIZE** — After you select a printer, this list prefills with the appropriate paper sizes available. Select the requested paper size from this drop-down list.

- **ORIENTATION** — After you select a printer, you can specify the direction that the paper faces. Portrait indicates that the paper is taller than it is wide (as shown in the previous figure); landscape indicates that the paper is wider than it is tall.
 - **NETWORK** — Click this button to locate the printer or plotter on the network that you want to set as the default. This button only displays for users running under Windows NT 4.0, Windows 2000 and Windows XP Pro. The Connect to Printers dialog displays.
3. To select a default printer, do one of the following:
 - Select the path of the printer you want to use as your default and click **OK**,
 - Double-click the printer in the list.Using either method the Printer Preferences window redisplay.
 4. Click **OK** to confirm your selections and set your MapInfo Professional default printer options.

Note: If you selected the **SAVE PRINTER INFORMATION TO WORKSPACES** button in the Startup preferences, MapInfo Professional saves the printer information and settings to the workspace. To set this preference, make changes in the Startup Preferences dialog box. If you are planning to share these workspaces with users running versions of MapInfo Professional earlier than 6.0, do not select this preference.
 5. Click **OK** to save these settings and return to the Preferences dialog box.
 6. Click **OK** to close the Preferences dialog box.

If you select the Windows Default printer, MapInfo will always use the printer that is currently set as the default in Windows. The settings for that printer will display in the MapInfo Preferred Printer Setup group. You will not, however, be able to change them in the Printer Preferences dialog box. To change the Windows default printer, go back to the Windows Control Panel.

To use a printer other than the one indicated in the Printer preferences for a particular window (Map, Layout, etc.), choose either:

- On the **FILE** menu, click **PRINT**. You can change the printer you are using in the Print dialog box, overriding the default printer settings.
- On the **FILE** menu, click **PAGE SETUP**. In the Page Setup dialog box, click the Printer to display the Preferences dialog box for the default printer. Select a different printer in the Name drop-down list. This will override the default printer set in the Printer preferences.

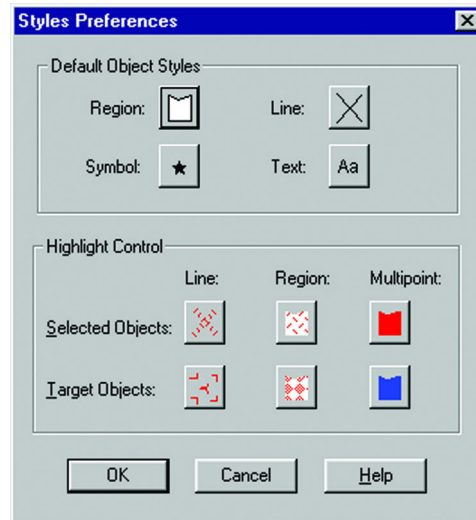
Note: The printer override applies only to the window you are currently printing. To actually change the default settings, you must go back to the Printer preferences and specify a new default printer.

Setting your Style Preferences

The Style preferences allow you to preset the look of your objects and lines.

To set the default style preferences:

1. On the **OPTIONS** menu, point to **PREFERENCES** and click **STYLES** to display the Styles Preferences dialog box.



2. Complete your selections using these instructions.
 - **DEFAULT OBJECT STYLES** — Click the Region, Symbol, Line, and Text buttons to set these style options. These selections will serve to create the default settings for these style elements.
 - **HIGHLIGHT CONTROL** — Specify the Line, Region, and Multipoint styles of selected and target objects, as well as highlighting specifications in the Map window. Additionally, specify the style of selected and target Multipoint objects. The default settings are shown in the Style boxes of the Highlight Control group. click one of the boxes to display the corresponding style dialog box and change its settings.
3. Click **OK** to save these settings and return to the Preferences dialog box.
4. Click **OK** to close the Preferences dialog box.

Starting up and Leaving MapInfo Professional

In this section we cover the very basics of starting MapInfo Professional, using the STARTUP.WOR, and exiting the program. Since opening a table is basic to getting started in using MapInfo Professional, we cover that topic here, as well.

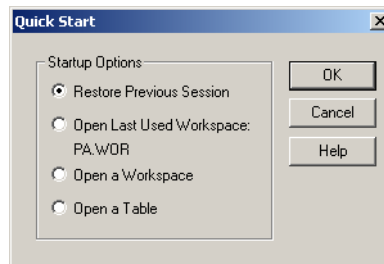
Starting MapInfo Professional

Now that you have MapInfo Professional installed and have read a little about its power and functionality, you are ready to begin mapping and analyzing your data.

To start MapInfo Professional:

1. Do one of the following:
 - Double-click the MapInfo Professional icon on your desktop. In a few seconds, MapInfo Professional's Quick Start dialog box displays.
 - From the **START** menu, select **MAPINFO PROFESSIONAL 7.5** (or **MAPINFO PROFESSIONAL 7.5 CLIENT**, if this is a network installation) from the Selected Program folder.
 Using either method the Quick Start dialog displays.

Here you can choose how you want to start your mapping session. The Quick Start dialog box displays every time you start MapInfo Professional, but you can change this behavior in the Startup preferences (On the **OPTIONS** menu, point to **PREFERENCES** and click **STARTUP**) using instructions in [Setting the Startup Preferences on page 89](#). In the Startup Preferences dialog box, clear the Display Quick Start dialog box to deactivate the display of the Quick Start dialog box.



If you are returning to MapInfo Professional, you can return to the previous mapping session by choosing Restore Previous Session or use last workspace. If this is your first look at MapInfo Professional, choose the Open a Table option to begin. The Open dialog box displays.

Using the Startup Workspace

Instead of starting MapInfo Professional with the MAPINFOW.WOR, which only opens the tables you were last working with, you can load a particular workspace on startup every time.

To set the startup workspace:

1. Display the tables in the size and position you want to see them at startup.
2. On the **FILE** menu click **SAVE WORKSPACE** and in the Save Workspace dialog box, save the current workspace as a file called STARTUP.WOR in your program file directory or to your home directory (where Windows configuration files such as WIN.INI are stored) so MapInfo Professional can find it at startup.

For more on STARTUP.WOR, see [Setting the Startup Preferences on page 89](#).

3. Click **SAVE** to save your workspace.

Opening a Table

Just about everything in MapInfo Professional starts with opening a table. You can display the information in your tables in a number of ways in MapInfo Professional, as a table, in a browser, and on a map.

To open your table:

1. On the **FILE** menu, click **OPEN**. The Open dialog box displays.
2. Choose the drive and directory for the table you want to open.
3. Choose the appropriate table (.tab file). When opening multiple tables, use Shift-click to select adjacent tables and Control-click to select non-adjacent tables.
4. Choose **NEW MAPPER** from the Preferred View list.

You can also open tables without displaying them, making the data available for other uses. In this case, choose No View from the Preferred View list box in the Open dialog box.

5. Click **OPEN**. A window containing the data from the table displays as a map.

You can open additional tables to add more information (layers) to the Map window. If you want the second table to display in the current Map window, leave the Automatic option selected in the Preferred View list. MapInfo Professional displays the table in the current Map window automatically.

If you do not want the table to display with the first map, choose **NEW MAPPER**. MapInfo Professional opens a second table in its own Map window.

To set a default path you want MapInfo Professional to use when opening tables, click select new directories in the Directories Preferences dialog box. See **Setting your Directory Preferences on page 91** for more information on this process. Here, you can also set default paths for workspaces, MapBasic programs, Import files, and DBMS SQL queries.

Note: If your data file does not contain graphic objects, you will not be able to display the table in a Map window. You can only bring it up in a Browser. You must first geocode the table to display it as a map. Geocoding is discussed more fully in **Geocoding - Assigning Coordinates to Records in Chapter 4 on page 162**.

Use the Places Bar to quickly access a specified directory. There are four MapInfo Professional Places options: Table; Workspaces; Import Files; Remote Tables. Designate each directory path in the Directories Preferences dialog box.

If you are using the Windows 2000 operating system, select MapInfo Places to display MapInfo Professional specific folders, or choose Standard Places to display the default places.

Exiting MapInfo Professional

To leave MapInfo Professional:

- On the **FILE** menu, click **EXIT**. There is no confirmation message.
If you have edited the existing open tables, MapInfo Professional prompts you to save them. You can choose to either save them or exit and lose those changes.

Leaving MapInfo Professional Using the MAPINFOW.WOR Workspace

The Startup preferences allow you to automatically save your work setup to a workspace when you exit, and display that setup when you enter MapInfo Professional again.

To set the preference option that allows you to save your setup to the MAPINFOW.WOR workspace:

1. On the **OPTIONS** menu, point to **PREFERENCES** and click **STARTUP** to display the Startup Preferences dialog box.
2. Check the **SAVE MAPINFOW.WOR** option in the Startup Preferences dialog box.
Note: To enable this option, clear the **DISPLAY QUICK START DIALOG** check box when you enter MapInfo and select **LOAD MAPINFOW.WOR**.
3. Click **OK** to save these settings and return to the Preferences dialog box.
4. Click **OK** to close the Preferences dialog box.

The Basics of MapInfo Professional

Now that you have installed MapInfo Professional®, you are probably anxious to get mapping. But, if you are new to MapInfo Professional, take a few minutes to read this chapter to familiarize yourself with the concepts, components, and tools for successful computer mapping.

Sections in this Chapter:

- ♦ **A Tour of the MapInfo Professional Desktop 101**
- ♦ **Data - Where MapInfo Professional Begins 107**
- ♦ **Reviewing the Windows in MapInfo Professional 115**
- ♦ **Understanding Layers and Objects 119**
- ♦ **Saving and Exporting Your Work 136**
- ♦ **Using the Tools in the Tool Manager 141**

A Tour of the MapInfo Professional Desktop

This section details the tools and commands that are available to you in the MapInfo Professional product. You may refer to these frequently as you familiarize yourself with MapInfo Professional.

Working with Toolbars

MapInfo Professional provides four toolbars of tool buttons and commands to give you tremendous mapping creativity at the click of a button.

To reshape the toolbars, click and drag on their borders. Drag the title bar to move them. To dock a toolbar, drag it to the area directly underneath the Main menu bar. The toolbar changes shape and positions itself directly under the menu bar. You can easily change it back to the floating view by clicking the background area of the toolbar and dragging it away from its position. The toolbar retains the same shape as it had before you docked it.

You can also dock and undock a toolbar from the Options menu.

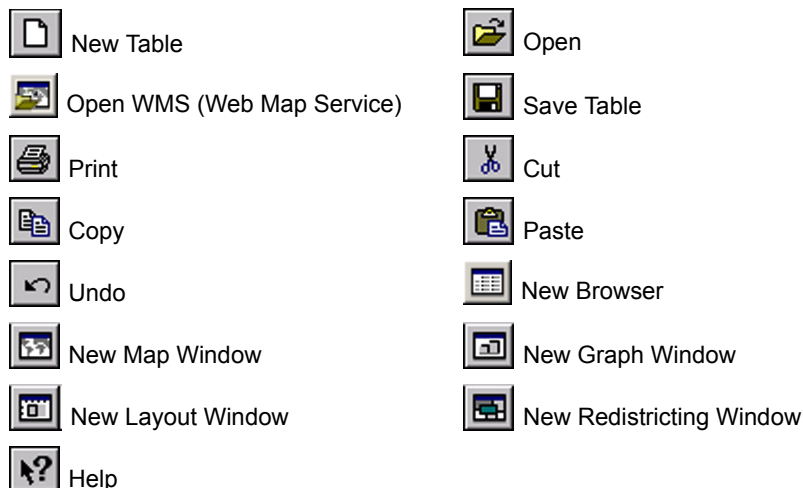
1. On the **OPTIONS** menu, click **TOOLBARS**, and in the Toolbar Options dialog box.
2. Do one of the following:
 - Select the **FLOATING** check box for each toolbar that you want to have float and be able to move around.
 - Clear the **FLOATING** check box for each toolbar you want to dock.

Note: To display or hide the toolbars, select or clear the **SHOW** check box. You can also choose whether you want to display color buttons or larger buttons for each toolbar.

3. Choose **SAVE AS DEFAULT** to save your arrangement. To remove a toolbar from the screen, click its control box.


















Reviewing the Standard Toolbar








The Standard toolbar contains tools for commonly performed menu functions from the File, Edit, and Window menus. It also contains tools for quick access to a new Redistricting window and online Help. Many of these tools are familiar to you from working with Microsoft Windows.



Reviewing the Main Toolbar

The Main toolbar contains tools to select objects, change the view of the Map window, get information about an object, and show distances between objects. It also contains command buttons that allow you to change layer attributes and open a legend or statistics window.










	Change View *	Accesses the Change View dialog box so you can specify settings for Map window width, map scale, resizing, and centering.
	Grabber *	Accesses the Grabber tool so you can reposition a map or layout within its window.
	Info tool *	Accesses the Info tool so you can view the tabular data that is associated with a map object.
	Label	Accesses the Label tool so you can label objects with information from the related database.
	HotLink	Accesses the HotLink tool, so you can launch active objects such as files or URLs from your Map window.
	Layer Control	Accesses the Layer Control dialog box so you can specify how the various tables in a Map window are layered and displayed.
	Legend	Accesses the Legend window for maps or graphs.
	Marquee Select	Accesses the Marquee Select tool so you can select and search for map objects within a given rectangle (marquee box).
	Boundary Select	Accesses the Boundary Select tool so you can select and search for map objects within a given region.
	Polygon Select	Accesses the Polygon Select tool so you can select objects within a polygon that you draw.
	Unselect All	Accesses the Unselect All tool so you can clear all of your object and record selections. Performs the same operation as the Unselect All command.
	Invert Selection	Selects all objects or records not included in the current selection, and cancels the current selection.
	Graph Select	Accesses the Graph Select tool. As you click graph objects, such as a riser bar, pie slice, column, etc., the tool selects the corresponding records from the table.
	Radius Select	Accesses the Radius Select tool so you can select and search for map objects within a circular region.
	Ruler	Accesses the Ruler tool to determine the distance between two points and the length of some path.
	Select	Accesses the Select tool to select objects/records in a Map, Layout, or Browser window. Also acts as the default pointer/cursor tool.
	Assign Selected Objects	Assigns selected objects to the target district during a Redistricting session.








	Set Target District from Map	Sets the target district from the map during a Redistricting session.
	Statistics	Accesses the Statistics window to tally the sum and average of all numeric fields for the currently chosen objects or records.
	Zoom-in *	Accesses the Zoom-in tool to get a closer area view of a map or layout.
	Zoom-out *	Accesses the Zoom-out tool so you can get a wider area view of a map or layout.
	Drag Map Window *	Accesses the Drag Map Window button to drag an MapInfo Professional map into an OLE container application.
	Clip Region On/Off	Redisplays the entire map.
	Set Clip Region	Isolates a map region for display.

* These tools are also available when you access your MapInfo map within a container application such as MS Word, PowerPoint, etc.

Reviewing the Drawing Toolbar







The Drawing toolbar contains tools and commands that are used to create and edit map objects. For more about how to use these buttons, see [Using the Drawing Tools in Chapter 7 on page 253](#).

	Add Node	Accesses the Add Node tool, which allows you to add a node to regions, lines, or polylines when you are in Reshape mode.
	Arc	Accesses the Arc tool, which allows you to draw an arc the size and shape of one quarter of an ellipse.
	Ellipse	Accesses the Ellipse tool, which allows you to create elliptical and circular objects.
	Frame	Accesses the Frame tool, which allows you to create frames in the Layout window to display maps, graphs, browsers, and legends.
	Line	Accesses the Line tool, which allows you to draw straight lines.
	Line Style	Accesses the Line Style dialog box where you can change the style, color, and width of line objects.
	Polygon	Accesses the Polygon tool, which allows you to draw polygons (a closed, connected sequence of lines).
	Polyline	Accesses the Polyline tool, which allows you to draw polylines (an open, connected sequence of lines).
	Rectangle	Accesses the Rectangle tool, which allows you to draw rectangles and squares.

	Region Style	Accesses the Region Style dialog box where you can change the fill pattern, color, and background, plus the border style, color, and width of region objects.
	Reshape	Toggles in and out of Reshape mode. Reshape allows you to edit regions, polylines, lines, arcs, and points by moving, adding, and deleting nodes that define them.
	Rounded Rectangle	Accesses the Rounded Rectangle tool, which allows you to draw rounded rectangles and squares.
	Symbol	Accesses the Symbol tool, which allows you to place point symbols on your map like "push pins."
	Symbol Style	Accesses the Symbol Style dialog box where you can change the style, color, and size of a symbol object.
	Text	Accesses the Text tool, which allows you to add titles, labels, and annotation to maps and layouts.
	Text Style	Accesses the Text Style dialog box where you can change the font typeface, size, style, color, and background of text objects.

DBMS Toolbar

The DBMS Toolbar contains tools and commands that are used to access tables residing on a remote database. These tools are only available if you have installed a relational database manager.

	Open DBMS Table	Accesses the Open dialog box, which allows you to access a remote database. If a connection has not previously been established, you will be prompted to open a connection. This button is also found in the Open dialog box if DBMS is installed.
	Make DBMS Table Mappable	Accesses the Make DBMS Table Mappable dialog box, which allows you make a table linked to a remote database mappable in MapInfo Professional.
	Refresh DBMS Table	Accesses the Refresh DBMS Table dialog box, which allows you to refresh an MapInfo Professional linked table with the most recent data residing on the remote database for that linked table.
	Unlink DBMS Table	Accesses the Unlink DBMS Table dialog box, which allows you to unlink a downloaded table from its remote database.
	Change Symbol for a Mappable DBMS Table	Accesses the Change Symbol for a Mappable DBMS Table dialog box, and allows you to change the symbol style of a mappable DBMS table.
	DBMS Disconnect	Accesses the Close DBMS Disconnection dialog box, where you can close a connection to a remote database.

Using Workspaces

A workspace is a list of all the tables, windows, and settings you are using, stored in a file with the extension .WOR. Workspaces are a convenient way to return to a previously created map without having to open each table file individually. The workspace keeps track of the following elements:

- Map, Browser, Graph, 3DMap, and Layout windows, including their size and position on the screen
- Query tables created from base tables using either the Select or SQL Select statements (queries on queries will not be saved)
- Graphs
- Thematic maps
- Legend windows
- Cosmetic objects
- Labels
- Styles for fonts, symbols, lines, and fill patterns used to display objects

To view the contents in the workspace file, open the .WOR file in MapInfo Professional, a text editor or word processor.

Note: When you save a workspace, you cannot save any references to selections or queries made by the Selection tools or the Query options.

You can use the Workspace Packager tool to create a copy of your current workspace in a new folder, and copy all the data referenced by the workspace in the same folder. Using this tool, the workspace looks to these internal references to find the data and .tab file, so you can open this workspace no matter where you have moved or copied that folder, even if you move it to a different computer. You can access this tool by looking for it in the list in the Tool Manager (on the **TOOLS** menu, click **TOOL MANAGER**).

How Renaming Tables Affects Workspaces

When you change the name of a table that is listed in a workspace, you invalidate that workspace. Table names are stored in the workspace file. If you change the name of the table, the workspace cannot find it.

For example, you might create a workspace called CUSTOMER.WOR which contains the STATES table. If you later rename the STATES table to AMERICA, MapInfo Professional will not be able to open the customer.wor workspace. It will try to open the STATES table and not be able to locate it.

There are two ways to avoid this problem:

- Make any table name changes before you start to build workspaces.
- Open the workspace file in any text editor and manually change the table names.
- Open a workspace. Rename the table(s) using the Rename Table dialog box and immediately save the workspace.

MapInfo Professional v. 6.0.0.32 and later places an “interactive” clause after each open table statement to prompt you for the file location if the table is not found in the original workspace path.

Saving Printer Information to a Workspace

MapInfo Professional enables you to save your printer information to a workspace, and restore printer information from a workspace. These settings are located in the Startup preferences (on the **OPTIONS** menu, point to **PREFERENCES**, and click **STARTUP**). To save printer information to a workspace, check the **SAVE PRINTER INFORMATION TO WORKSPACES** check box. Subsequently, when you save your workspace, the printer name, paper orientation, paper size, and the number of copies are saved. When this preference is on, the workspace is written as a version 6.0 or later workspace.

Note: We recommend that you leave this preference on. However, if you will be sharing workspaces with other users, particularly if they are using earlier versions of MapInfo Professional, you may want to leave the preference turned off.

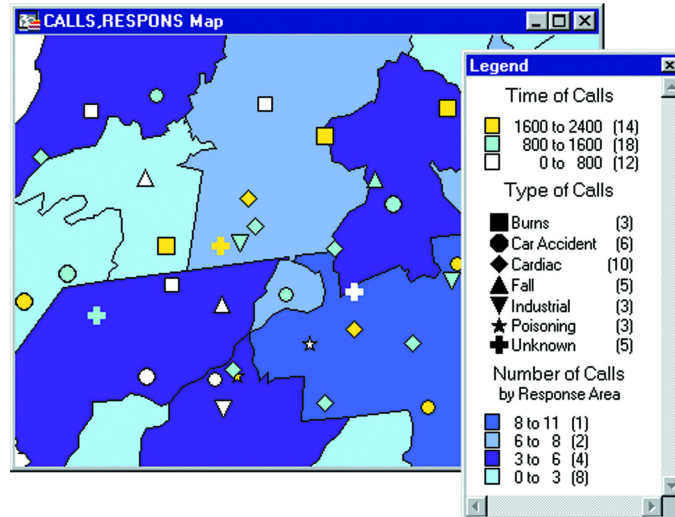
To restore printer information from a workspace, check the **RESTORE PRINTER INFORMATION TO WORKSPACES** box. When you open the workspace, the printer name, paper orientation, paper size, and the number of copies are restored. This is useful if you are sharing workspaces with other MapInfo Professional 6.0 or later users who are also using the same printers. You may want to leave it off if you want to send the workspace to someone who is using a different printer. If this preference is turned off, MapInfo Professional uses the default printer selected in the Printer preferences.

Note: You can get additional printer advice in the MapInfo Professional *Printing Guide* on the installation CD.

Data - Where MapInfo Professional Begins

To use MapInfo Professional, you need to match the files that contain your information (*data*) and maps that come from MapInfo Professional or that you create yourself. MapInfo Professional organizes all its information, whether textual or graphic, in the form of tables; each table is a group of MapInfo Professional files that constitute either a map file or a database file.

Emergency medical calls thematically shaded by type of call and time of call, with response zones shaded by number of calls.



Everything you do in MapInfo Professional begins when you open one or more tables, whether they are maps or data from a database.

What Is a Database and Other Basic Terminology

A *database* is a collection of information organized so that it can be readily accessed using a computer. Databases in MapInfo Professional are often referred to as tables.

To understand MapInfo Professional, you need a basic understanding of database organization, in particular, three fundamental concepts: *record*, *field*, *index*, and *query*.

LastName	FirstName	Address	ZIPCode
Fraser	Mark	212 Hudson St	12205
Donaldson	Eva	459 Yates St	12208
Espinosa	Kim	200 Broadway	12180
Smith	Charles	1 Redbird Ln	12065
Chang	Elizabeth	53 Crescent Rd	12077

To understand the database concepts we are about to discuss, consider the table above.

Each row in the list contains information about one person. In database terms, each row is a *record*. Each different box of information (Last Name, First Name, etc.) within a record is called a *field*. Fields correspond to the columns so that the table shown above contains four different fields.

Database fields are ordered (first, second, third, fourth, etc.), and the basic convention is that the first field displays as the first column in the database. The second field is in the column to the right of the first, and so on to the last field, which is displayed in the rightmost column.

Since the data in a database isn't usually in alphabetical order or postal code order or any other pattern which would make it easy for the computer to find the information, the computer needs a way to organize the information. A database uses an *index* to keep track of what information is where and what record it is tied to. Without indices it would be tedious to find anything in a database with hundreds of records, not to mention databases with thousands and tens of thousands of records.

A database index works on the same principle as a book index. A book index is an alphabetical list of topics that appear in the book and the page number or address of the information. Database indices work in a similar way, except that they generally work behind the scenes. You don't ever see them. But the computer constructs them and allows you to use them in your work. An index allows the computer to work with the records according to the order of items in the key field.

MapInfo Professional requires fields to be indexed in order to use the Find command. Indices are also used to improve performance in SQL Select and joins.

A *query* is just another word for a question. You query data to collect a particular type information from your database. For example, if you wanted to know how many customers live within a certain number of miles of your store, (and you had that kind of information in your database), you could query the database to find out that information. The result of the query is *query data*. You can think of query data as a subset of your data as in the example — a list of all the customers within 5 miles and none of the customers who live further away. MapInfo Professional has tools to help you query your data and display it on a map. For more about querying your data, see [Selecting and Using Queries in Chapter 8 on page 283](#).

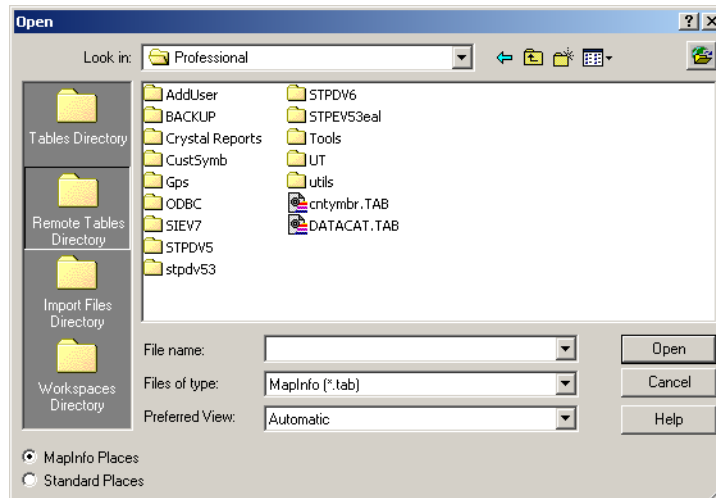
Opening Tables and Files

To work with the data in your database, you must first open the file or table that contains the data.

To open a local table:

1. On the **FILE** menu, click **OPEN**. The Open dialog box displays.

Note: If you are at the Quick Start dialog box (the first dialog box you see after starting MapInfo Professional), choose the **OPEN** button. The Open dialog box displays.



2. Navigate to the data file you want to open. Use the Files of type drop down to select the type appropriate for your data.
3. Select the view you want of this data from the Preferred View drop-down list. For more information about the Preferred View options, see [A Note about the Preferred View Options on page 110](#).
 - **AUTOMATIC** – MapInfo Professional chooses the most appropriate view. If the data is mappable (i.e., graphic objects are attached to the data), for example, MapInfo Professional opens the table in a Map window. If you have a Map window displayed and the table you want to open is mappable, MapInfo Professional will automatically open the table in the current Map window. If the data is not mappable, MapInfo Professional will attempt to open the table in a Browser window. If the table cannot be mapped or browsed, MapInfo Professional opens the table using the No View option (no data is displayed).
 - **BROWSER** – MapInfo Professional attempts to open the table in a Browser window.
 - **CURRENT MAPPER** – MapInfo Professional attempts to add your data to the current Map window.
 - **NEW MAPPER** – MapInfo Professional attempts to open the table in a new Map window.
 - **NO VIEW** – MapInfo Professional opens the table, but no data is displayed.
4. To open the file, do one of the following:
 - Double click the file you want to open
 - Click the file you want to open to highlight it in the list and click **OPEN**.

Using either method, MapInfo Professional opens the data file.

Note that although an MapInfo Professional table consists of two or more component files (STATES.tab, STATES.DAT, STATES.MAP etc.), only the .tab file appears in the File Name box of the Open dialog box. It is the only component file you must open. For more about these other MapInfo file types, see [Understanding the Files Associated with MapInfo Professional Tables on page 112](#).

In MapInfo Professional you can work with a variety of table types. Some data tables are like the example table we just discussed. Further subdividing this class of tables are data tables that contain graphic objects (map objects) and data tables that do not (such as spreadsheets or external database tables).

Raster tables are graphic images that you can display in a Map window. These computerized pictures do not have the same table structure of record, field, and index as data tables do, and therefore, will not be discussed in this chapter. For more on raster images, see [Registering Raster Images in Chapter 13 on page 454](#).

You can see what windows are currently open by reviewing the list at the bottom of the Window Menu. If one of these “More Windows” windows is the active window, the check box displays beside the More Windows entry. To make another window active, click the entry in the Window list. The window you selected comes to the forefront of the MapInfo Professional screen. When you select the More Windows entry, the Select Window dialog box displays. To activate a window from this list, either double-click the entry in the Select Window list, or click the entry and click **OK**.

A Note about the Preferred View Options

Of the five Preferred View options, Automatic and No View will work on all tables, regardless of what kind of data they contain. MapInfo Professional attempts to open the table as specified for Browser, Current Mapper, and New Mapper. If it cannot, it will open the table according to the following rules:

- If Current Mapper is selected, and there is no Map window displayed, MapInfo Professional will attempt to open the table in a new Map window.
- If Current Mapper or New Mapper is selected and the data is not mappable, MapInfo Professional will try to open the table in a Browser window.
- If the table cannot be mapped or browsed, MapInfo Professional will open the table using the No View option (no data is displayed).

Opening Data in Remote Tables

MapInfo Professional also enables you to access remote database data through its ODBC connectivity support and the Oracle Spatial Object support. The MapInfo Professional ODBC connectivity support supplies many ODBC drivers that you can easily install. Oracle spatial databases enable you to store spatial objects with your conventional data in the same database. This enables you to read and write geographies in Oracle Spatial without the need for a middleware product such as MapInfo Professional’s SpatialWare, or SDE. You also gain better performance through the Oracle Call Interface (OCI). In addition, Oracle applications can use this same spatial or non-spatial data through other interfaces (ODBC, OCI, JDBC, PL/SQL, HTTP, IIOP, etc.) or use other spatial or non-spatial tools (MapInfo Professional, ArcView, Intergraph, Excel, Forte, Formida, etc.). For more about accessing remote data using ODBC connectivity, see [Setting your Database Connection Preferences in Chapter 2 on page 73](#).

What Data Can I Use in MapInfo Professional?

MapInfo Professional allows you to use data that was created in other file formats. When you bring data into MapInfo Professional for the first time, you need to specify its format. For example, if your data is in Delimited ASCII format, choose Delimited ASCII from the File Format drop-down list.

Data file choices include:

- Microsoft Access
- Microsoft Excel
- dBASE DBF

- ESRI® Shapefiles
- Raster Image
- Grid Images
- ASCII Delimited Text
- Lotus 1–2–3
- Remote Databases (Oracle, Informix, SQL Server, etc.)
- Workspace

When you choose a particular file format, the File Name box will only list files that have the appropriate extension. For example, if you choose dBASE DBF from the File Format drop-down list, MapInfo Professional will only list files that are in dBASE format.

When you choose a file other than a MapInfo-formatted file type, MapInfo Professional creates a table structure for that data based on the type of file that it is.

Note: During the .tab file creation process, the original file is in no way altered. The file retains its original properties.

When you open that table in future work sessions, MapInfo Professional will treat these files as if they were in MapInfo Professional's native format. The next time you want to open the table, you should choose the .tab format for the table. If you accidentally attempt to open the file again with its original file format, MapInfo Professional prompts you with the message:

```
Table definition already exists. Overwrite it?
```

This message displays because MapInfo Professional has already created a table for that file. To use the file you have already created, press **CANCEL** and open the associated .tab file.

Also keep in mind that MapInfo Professional supports long filenames and UNC paths. The UNC paths allow you to access your data without having to remember your drive mappings from one session to another.

To display your table in the Map window, your data must contain X and Y coordinates. If it doesn't already, you can add them using MapInfo Professional. Assigning these coordinates is called geocoding. More about geocoding follows later in this chapter and in **Chapter 4: Putting Your Data on the Map**.

Support for Raster Images

MapInfo Professional supports raster image display. Raster images are computerized pictures. These graphic images can be used as backgrounds for maps you create in MapInfo Professional and can serve as a reference for your displayed data.

When you bring in a raster image to MapInfo Professional, you may need to register it (specify its map coordinates) so MapInfo Professional can display it properly. Choosing the Raster Image file format from the Open dialog box will bring you to the Image Registration dialog box where you can specify the appropriate map coordinates. Once you register the image, a process that creates a .tab file for the image, you can open it as you would open any table in a Map window. Images that you purchase from MapInfo Professional will already be registered.

If a raster image is georeferenced it will be automatically opened. If a raster image has an associated world file, you will be prompted to choose the projection. If you open a raster image that does not have any georeferencing data, you will be prompted to display or register the image.

For a full discussion of raster image display, see [Registering SPOT Images in Appendix C on page 592](#).

Understanding the Files Associated with MapInfo Professional Tables

When you open your data file, MapInfo Professional creates a table. This table consists of at least two separate files. The first file contains the structure of the data. The second file contains the raw data. All MapInfo Professional tables have the following two files:

- `<SOMEFILE>.tab`: This file describes the structure of your table. It is a small text file describing the format of the file containing your data.
- `<SOMEFILE>.DAT` or `<SOMEFILE>.WKS`, `.DBF`, `.XLS`: These files contain your tabular data. If you are working with a dBASE/FoxBASE, delimited ASCII, Lotus 1–2–3, Microsoft Excel, or Microsoft Access file, your MapInfo Professional table will consist of a `.tab` file and your data or spreadsheet file. For raster tables, the equivalent extension might be `BMP`, `TIF`, or `GIF`.

Your data may also contain graphic objects. Once you assign X and Y coordinates to your data records, your table will also contain graphic objects. In [Geocoding - Assigning Coordinates to Records on page 162](#), you will learn how to assign X and Y coordinates to your data records so you can display them on a map. If you already have graphic objects in your table, there are two more files associated with the table:

- `<SOMEFILE>.MAP`: This file describes the graphic objects.
- `<SOMEFILE>.ID`: This file is a cross reference file that links the data with the objects.

For a Microsoft Access table, there will be a file `SOMEFILE.AID` associated with the table instead of `SOMEFILE.ID`. This file is a cross reference file that links the data with the objects for a Microsoft Access table.

Your table may also include an index file. The index file allows you to search for map objects using the Find command. If you want to locate an address, city, or state using the Find command, those fields must be indexed in your table. The index is located in:

- `<SOMEFILE>.IND`

Opening Your Data in MapInfo Professional

You can open your Excel (`.XLS`), dBase (`.DBF`), Microsoft Access (`.MDB`), and ASCII (`.TXT`) in MapInfo Pro and display that data on a map. There are three steps to accomplishing this:

1. Creating a copy of your data in MapInfo format.
2. Creating points on a map using either coordinates in your data or by matching your data to a search file (see [When Do I Geocode vs. Create Points? in Chapter 4 on page 149](#) for this process).
3. Display your data on the map (see [Displaying Your Data on the Map in Chapter 4 on page 198](#) to complete this process).

If you are accessing your data remotely or use SpatialWare or other ODBC supported database product, see [Working with Remote Tables and Databases in Chapter 6 on page 225](#) and [Working with the MapBasic Window in Chapter 15 on page 553](#) for additional support.

For more information about converting, displaying, and printing your data, see [Enhancing Your Data in Chapter 5 on page 208](#).

Opening MapInfo Professional Sample Data

MapInfo supplies sample maps and refining data that you can use to plot your own information.

To access and open the sample data:

1. On the **FILE** menu, click **OPEN** to display the Open dialog box.
2. Navigate to your data directory and double click the **DATA** folder in the list.
3. To open the data file, do one of the following:
 - Double click the directory that contains the data you want until you see a list of .tab files.
 - Select the .tab file you want to open and click **OPEN** to display it.Using either method the data file opens.

We recommend that you play with this data when you first get started to get a feel for what data is in these directories and to become familiar with the process.

Opening Special File Types

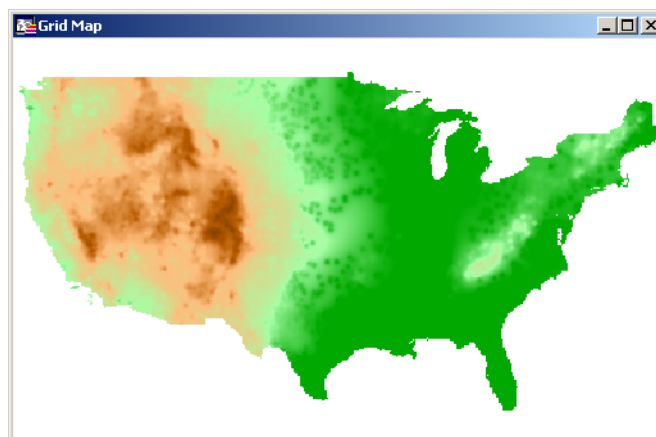
There are additional file types that MapInfo Professional can read including rasters, grids, shape files. For details about working with raster images, see [Displaying a Raster Image on page 131](#) and [Registering the Coordinates of a Raster Image in Chapter 13 on page 459](#).

Opening a Grid Layer

A grid layer is a type of thematic map that displays data as continuous color gradations across the map. To produce this type of thematic map, you interpolate point data from the source table. In MapInfo Professional, a grid file from the data interpolation is generated and is displays as a raster image in a Map window.

To open a grid layer:

1. On the **FILE** menu, click **OPEN** to display the Open dialog box.
2. Select **GRID IMAGE** in the Files of type drop-down list.
3. Navigate to the directory in which your grid image is located and click the file you want to open.
4. Click **OPEN** to display the grid image.

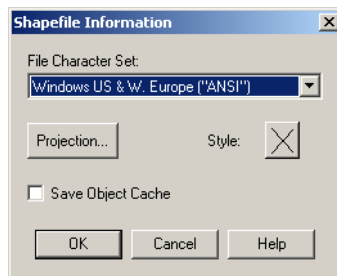


Opening an ESRI Shapefile

One of the prominent graphical formats in our industry is the ESRI Shapefile.

To open a shapefile in MapInfo Professional:

1. On the **FILE** menu, click **OPEN** to display the Open dialog box.
2. Select **ESRI (R) SHAPEFILE** in the Files of type drop-down list.
3. Navigate to the directory in which your image is located and click the file you want to open.
4. Click **OPEN** to display the Please specify a TAB filename file. This dialog box saves the shape file into a format that MapInfo Professional can read. The file has the same name as the file you selected but has a .tab extension.
5. Click **SAVE** to save the file with the new name. MapInfo Professional displays the Shapefile Information dialog box.



6. Complete the entries in this dialog box and click **OK** to display the shapefile.

File Character Set

Select the character set appropriate for this file. The default option is **WINDOWS U.S. & WESTERN EUROPE (ANSI)**, but make your selection based on your local settings.

Projection

Select the appropriate projection for this file by clicking this button, selecting the category and projection and clicking **OK**.

Style

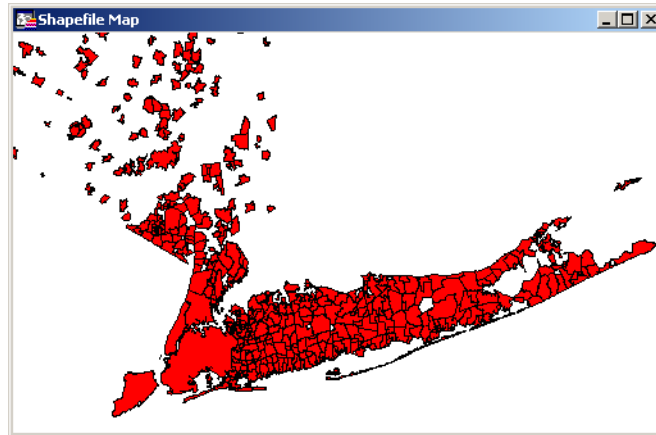
Select any line or region style overrides that are necessary for this image by clicking the **STYLE** button. When you select this option, the appropriate style options dialog box displays. Make your changes and click **OK** to save them.

Save Object Cache

Select this check box to save the *.MAP file to hard drive. If you choose not to save the object cache, you will have to recreate the *.MAP file the next time you open the Shapefile file.

However, if you are going to save the shapefile as a *.tab file, you do not have to select the check box.

Note: If after you open the Shapefile in MapInfo Professional, you edit the file in ESRI ArcView and save the file, the contents of the *.MAP and *.DAT files are recreated to retain these edits even if you selected **SAVE OBJECT CACHE** before.



Reviewing the Windows in MapInfo Professional

MapInfo Professional allows you to display your data in many different windows and with different views at the same time. For instance, you can display the WORLD table of country boundaries in a Map window to view the geographic boundaries. At the same time you can display the tabular data of the WORLD table in a Browser window to see the country names, population, and other data in the file. If you make a change in either window, it is reflected in the other.

Only one view can be active at a time. To make a different window active, click its title bar. Notice that the menu bar changes depending on which window is active. For instance, when you are working in a Map window when you also have a Browser open, only the Map menu is available on the menu bar. Make the Browser active. The Browse menu replaces the Map menu.

There are many different types of windows you can display your data in, depending upon what you need your data to communicate. This section covers the many ways you can display your data using MapInfo Pro. Each of these display methods: map, list, graph, and presentation give your information a different impact. How you display the information you have should depend upon what effect you want. Consider these options carefully before you select a display type.

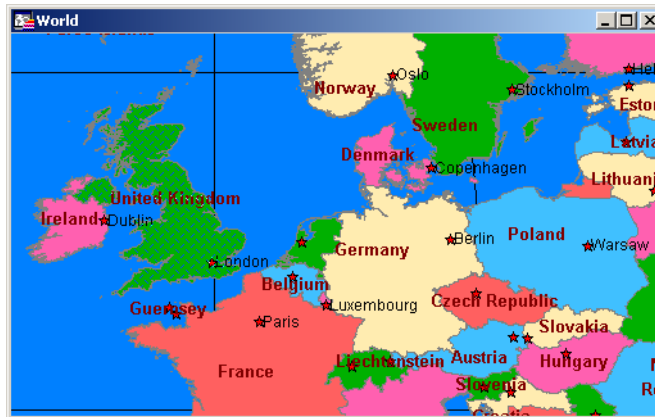
- **Map windows** present information arranged as conventional maps, allowing you to visualize the geographic patterns of your data.
- **Browser windows** present information as tabular lists (just as conventional databases do), allowing you to fully examine tabular data.
- **Graph windows** present information arranged as graphs, allowing you to visualize and make comparisons of the purely numerical patterns.
- **Layout windows** present information in a polished and attractive way and can be embedded in other applications such as Microsoft Word or PowerPoint.

Displaying Data in a Map Window

You use Map windows to display the geographic objects from your table on a map. Map windows can display information from many tables at once, with each table a separate layer.

Opening a Table in a Map Window

You can create your maps or edit existing maps. You can open a Map window directly on the **FILE** menu, by clicking **OPEN** or by selecting **NEW MAP WINDOW** from the **WINDOW MENU**.



Getting Around in the Map Window

There are a wide variety of tools that allow you to zoom, pan, and move objects around the Map window. Zooming allows you to look more closely or more widely at a particular geography. Panning allows you to move around a map left, right, up, and down. Moving selected objects in an editable layer is useful when you want to get your map right.

You can zoom using the mouse wheel or using the keyboard. For more about zooming using the mouse wheel, see [Using the Microsoft IntelliMouse™ to Move Around the Windows \(7.8\) in Chapter 2 on page 79](#).

In addition to the usual zoom keys on your Main Toolbar (🔍, 🔍, and 🔍), you can use the **+** and **-** keys on the keyboard, to zoom in and out more precisely.

- When you press **+**, you zoom in by a factor of 2.
- When you press **-**, you zoom out by a factor of .5.

You can pan in your Map window using the scroll bars or the **ARROW** keys **UP**, **DOWN**, **LEFT**, and **RIGHT**.

Further, you can move an object in an editable layer more precisely by selecting it and using the following key combinations.

- **<CTRL + ARROW>** - moves the editable, selected objects 1 pixel at a time
- **<CTRL + SHIFT ARROW>** - moves the editable, selected objects 10 pixels at a time

Note: These tools also apply to the Layout window.

Displaying Data in a Browser Window

You use Browser windows to view and manipulate your data records in traditional row and column form, typically used in spreadsheets and databases. Each column contains information about that particular field, such as name, address, phone number, cable ID number, or order amount. Each row contains all information relating to a single record.

Opening a Table in a Browser Window

You can edit records in your table, copy records, add new ones, or delete existing records. To open a Browser directly, on the **WINDOW MENU**, click **NEW BROWSER WINDOW**.



Country	Capital	Continent
<input checked="" type="checkbox"/> United Kingdom	London	Europe
<input type="checkbox"/> Ukraine	Kiev	Europe
<input type="checkbox"/> Burkina Faso	Ouagadougou	Africa
<input type="checkbox"/> Uruguay	Montevideo	South America
<input type="checkbox"/> Uzbekistan	Tashkent	Asia
<input type="checkbox"/> Saint Vincent and the Grenadines	Kingstown	North America
<input type="checkbox"/> Venezuela	Caracas	South America
<input type="checkbox"/> Virgin Islands, British	Road Town	North America
<input type="checkbox"/> Viet Nam	Hanoi	Asia
<input type="checkbox"/> Virgin Islands, U.S.	Charlotte Amalie	North America
<input type="checkbox"/> Namibia	Windhoek	Africa
<input type="checkbox"/> West Bank		Asia
<input type="checkbox"/> Wallis and Futuna	Mata-Utu	Oceania
<input type="checkbox"/> Western Sahara	N/A	Africa

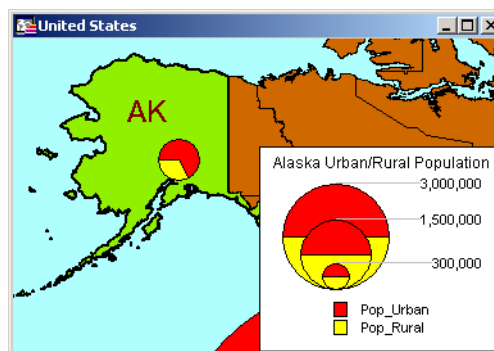
To create a report of your data, use the Crystal Reports functionality included with this version of MapInfo Professional (on the **TOOLS** menu, click **CRYSTAL REPORTS**).

Displaying Data in a Graph Window

The Graph window allows you to visualize statistical relationships in graph format. You can create many different kinds of graphs: 3D, bar, line, area, histogram, scatter, bubble, and pie graphs. You can also choose from a number of different graph templates.

Opening a Table in a Graph Window

To create a graph, on the **WINDOW** menu, click **NEW GRAPH WINDOW**. From there, you need to select the criteria you want to graph from the data in the tables. For more information about using the graph features of MapInfo Professional, see [Graphing Your Data in Chapter 11 on page 388](#).



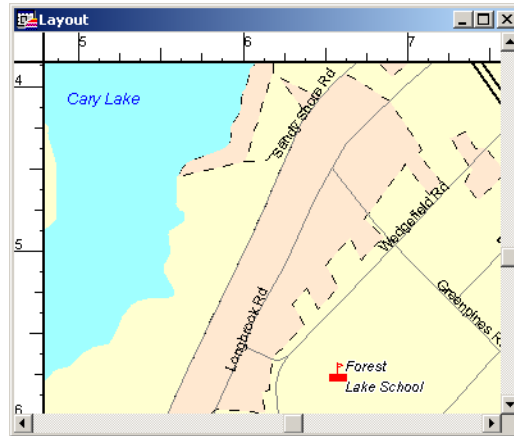
Displaying Data in a Layout Window

The Layout window allows you to combine Browsers, Map windows, Graph windows, and other graphic objects into one layout which can then be sent to a printer or plotter. You use this type of window to create presentation graphics.

Opening a Map in a Layout Window

To use a Layout window, on the **WINDOW** menu, click **NEW LAYOUT WINDOW**.

Note: MapInfo Professional has some excellent tools to assist you in moving around the Layout window. See [Getting Around in the Map Window on page 116](#) for these details.



Other Windows for Displaying Data

There are two other ways of displaying data that are used less often or can be used in conjunction with display options we have already reviewed.

- *Legend Windows* are the key boxes at the bottom of the map that explain what the map symbols mean. There are two different kinds of legend windows:
 - a. The *Theme Legend* window is automatically created and details the meaning of colors, symbols and styles on a thematic map. Display or hide this legend in the **OPTIONS** menu, by clicking the **SHOW/HIDE THEME LEGEND WINDOW** menu option.
 - b. The *Cartographic Legend* displays legend frames for any map layer, not just thematic map layers. The legend window displays the legend, or key, to the cartographic data on your map.

The legend frames can all be in one window, or can be split among several legend windows for the same map. Therefore, each map can have one or more cartographic legend windows containing the frames of your choice. Additionally, you can customize the text and style of the information presented. Modifications to the legend can be made through shortcut menus you access by right-clicking in the legend window or through the Legend menu. You can learn more about legends in [Working with Legends in Chapter 9 on page 335](#).

- *Redistricting Windows* allow you to create groupings of spatial information. This is a little more complex than these other options. For more information about redistricting windows, see [Redistricting — Grouping Map Objects into Districts in Chapter 15 on page 518](#).

Understanding Layers and Objects

Computer maps are organized into layers. Think of the layers as transparencies that are stacked on top of one another. Each layer contains different aspects of the whole map.

What is a Layer?

In MapInfo Professional you begin by opening your table of data and displaying it in a Map window. Each table displays as a separate layer. Each layer contains the table plus any map objects, such as regions, points, lines, and text. Additionally, the layer contains style overrides and zoom layering characteristics that you can add to give the layer more or less prominence in the Map window.

For example, one layer may contain state boundaries, a second layer may have symbols that represent capitals, a third layer might consist of text labels. By stacking these layers one on top of the other, you begin to build a complete map. You can display one, two, or many tables at a time.



Map layers form the building blocks of maps in MapInfo Professional. Once you have created your map of layers, you can customize the layers in a variety of ways, add and delete layers, or reorder them.

Map Objects as Part of Layers

We mentioned earlier that maps in MapInfo Professional are made up of layers of map objects. There are five basic types of objects:

- *Regions*: closed objects that cover a given area. These include polygons, ellipses, and rectangles. For example, country boundaries, postal code boundaries, sales territories.
- *Point objects*: represent single locations of data. For example, customer locations, restaurants, parking meters. Points can also be combined into multipoint objects.
- *Line objects*: open objects that cover a given distance. These include lines, polylines, and arcs. Examples are streets, rivers, power lines.
- *Text objects*: text that describes a map or another object, such as labels and titles.
- *Collection objects*: combination of region, line, and multipoint objects.

You can have each type of object in a separate layer (most common), or you can combine objects in the same layer. MapInfo Professional lets you create, edit, customize, and display these objects to make maps that meet your needs.

For information about drawing and editing map objects, see [Drawing and Editing Objects in Chapter 7 on page 252](#).


Managing a Map's Layers

The key to controlling your map layers is the Layer Control dialog box. The dialog box shows all the layers that make up the current Map window and the status of the layer attributes. These attributes are: visible, editable, selectable, and auto label. The icons above each check box column represent the attributes. ToolTips display over the attribute icons when you move your cursor over them to help familiarize yourself with each icon. It is easy to change a layer's, or multiple layers', attributes using the check boxes.

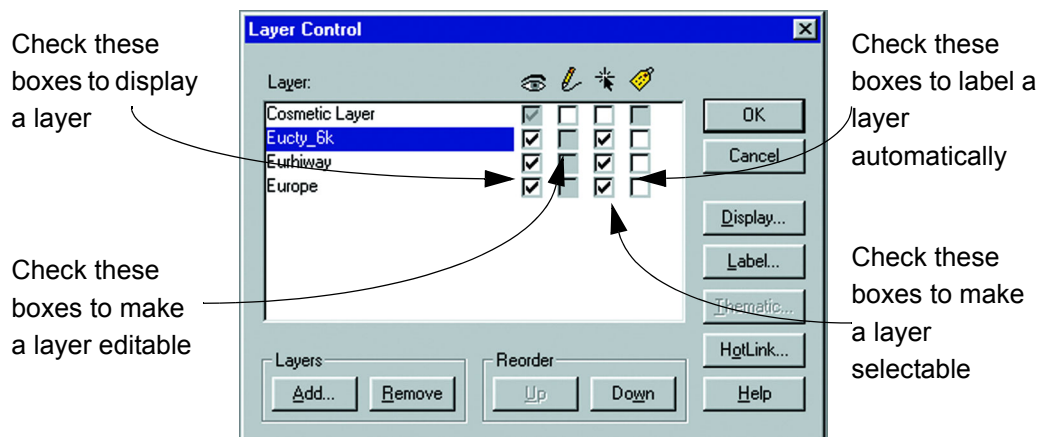
You also have options available to change the Display and Label settings; modify any thematic maps you have displayed; and reorder, add, or remove layers.

Accessing Layer Control

To access the Layer Control dialog box:

- In the Map window, do one of the following:
 - On the **MAP** menu, click **LAYER CONTROL**
 - Click **LAYER CONTROL**  in the Main toolbar.

Layer Control enables you to manipulate the layers and their attributes to control the map display.



- When you have completed your selections and changes, click **OK** to display the changes on the map.


Reordering Layers

Map layers display in the order that they are listed in the Layer Control dialog box, with the bottom layer drawn first and the top layer (which is always the Cosmetic Layer) drawn last. It is important to order your layers correctly.

For example, you have a layer of customer points and a layer of census tracts. If the layers are incorrectly ordered in the Map window, MapInfo Professional might draw the customer points first and then display the census tract layer second. Your points would be obscured by the census tract layer.

You can reorder how layers are displayed in a Map window two ways.

To reorder the layers in a map:

1. Click  in the Main toolbar to display the Layer Control dialog box.
2. Do one of the following:
 - Select the layer or layers you want to reorder and use the **UP** and **DOWN REORDER** buttons to position the layer(s) where you want them.
 - Click the layer or layers and drag it (or them) to the new position. When you use the click and drag method, the cursor changes and as you move the cursor, a marker displays indicating the layer's new position.
If you cannot move a layer to a particular position (e.g., attempting to move a layer above the Cosmetic layer), the cursor changes to a circle with a slash through it to let you know that you cannot move the layer to the proposed position.
3. To display the new layer order on the Map window, click **OK**.

Layer order is also important when you use the Select tool. The Select tool selects objects from the topmost Selectable layer. If you have several objects at the same location, it is difficult to select the exact one you want. You can reorder your layers in Layer Control so that the layer you want to select from is the new topmost layer.

MapInfo Professional does not allow you to control the front-to-back ordering of objects within a single map layer. If you are editing a table, and you draw a line on top of a circle, the line might appear in front of or behind the circle; you cannot control whether it is in the front or the back. You can, however, control the front-to-back ordering of objects in a Layout window.


Note: If you need to control the ordering of objects (e.g., you need to make sure that your lines display on top of your regions), put the different object types in separate layers. Put your line objects in one table, and put your region objects in another table. Then use the Layer Control dialog box to order the layers.

Adding a Layer to the Map

You can add one layer to the current Map window at a time or use the multiselect functionality to add new layers simultaneously.

Note: You can only add layers from tables that are open. If you want to add a layer and you do not see it in the list, make sure the table that contains that layer is open.

To add a new layer to the current Map window:


1. Click  in the Main toolbar to display the Layer Control dialog box.
2. Click the **ADD** button. A list of available layers displays.
3. Select the layers you want from the list, using the **SHIFT** key to select adjacent layers and the **CONTROL** key to select nonadjacent layers.
4. Click **OK** to add the layers to the Layer list.

Drag the new layers to the appropriate position in the Layer Control list as necessary.

5. Click **OK** to display the new layers.

Removing a Layer from the Map

To remove a layer from the current Map window:


1. Click  in the Main toolbar to display the Layer Control dialog box.
2. Click the layer or layers you want to remove, using the **SHIFT** key to select adjacent layers or the **CONTROL** key to select random layers.
3. Click the **REMOVE** button. MapInfo Professional removes the layers from the list.
4. Click **OK** in the Layer Control dialog box to redisplay the Map window without the removed layers.

Display settings for each layer are available in the Display Options dialog box, discussed in the next section.

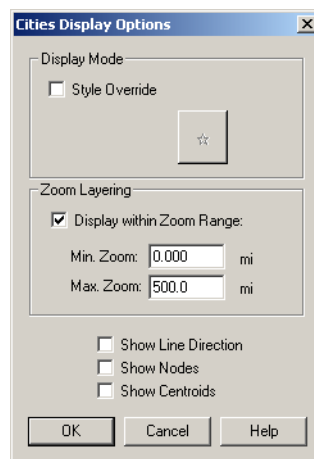
Changing a Layer's Display Options

The Display Options dialog box enables you to customize the display for each layer in a Map window. For more about changing the look of data on your layers, see [Changing a Map's Style in Chapter 12 on page 407](#).

To change the display options of a layer:

1. Click  in the Main toolbar to display the Layer Control dialog box.
2. In Layer Control, do one of the following:
 - Select a layer and click the **DISPLAY** button.
 - Double-click a layer.

Using either method, the Display Options dialog box displays.



Here, you can change the default styles for the layer, set the zoom at which a layer displays, and show line direction, object nodes and centroids.

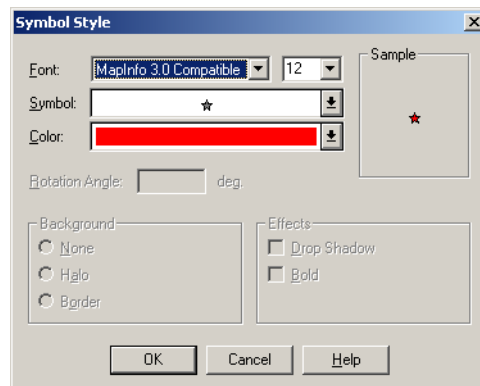
3. To make changes to the Style Override or the Zoom Layering options, select the check boxes.

The Zoom Layering options allow you to determine zoom levels at which the selected layer displays, so that the map layer displays only when the map's zoom level falls within this preset distance.

For more about zoom layering, see [Setting the Zoom Layering on page 123](#).

The Show options at the bottom of the Display Options dialog box, allow you to set the way points, lines and regions display on the current layer. See [Displaying the Lines, Nodes, and Centroids on page 124](#) for more about these options.

4. When you make style override changes, click the **STYLE** button to display these options:

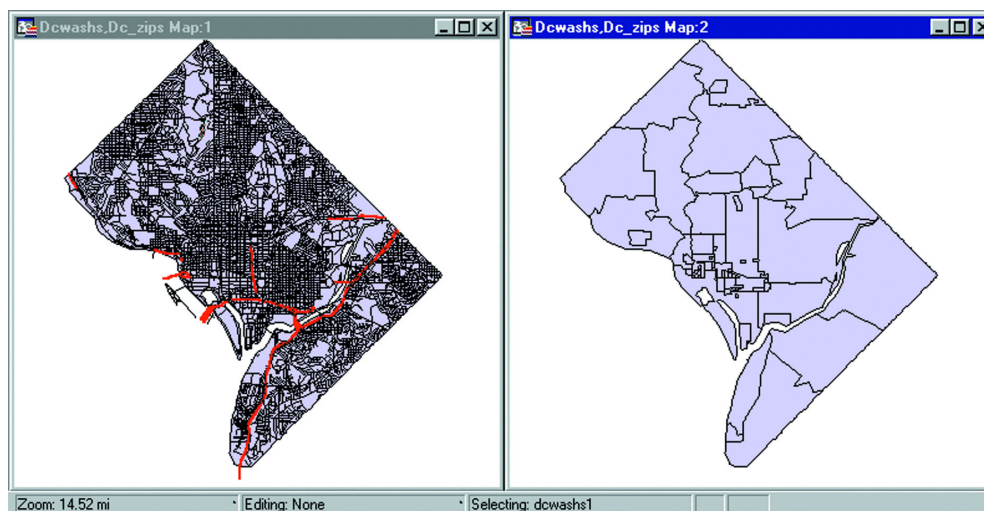


You can make changes to every aspect of the symbol styles in this layer.

5. Make your new selections in this box and click the **OK** button to return to the Display Options.
6. In the Display Options dialog box, click **OK** to return to the Layer Control dialog box.
7. Click **OK** to see your changes on the Map window.

Setting the Zoom Layering

Sometimes you want a map layer to display only at certain zoom levels. *Zoom Layering* controls the display of a map layer so that it displays only when the map's zoom level falls within a preset distance.



For example, you have a layer of streets and a layer of postal code boundaries. When you zoom out past 10 or so miles, the streets look like a black smudge in the window. This is because the zoom (window width) is too wide to show detailed street maps.

Use Zoom Layering to tell MapInfo Professional to display the street layer only when the zoom is set to a distance that allows you to see the street detail properly, for instance, less than 5 miles.

The first map doesn't have zoom layering set for its street layer. At a zoom of 15 miles across, notice how difficult it is to see any detail. The second map has zoom layering set to display the streets when the zoom is less than five miles. Therefore, the streets layer does not display when the window is set at 15 miles.

To set zoom layering:

1. Make the layer editable.
2. Open the Layer Control box and highlight the layer you want to set the zoom layering for.
3. Choose the **DISPLAY** button. The Display Options dialog box displays.
4. Click the **DISPLAY WITHIN ZOOM RANGE** box to activate the zoom distance boxes.
5. Specify a minimum and maximum distance within which you want the layer to display. Note that you cannot change Display settings for more than one layer at a time.
Note: If you have more than one layer selected, the Display, Label, and Thematic options are unavailable.
6. Click **OK** to save your settings and click **OK** again to return to the map window.

You can display different layers in the same Map window at different zoom levels. For example, you have a layer of streets, a layer of county boundaries, and a layer of state boundaries. You want the streets layer to be visible only when the zoom level is less than eight miles. You want the county boundary layer to display when the zoom level falls between 20 miles and 200 miles. You want the states boundary layer to be visible only when the zoom level is greater than 100 miles. You can set a different zoom level for every layer in your Map window.

Note: When you add an object, a region, a line or a polyline in the Map window and zoom out beyond where the zoom layer would permit you to see that feature, MapInfo Professional turns off zoom layering so you can continue to see what you are working on. When you complete the add process, a message displays asking you if you want to leave zoom layering off (so you will still be able to see the feature). If you answer **CANCEL**, MapInfo Professional cancels the zoom layering. If you answer **OK**, you need to adjust your zoom settings to see this feature again.

Displaying the Lines, Nodes, and Centroids


The Display Options dialog box also allows you to display line directions, nodes, and object centroids. Check the Show Line Direction box whenever you want to show in what direction line objects are drawn. Check the Show Nodes box to display the nodes of objects in a layer. This is helpful for many editing procedures.

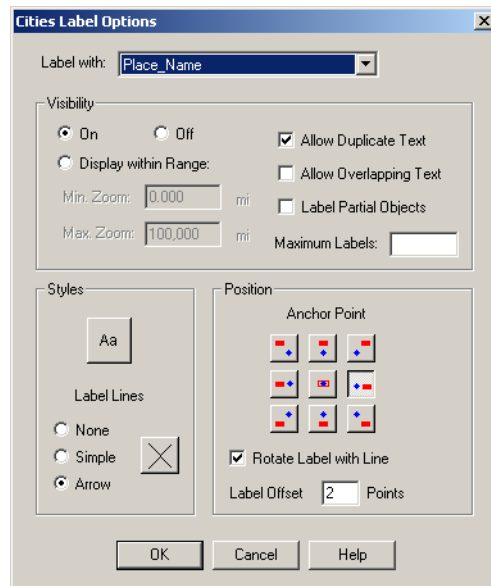
The Show Centroids box displays the centroids of each object in a layer. In MapInfo Professional, a region's centroid does not represent its center of mass. Instead, the centroid represents the location used for automatic labeling, geocoding, and placement of thematic pie and bar charts. If you edit a map in Reshape mode, you can reposition region centroids by dragging them.

Changing a Layer's Labeling Options

The Label Options dialog box enables you to customize the automatic labeling for each layer you select.

To change the label options of a layer:

1. Click  in the Main toolbar to display the Layer Control dialog box.
2. In Layer Control, select a layer and click the Label button. The Label Options dialog box displays.

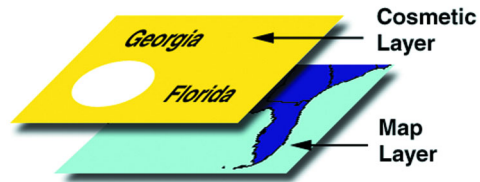


Use the options in this window to customize the labels for the selected layer on your map.

3. Make your changes in this dialog box and click **OK** to return to the Layer Control dialog box.
 - You can select a new autolabel for this layer from the Label with drop down list.
 - You can set the visibility options for the labels in this layer based on zoom criteria, and allow/disallow label duplication, label overlap, and partial labeling of objects. You can even set a maximum number of labels.
 - You can set the label styles in the Styles box.
 - You can determine the label's position relative to the object/line in the Position box.
4. In the Layer Control dialog box, click **OK** to display these label changes in the Map window.

Understanding the Cosmetic Layer

Every Map window in MapInfo Professional has a Cosmetic Layer. Think of the Cosmetic Layer as the blank transparency that lies on top of the other map layers (transparencies). It can store map titles and other graphic objects you create during a work session. The Cosmetic Layer is always the top layer of the map. You cannot remove the Cosmetic Layer, nor reorder it.



You can only make the Cosmetic Layer editable or selectable. Other Layer Control options (labeling, zoom layering, display mode) are not available for the Cosmetic Layer. To select fill patterns, line types, symbols, and text font for the Cosmetic Layer, use the Line Style, Region Style, Symbol Style and Text Style commands from the Options menu. When the Cosmetic Layer is editable, you can access the style options from the Drawing Toolbar.

The contents of the Cosmetic Layer are linked proportionally to the map. Map objects (except for symbols) and text in the Cosmetic Layer are proportionally linked to the zoom level of the map. If you draw objects in the Cosmetic Layer and then change the map's zoom from 30 to 100 miles, the size of the objects will appear smaller.

Removing Cosmetic Objects

To clear objects from the Cosmetic Layer:

- On the **MAP** menu, click **CLEAR COSMETIC LAYER**.

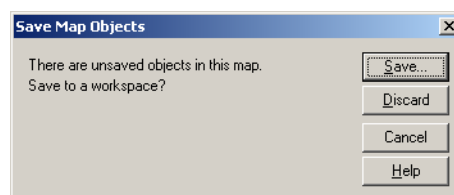
Saving Cosmetic Objects

When you close a Map window, MapInfo Professional does *not* save the objects in the Cosmetic Layer automatically. To save objects drawn on the Cosmetic Layer, you must either save the table to a workspace or to a table.

When you close a table without saving the Cosmetic objects first, MapInfo Professional prompts you with the Save Map Objects dialog box to encourage you to do so. You can turn this prompt off in Map Window Preferences.

To save the objects in the Cosmetic Layer to a table:

1. Click the **CLOSE** button in the upper right hand corner of the table. The Save Map Objects dialog box displays.

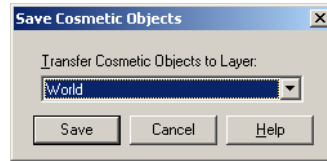


2. Click **SAVE** to display the Save Workspace dialog box.
3. Type the name of the workspace in the File name field and click **SAVE**.

You can also save the contents of the Cosmetic Layer to a table.

To save the objects in the Cosmetic Layer to a table:

1. On the **MAP** menu, click **SAVE COSMETIC OBJECTS**. The Save Cosmetic Objects dialog box displays.




2. Select the layer to which you want the objects to be transferred from the drop-down list.
3. Click **SAVE** to save the table and transfer the objects to the new layer.

Making the Layers “Editable”

To make changes to the graphic objects in a layer, you must make the layer editable. You can draw objects on that layer, add text, combine, or delete objects. You can only make one layer editable at a time.

To make a layer editable:

1. Click  in the Main toolbar to display the Layer Control dialog box.
2. Place a check in the Editable column beside the layer you want to edit.
3. Click **OK** to return to the Map window.

You can also control the editability of the layer via the Status Bar at the bottom of your screen.

To change the editable layer from the Status Bar:

1. Click the Editing box to display a list of the layers used in the Map window.



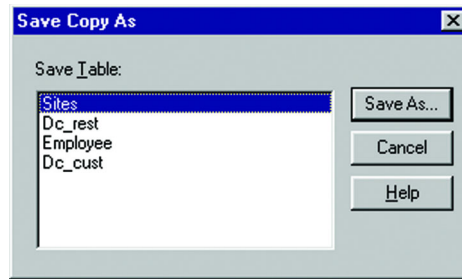
2. Choose the layer you want to make editable. Its name displays in the Status Bar.
3. To deactivate editability for all the layers, choose **NONE**.

How to Make a Read-Only Table Editable

If you are working with tables that were opened from Excel, Lotus, or ASCII files, you may have noticed that they come in as read-only tables. Because the files are not in native MapInfo Professional formats or standard DBF format, MapInfo Professional is unable to edit the tabular information contained in these tables.

If you wish to modify the table information, you must save a copy of the table.

1. With your table opened, On the **FILE** menu, click **SAVE COPY AS**. In this example, we will save a copy of an Excel file named Sites.




2. Choose a new name for the file.
3. Click **SAVE**. There is now a copy of the Excel file saved in MapInfo Professional native format. Open the new file, and you will have full edit capabilities.

Selecting Objects in a Layer

If you only want to select objects for further analysis rather than edit the objects, make the layer selectable. More than one layer can be selectable at a time. If a layer is editable, it is automatically selectable.

The Select tool selects objects from the topmost Selectable layer. To select an object that is not in the top Selectable layer, you can turn off the Selectable option in Layer Control for every layer above the layer you want to select from. Using the multi-select functionality, you can do this in just a few steps. Select the layers, and select a Selectable check box for one of the layers. The Selectable attribute is cleared for the selected layers. As an alternative, you can leave all layers Selectable and use the **CTRL** key in combination with the Select tool to cycle through each Selectable layer.

To make a layer selectable:

1. Click  in the Main toolbar to display the Layer Control dialog box.
2. Place a check in the Selectable column beside the layer in which you want to make selections.
3. Click **OK** to return to the Map window.

To make more than one layer at a time selectable, select the layers you want, and select the Selectable check box for one of the layers.

For example, if you want to find all customers who live within a fifty kilometers radius of Paris, make the Street layer selectable. If the map also includes a layer of hospitals (which you do not want to include in the radius search), turn off the Selectable option for the hospital layer.


Keep in mind that the Editable or Selectable options only apply to the Map window itself. You can always select objects using the Select or SQL Select commands regardless of whether a layer is selectable.

Getting Layer Information

You can use the Info tool to get information pertaining to the map layer.

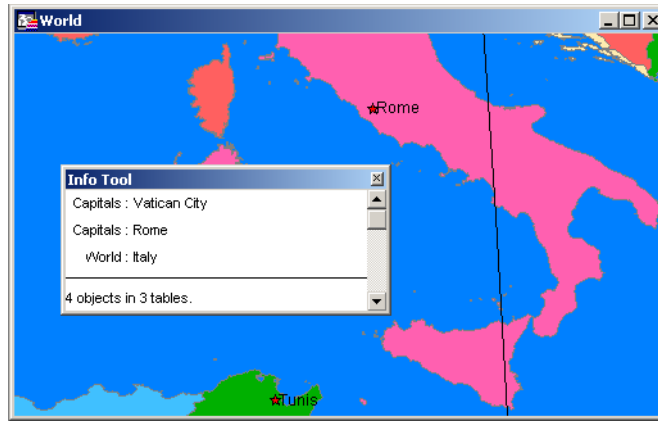
To get information about an object in a particular layer:

1. Make sure the layer you want information about is the selectable layer.

2. Click Info  in the Main toolbar and click the object you want information about.

Note: If the information that displays is not what you were looking for, check to see that the layer you are interested in getting data for is selected.

Using either method, the Info box displays.



When you click a map location using the Info tool where two or more selectable map objects overlap, the data tied to the objects on each layer display in the Info tool window. If you do not want the information for all layers to display, turn off Selectable for those layers in the Layer Control dialog box.

You can also view an object's label expression in an InfoTip when you use the Select, Info, or Label tools. InfoTips work very much like ToolTips. Using one of these tools, place your cursor over an object. An InfoTip displays the label expression for the object in the topmost selectable layer. To set InfoTips for a particular layer, adjust the Selectable attribute in the Layer Control dialog box so that the Tips display for the layer you want. InfoTips are active by default, but you can turn them off in the Map window preferences (on the **OPTIONS** menu, point to **PREFERENCES** and click **MAP WINDOW**).

Working with Thematic Layers

When you create a thematic map in MapInfo Professional, the thematic shading is added to your map as a separate layer. It is drawn on top of the layer, from which it gets the raw data.

Separating a thematic layers from its base layer provides you with several important options:

- Graduated symbol thematic maps do not require that your base layer contain point objects. Instead, graduated symbol objects are built regardless of the map object type. Therefore, even if your base layer contains region or line objects, you will still be able to create a graduated symbols map.
- You can have multiple thematic layers per base layer. In some cases, you do not have to add another base layer to the map to create another thematic layer. You can display more than one thematic layer at a time, as well as perform bivariate thematic mapping.
- You can use Layer Control to turn the display on or off for a given thematic layer. The layer it is based on can continue to display. You can also set individual zoom layers on thematic maps.

Ordering of Thematic Layers

To display thematic layers properly, they must be in a specific order. This is especially important when you want to display more than one thematic layer at a time. For example, you would want pie or bar charts for an area map to display on top of regions that are shaded in order to see them.

The following lists the order of map layers from top to bottom (note that map layers are drawn from the bottom up):

1. Pies, Bars, or Graduated Symbol thematic layer.
2. Dot Density thematic layer.
3. Ranged thematic layer – where Color or Size Attributes are applied.
4. Ranged (or Individual Value) thematic layer – where All Attributes are applied.
5. Major layer or base layer.
6. Grid thematic layer.

When you create a new thematic layer, MapInfo Professional automatically inserts it into its proper place.

Displaying Thematic Layers

You can turn the display on and off for thematic layers the same way you can for other map layers. All the display settings in Layer Control are also applicable to thematic layers, enabling you to set a zoom level for each thematic layer. You can also access the Modify Thematic Layer dialog box through Layer Control by clicking the Thematic button.

Thematic layers are always drawn after their base layer. Therefore, they appear above their base layer in the Layer Control list, and are indented to distinguish them from other map layers.

Thematic layers are displayed in the list with this naming convention:

```
<Thematic type> with/by <variable-list>
```

The type of thematic map is noted first, followed by the list of variables used to create the map. For example, a pie thematic layer that uses commuting data is listed this way:

```
Pies with ComAlone, ComCarpool...
```

The variable list is truncated if there is not enough room to display each variable used in your thematic analysis.

For more information about thematic mapping, see [Using Thematic Mapping to Analyze Information on page 313](#).

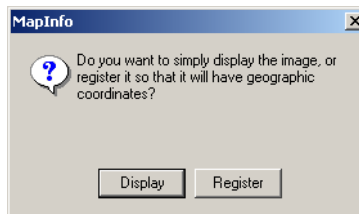
Working with Raster and Grid Layers in Layer Control

A raster image is a computerized picture. If you have a raster image file, you can overlay additional MapInfo Professional data, such as street maps and customer locations, on top of the image. Raster images consist of rows of tiny dots (pixels) which are sometimes known as bitmaps. In contrast, objects in vector images contain coordinate-based data structures represented by x and y coordinates (most of MapInfo Professional's data is in vector format).

Displaying a Raster Image

To open a raster image:

1. On the **FILE** menu, click **OPEN** to display the Open dialog box.
2. Select **RASTER IMAGE** in the Files of type drop-down list.
3. Navigate to the directory in which your raster image is located and click the file you want to open.
4. Click **OPEN** to display the MapInfo (Display or Register) dialog box.




If you are going to work with the raster image, you need to register it and specify a projection within which to work. For a complete definition of registration and projection, see [Registration on page 656](#) and [Projection on page 655](#) in the Glossary.

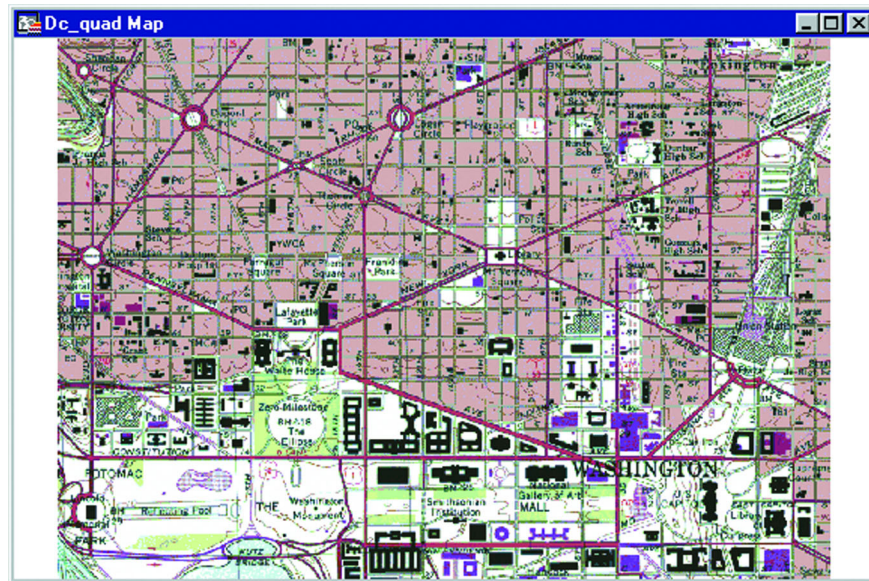
5. Do one of the following:
 - Click **DISPLAY** to simply display the raster image.
 - Click **REGISTER** to set up registration points for the raster image. For details on registering the raster image, see [Registering Raster Images in Chapter 13 on page 454](#).

Changing the Display of a Raster Image

Raster images can also be layers in MapInfo Professional. They appear in the Layer Control dialog box just like any other layer. You can change the display style of a raster layer within the Layer Control dialog box.

To change the display of a raster layer:

1. Click  in the Main toolbar to display the Layer Control dialog box.
2. Highlight the raster layer in the Layer list and click the **DISPLAY** button.
3. In the Display Options dialog box, select the **STYLE OVERRIDE** check box and click the **STYLE** button. The Adjust Image Styles dialog box displays, where you can make changes to the transparency, brightness, contrast, and translucency settings.
4. Click **OK** to save your changes.



In MapInfo Professional, raster images are used as display layers only. They cannot have any data attached to them like vector map images. Raster images are particularly well-suited for use as a backdrop for vector map layers because they provide a much greater level of detail than vector maps. For more information about raster image files, see [Registering Raster Images in Chapter 13 on page 454](#).

Working with Seamless Layers

Use or create a seamless map layer to treat a group of base tables as if they were one. A seamless layer allows you to change display attributes, apply or change labeling or use the Layer control dialog box for an entire group of tables at once. You can also retrieve information using the Info tool, and select or browse any one of the layer's base tables. A base table can be any regular MapInfo Professional table. Grid layers cannot be made seamless.

This feature is especially useful when you want to display a vector or raster backdrop for your maps such as joining street or boundary maps. For example, you may have a seamless layer of county boundaries made up of several individual county tables.

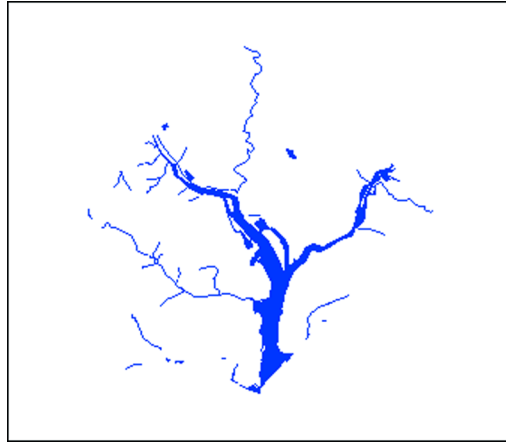
Opening a Seamless Map Layer

MapInfo Professional includes sample seamless maps or you can create your own. Some of these data files are available on the MapInfo web site in the MapInfo Professional Tutorial data. We recommend you download this data for use with these examples.

We'll display a sample seamless map:

1. On the **FILE** menu, click **OPEN**.
2. From the data directory, choose DCWATER.

The following seamless map layer of water areas in Washington DC displays.



Notice at first glance that the seamless layer looks like any other MapInfo Professional table. However, the DCMETROW seamless map layer is made up of the following base tables:

- VAARLIW.tab Arlington Virginia water areas.
- VAALEXW.tab Alexandria Virginia water areas.
- DCWASHW.tab Washington DC water areas.

The structure of each seamless layer includes the path name of each base table plus a description that defaults to the table name (alias). To view the table structure, turn the seamless layer off and display the seamless table in a browser. Refer to [Turning Seamless Layers On and Off on page 136](#).

Other sample seamless tables including DC_WATER are available in the tutorial data on the MapInfo Professional Tutorial page of the MapInfo web site, www.mapinfo.com/miprotutorial.

Characteristics of a Seamless Layer

Since a seamless layer is actually made up of *several* base tables, MapInfo Professional does treat it a little differently than a regular MapInfo Professional table. You can use the following MapInfo Professional features with a seamless map layer:

- *Layer Control*. Use any of the functions except Thematic Mapping from the Layer control dialog box on your seamless layer. Add, Remove, or Reorder layers or set Display, Zoom Layering or Label options for the seamless layer (*all* base tables) at one time. However, you cannot make a seamless layer editable.
- *Info Tool*. Retrieve information about a particular object in a base table.
- *Select Tools*. Select objects from the seamless layer. You can only select a group of objects if they reside in the same base table. Press the Shift key while clicking the Select Tool to do so. If you attempt to select several objects that reside in different base tables, MapInfo Professional will only select objects in one base table. If you use the Marquee or Radius select tools and the selected area spreads across two different base tables, MapInfo Professional selects the objects in the center of the circle or polygon.
- *Browse Table*. Display a Browser window of a particular seamless table. You will be prompted to select a base table.

Creating/Compiling a Seamless Layer

To create your own seamless layer, run the Seamless Table Manager. Your seamless layer will be most useful if you use homogeneous tables that ideally have the same projection and the same number of columns. For example, you may want your seamless layer to contain several counties, each stored in a separate base table, or an interstate highway that runs between several states, each stored in a separate base table. If your tables are not homogeneous, maps and labels will not display correctly and map items will not be selectable. Grid tables cannot be made seamless.

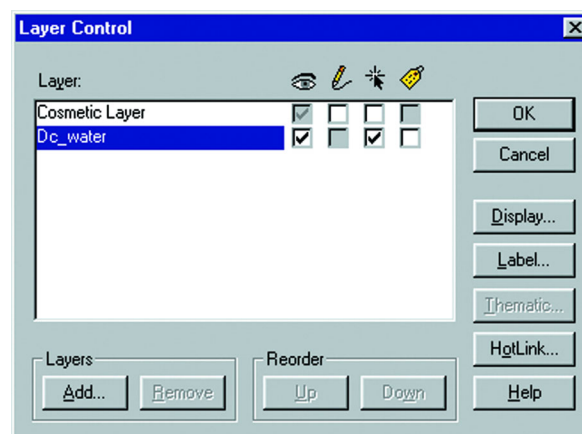
To use the Seamless Manager:

1. On the **TOOLS** menu, click **TOOL MANAGER**.
2. Check the **LOADED** box next to the Seamless Table Manager tool.
3. Click **OK**. The Seamless Table Manager tool is added to the **TOOLS** menu.

You use the tools of the Seamless Manager to create and compile a seamless layer.

Experimenting with a Seamless Layer

With the DCWATER seamless layer displayed, click the **LAYER CONTROL** button. The Layer Control dialog box displays.



Notice the seamless layer is referred to by one name, DCWATER, in the Layer Control dialog box. You can add, remove or reorder seamless layers as if they were conventional MapInfo Professional layers. You can also set Label and Display options for *all* the tables in the seamless layer as if they were one table. Notice the editable option for the seamless layer is grayed.

Choose your seamless layer and experiment with order, display and labeling options.

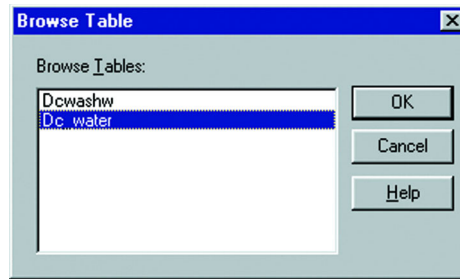
To retrieve information from a seamless layer:

1. From the Main Toolbar, click the **INFO** tool.
2. Click the object for which you want information.

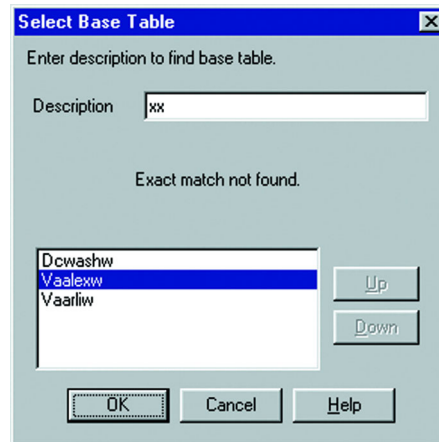
The Info Tool Window displays. It contains the information about the object you selected including the name of the base table in which it is stored.

To browse the seamless layer:

1. On the **WINDOW** menu, click **NEW BROWSER WINDOW**. The Browse Table dialog box displays.



2. Select a layer (table) from the list and click **OK**. The Select Base Table dialog box displays.



3. Type the name of the base table you want to browse. We typed XX to indicate an unknown table. A Browser window with the base table you selected displays. If a base table matching your description is not found, a list of possibilities displays. Keep in mind, base tables are treated like any other MapInfo Professional tables. Once a base table from a seamless table is browsed, it will be opened as any other regular MapInfo Professional table.
4. To select a base table from the list, highlight it and click **OK**.

Specifying Search Paths for Component Tables of Seamless Layers

You can set search paths that MapInfo Professional will use to look for the component tables of a seamless layer.

To set the search path for the component tables of a seamless layer:

1. On the **OPTIONS** menu, click **PREFERENCES** and click the **DIRECTORIES** button. The Directory Preferences dialog box displays.
2. In the Search Directories for Tables group, click **ADD**.
3. Specify a drive and directory in the Choose Directory dialog box and click **OK**. You can set up to four paths. Use the **UP** and **DOWN** keys to change the search order and use the **ADD** and **REMOVE** buttons to add or remove paths from the list.
4. Click **OK** to close the Preferences dialog box.

Turning Seamless Layers On and Off

If you need to edit the structure of your seamless table, you'll need to turn your seamless behavior off.

To turn your seamless behavior off:

1. On the **OPTIONS** menu, click **SHOW MAPBASIC WINDOW** to display the MapBasic Window.
2. Type: `set table tablename seamless off`
MapInfo Professional turns off the seamless layer. Display the table in a browser to view or edit its table structure. Use the Seamless Table Manager to add or create seamless tables.

To turn the seamless layer on:

1. On the **OPTIONS** menu, click **SHOW MAPBASIC WINDOW**. The MapBasic Window displays.
2. Type: `set table tablename seamless on`
MapInfo Professional turns seamless behavior on again.

Saving and Exporting Your Work

Preserving your work is an important part of being productive. MapInfo Professional has a wide variety of ways you can save what you are working on, depending upon what needs to be saved and how you need to retrieve it.

Saving a Workspace

If you work with the same tables repeatedly, you know that opening each one individually every time you use it can be tedious. With MapInfo Professional's workspace feature, you can automate this process so you can get back to the business of creating maps and analyzing data sooner.

When you work with MapInfo Professional you generally use many different tables and windows. A Map window, for instance, is likely to be built of several layers. MapInfo Professional uses *workspaces* to save your work setup from session to session. Workspaces prevent you from having to reassemble all the pieces of your earlier setup from scratch. So, you don't have to reopen tables, re-create maps or layouts, resize windows, or do anything else just to duplicate what was on your desktop the last time you were using MapInfo Professional.

To save your current work setup:

1. On the **FILE** menu, click **SAVE WORKSPACE**. MapInfo Professional displays the Save Workspace dialog box in which you name the workspace and set the directory to which it should be saved.
2. Once you have entered the file name and selected the directory to which you want to save this workspace, click **SAVE**.

When you start your next session, you can open this workspace right from the Quick Start dialog box and continue where you left off.

You can change the directory path that MapInfo Professional uses for opening or saving workspaces in Directories preferences.

To change the directory path for opening/saving workspaces:

1. On the **OPTIONS** menu, click **PREFERENCES** and select the **DIRECTORIES** button.
2. In the Directory Preferences dialog box, click the **WORKSPACES** path in the Initial Directories for File Dialogs group, and do one of the following:
 - Click **MODIFY**
 - Double-click the path

Using either method, the Choose Directory dialog box displays.

3. Select the path you want to use, and click **OK**.

If you have edited a table (added, deleted, or modified items) you must explicitly save those changes first using **SAVE As** or **SAVE** commands in the **FILE** menu.

CAUTION: **Saving a workspace will not save edits you have made to tables in the workspace.**

If you close a window or table and you have thematic maps, graphs, label settings or label edits, or cosmetic objects pending, MapInfo Professional will prompt you to save the session to a workspace.

Closing a Table

Closing a table removes it from active use in your current session. Choose the **CLOSE** command from the **FILE** menu to close tables. When you close a table, you automatically close all views of that table. If you close a table that is displayed in a Map window with other tables, MapInfo Professional removes that table from the window, but the Map window remains open.

In addition, any subset tables of the original table (known as query tables) also close. You can use the Close command for any table, whether or not it is displayed in a window.

Opening and closing *tables* is different from opening and closing *windows* in which you view your tables. You can open a table without opening any views of the data. Similarly, closing a window does not close the table (or tables) you are viewing in the window. They are still open and available for use. To close a window, click the Control-menu box in the upper-left corner of any window and select **CLOSE**.

If you have made changes to a table but have not yet saved those changes, MapInfo Professional will ask you if you want to save them before closing the table. To save your changes, choose **SAVE TABLE** from the **FILE** menu.

Saving a Table or Saving a Copy of a Table

To save changes to map objects or data, you must save the table. (On the **FILE** menu, click **SAVE TABLE**.) A dialog box displays asking you to choose which table you want to save.

You can also save a copy of the table under a new name, using **SAVE COPY As**. This, in essence, creates a new table. This is helpful in several instances:

- When you want to retain any changes while preserving the original table.

- When you want to save a table with a temporary column (from Update Column).
- When you want to create a new table before you make editing changes to the original table.
- When saving spreadsheet files that you wish to modify in MapInfo Professional.
- When you want to save a table in a different projection.

To save a copy of the table:

1. On the **FILE** menu, click **SAVE COPY AS**. The Save Copy of Table dialog box displays.
2. Choose the file to save and click **OK**.
3. Give the file a new name.

The original table remains unchanged and open for all further changes. The new table does not open immediately after its creation, but can be opened for use at any time.

When choosing a name for your new table that begins with a number, MapInfo Professional adds an underscore to the beginning of the table name. For instance, your table 1STREETS.tab. will become 1_STREETS.tab.

Saving a copy of a raster table only saves a copy of the *.tab file, not the image. You cannot change the projection of a raster or grid table using **SAVE COPY AS**. To do this go to the **TABLE** menu, point to **RASTER** and click **MODIFY IMAGE REGISTRATION** and click the **PROJECTION** button. Then save the file from there.

Since MapInfo Professional supports long filenames, it is easier to give the new table a name that is descriptive and at the same time distinguishes it from the original file.

Note: MapInfo Professional does not maintain some objects when saving a copy of a version 3.0 table in version 2.x format. These objects include multiple polyline objects and polygons/polylines containing more than 8,000 nodes. In addition, region objects containing donut objects, while maintained, are handled differently in MapInfo 2.x.

Exporting Your Data to a New Format

You can export your Map window to other file formats with the Save Window As command (on the **FILE** menu, click **SAVE WINDOW AS**). This enables you to use your map in another application, such as word processing, presentation, or computer publishing packages.

Supported Export Formats

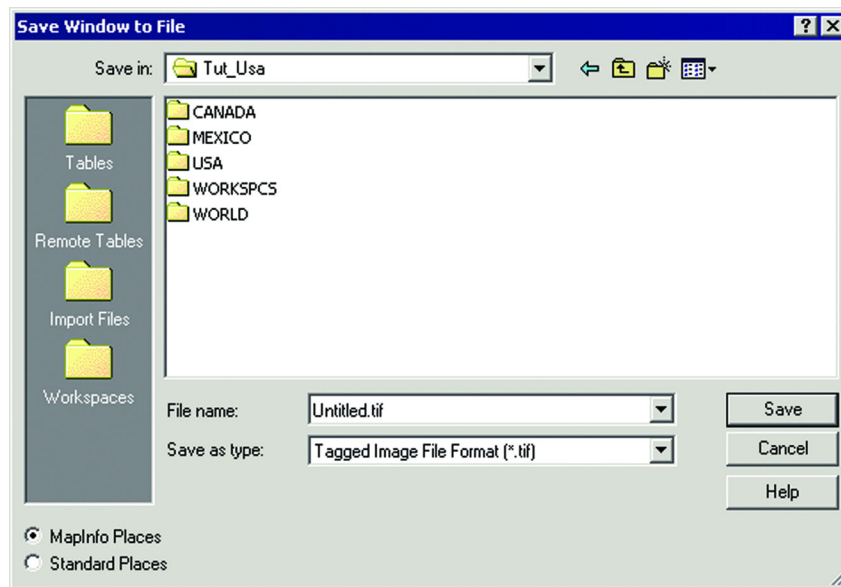
MapInfo Professional enables you to save to a number of formats. Windows Bitmap is the initial default. The Save Window to File dialog box sets the last-used format as the default. The supported formats are:

- Windows Bitmap (*.BMP)
- Windows Metafile (*.WMF)
- Windows Enhanced Metafile (*.EMF)
- JPEG File Interchange Format (*.JPG)
- JPEG 2000 (*.JP2)
- Portable Network Graphics Format (*.PNG)
- Tagged Image File Format (*.TIF)
- TIFF CMYK (*.TIF)

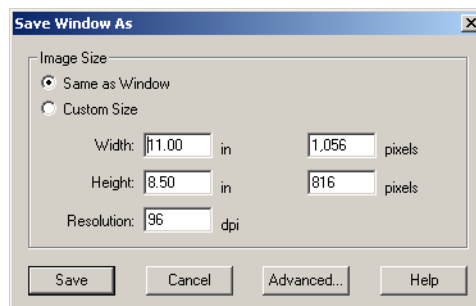
- Photoshop 3.0 (*.PSD)

To export a file:

1. On the **FILE** menu, click **SAVE WINDOW AS**. The Save Window to File displays.



2. Type a name for this file and select the file format you want to export to in the Save as type drop-down list. Click **SAVE**. The Save Window As dialog box displays.



3. Specify the image size settings. You can keep the image the same size as the window or choose a custom size. If you choose **CUSTOM**, also make any desired changes to the width and height of the image. You can make these changes in inches or in pixels.

If you are exporting a simple map or layout that does not contain raster or grid images, or any transparent fill patterns, you may be able to bypass the advanced settings.

Note: If you are saving the window to a raster format, select a resolution for the image. Metafile formats do not use the resolution option (WMF, EMF files).

4. Click the **ADVANCED** button to display the Advanced Exporting Options dialog box. See [Understanding the Advanced Exporting Options on page 140](#) for details about these options.



If you would like to include a border for your exported file, though, be sure to select the Export Border check box.

5. Complete the dialog box according to information in the following section, and click **OK**.

Understanding the Advanced Exporting Options

The Advanced Exporting Options dialog box settings allow you to apply the color, transparency, and border handling that are available for printed maps to your exported files.

Note: Borders are not exported from Layout windows.

The settings are the same as in the Advanced Printing dialog box. See [Advanced Printing Options in Chapter 4 on page 203](#) for a complete description.

Export Border

Select this check box to include a black border on images you are exporting. Clear this check box to export the image without a border. This check box is selected by default.

Internal Handling for Transparent Vector Fills and Symbols

Special programming has been added to handle transparent fill patterns and bitmaps for vector images when exporting. Select this check box to use this functionality or clear it to let the printer or Windows export functions to handle this. This check box is selected by default.

Use ROP Method to Display Transparent Raster

Select this check box to allow the internal ROP (Raster Overlay by Pixel) to manage the transparent pixel display in raster images. Since the ROP Method is largely a display method, not all export programs can use it. We recommend that you either check with the manufacturer before using this option or try a few test exports to get the results you want. This check box is cleared by default.

Export Raster in True Color When Possible

Select this check box to print and export your 24-bit raster or grid file images in true color (make sure your printer settings are set to greater than 256 colors). Clear this check box if you are not working with a color printer. This check box is selected by default.

Note: You can select dither method options in the display, printing, and exporting dialog boxes.

Overriding the default settings also works the same way. As with the advanced printing options, the options that are selected when you initially display the Advanced Exporting Options dialog box are the default settings, which are set in the Output preferences. The Advanced Exporting Options dialog box enables you to override the default export settings for individual file export operations. To actually change the default export settings, you must go to the Output preferences (on the **OPTIONS** menu, point to **PREFERENCES** and click **OUTPUT**) and change the settings there. See [Setting your Output Setting Preferences in Chapter 2 on page 92](#) for more information.

Using the Tools in the Tool Manager

MapInfo Professional contains many additional tools that simplify mapping tasks, convert MapInfo Professional files to different file formats and vice versa, automate tasks for working with DBMS tables, and more. The Tool Manager helps you run and manage these many utilities easily.

Use the Tool Manager to run, add, edit, or remove tools from the currently registered list of tools in the Tools menu. You can also configure a tool to run automatically upon startup. If you performed a Custom installation, you may have elected to not install the tools. In this case when you open the Tool Manager dialog box, the list box will be empty (on the **TOOLS** menu, click **TOOL MANAGER**).

What are the MapInfo Professional Tools?

AutoLabeler – Use this tool to place text object style labels in the Cosmetic Layer of the active Map window.

CoordSys Bounds Manager – Use this tool to check and set the coordinate system bounds for mappable MapInfo Professional base tables.

Concentric Ring Buffer – Use this tool to create concentric ring buffers around one or more map objects. The tool also computes aggregated values for underlying data that occur within each ring. Therefore, it can be used to count how many customers occur within each ring and their total sales. You can graph the results.

Coordinate Extractor – Use this tool to extract x, y coordinates for each record in your table using any projection in the MAPINFOW.PRJ file and places them in designated columns.

Create Line by Length (Cogoline) – Use this tool to draw lines of a specific length and angle in the editable layer, or the Cosmetic Layer, if no editable layer is selected.

DBMS Catalog – Use this tool to create a MapInfo Professional MapCatalog table in a remote database. You need the catalog to download coordinate information to MapInfo Professional from a remote database. This tool should be used by a qualified DBA.

DBMS Count Rows in Table – Use this tool to update the MapCatalog entry of a table to the correct number of rows.

DBMS SQL Builder – Use this tool to connect to an SQL database server, build queries and execute SQL statements. Additionally, issue queries to preview data and download query results to a local MapInfo Professional table.

Degree Converter – Use this tool to convert a column of data containing DMS coordinates to Decimal Decimals and Decimal Degrees to degrees/minutes/seconds.

Disperse Points – Use this tool to disperse points located at the same position. Points can be dispersed systematically or randomly.

EasyLoader – Use this tool to upload MapInfo .tab files into remote databases.

Grid Maker – Use this tool to draw a grid of longitude/latitude lines on your map, i.e., a graticule.

Grid Tools – Use these tools to create a MapInfo Professional native grid file from a table of points, convert grids from any format that MapInfo Professional can read into MapInfo Professional grid format (.MIG), and display x, y, and z coordinates, and row and column, of the grid you selected.

HTML Image Map – Use this tool to create an HTML image map from a MapInfo Professional Map window for use in a Web page.

Labeler – Use this tool to transfer layer's labels into permanent text objects, label current selection, and make individual labels created with the Label tool into permanent text objects.

Legend Manager – Use this tool to take control of how MapInfo Professional displays Legend windows. Includes the ability to have multiple Legend windows open, and associate each legend with a specific Map window.

Mapping Wizard Tool – Use this tool to open data, maps, perform analysis, and generate output using a wizard. This tool is set to load automatically when you start MapInfo Professional.

MapX Geoset Tool – Use this tool to read a MapX Geoset into a MapInfo Professional Professional Map window, and write a MapX Geoset from the contents of the MapInfo Professional Map window.

MDBLauncher – Use this tool to launch the MapInfo Professional Metadata Browser.

Named Views – Use this tool to save a Map window's current zoom and center as a named view. Return to that view by selecting the view name from a dialog box.

North Arrow – Use this tool to add a North Arrow to a Map or Layout window in various styles, and, optionally, add a Magnetic Declination Arrow. Use the North Arrow tool to designate in which corner to position the North Arrow, or use the North Arrow button on the Tools Toolbar to draw a rectangle and place the North Arrow at the specified location.

Overview – Use this tool to open a new Map window to provide an overview of another Map window.

Register Vector – This tool allows you to put control points into a vector image and reference points into a Map window and then performs an affine transformation to line them up.

Rotate Labels – Use this tool to rotate all the labels in a map layer at once.

Rotate Map Window – Use this tool to rotate the contents of the current Map window a specific number of degrees. It calculates and sets an Affine transformation for the Map window.

Rotate Symbols – Use this tool to rotate all the symbols in a map layer at once.

ScaleBar – Use this tool to create a custom distance scalebar to annotate a Map window. This tool can also be used in Layout windows.

Seamless Table Manager – Use this tool to create and manage seamless map sheets.

Search and Replace – Use this tool to search a character column for a specific string and replace it with another string.

Send to MapX Mobile – Use this tool to write a custom MapX geoset and associated .tab files to create a user-defined subset of a map window's background data for display on a mobile device.

Set the Minimum Bounding Rectangle Tool – Use this tool to set the Minimum Bounding Rectangle for ODBC live access based tables.

Shields – Use this tool to draw decorative frames around text objects.

Spatialize SQLServer Table – Use this tool to accommodate spatial data in an existing SQL table.

Symbol Maker – Use this tool to create, edit, and delete MapInfo Professional symbols. These symbols become part of the standard MapInfo Professional symbol set.

Table Manager – Use this tool to get information about all currently open tables, including table metadata.

TOC Tool – Use this tool to build a seamless table of all the files listed in a TOC file and create one or more seamless tables, grouped by zone and resolution.

Universal Translator – Use this tool to import and export MapInfo Professional data to and from other popular mapping files formats. This tool is set to load automatically when you start MapInfo Professional.

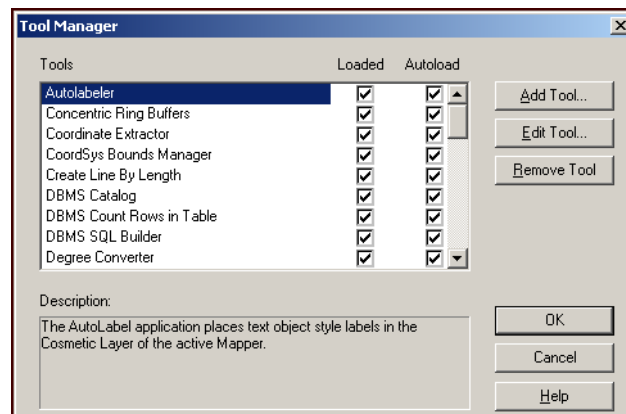
Window Manager – Use this tool to assign the title of Map, Browser, Graph, Layout, and Redistricter window and the default table view. The Set Default View option allows you to select a layer from an open map window and make the default zoom and center settings for the layer's base table match those of the map window. The default center and zoom settings are written to the table's .MAP file.

Workspace Packager – Use this tool to create a copy of a workspace in a new location or folder, and copies all the data referenced by the workspace to the same location. MapInfo Professional updates the internal references in the workspace and .tab files to point only to the "packaged" copies of the data, so you can open the new workspace no matter where the folder is moved or copied, even if the folder is moved or copied to a different computer.

Accessing and Loading the Tool Manager Tools

To access the Tool Manager Tools and load tools:

1. On the **TOOLS** menu, click **TOOL MANAGER** from the main menu. The Tool Manager dialog box displays.



2. To load a tool in this list, select the check box beside it in the Loaded column.

Select the check box in the Autoload column to load this tool each time you open the application.

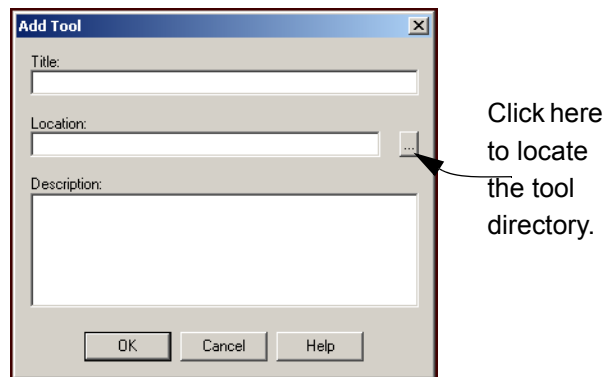
To unload a tool in this list, clear the check box beside it.


3. Click **OK** to save your changes.

Adding (Registering) a Tool in the Tool Manager

To add a tool to the Tool Manager:

1. On the **TOOLS** menu, click **TOOL MANAGER** to display the Tool Manager dialog box.
2. Click the **ADD TOOL** button. The Add Tool dialog box displays.



3. Navigate to the Tools directory by clicking the  button beside the Location field. The location of this directory depends upon your installation selections but in general the path is:

```
c:\Program Files\MapInfo\Professional\Tools
```

A list of tools displays.

4. Find the tool you want to register, select it, and click **OPEN**. The Add Tool dialog box redisplay with the path of the tool you selected in the Location field.
5. Type a title for this tool in the **TITLE** field and a description of this tool in the **DESCRIPTION** field. We recommend that you make the description as meaningful as possible for others that may also need to use this tool.
6. Click **OK** to add the tool to the Tool Manager list. The Tool Manager dialog box redisplay. The tool you just added displays in the Tool Manager dialog box and be available from the Tools menu.

Editing the Tool Title and Description

You can change the title of the tool and the description assigned to it using the Edit Tool button. Changing the title of the tool affects its position in the Tool Manager list because these entries are sorted alphabetically. However, it does not affect the order of the tool in the Tool menu list.

To edit the tool title and description:

1. On the **TOOLS** menu, click **TOOL MANAGER** to display the Tool Manager dialog box.
2. Click the **EDIT TOOL** button. The Tool Definition dialog box displays.
3. Type over the current title or description entry as desired and click **OK**.

- When you return to the Tool Manager dialog box, make sure you have selected the appropriate **LOADED** and **AUTOLOAD** options for this tool and click **OK** to save your changes.

Removing a Tool from the Tool Manager

You may not need all of the tools you have access to in the Tool Manager so you can use the Remove Tool option to remove it from the list. Keep in mind that removing a tool does not delete the tool or any files associated with the tool, just removes it from the list and the menu.

To remove a tool from the Tool Manager:

- On the **TOOLS** menu, click **TOOL MANAGER** to display the Tool Manager dialog box.
- Click the tool you want to remove to highlight it.
- Click the **REMOVE TOOL** button. The **UNREGISTER SELECTED TOOL** dialog box displays.
- Click **OK** to remove the tool from the list. The **TOOL MANAGER** dialog box displays.
- Click **OK** to confirm your removal.

Using the Tools Toolbar

For an on-screen button description, click and hold the mouse button down to display a button description in the StatusBar. Additionally, use ToolTips, text that describes the behavior of a button on a Toolbar. ToolTips display as the mouse tracks over a button. The text continues to display until an action is performed. For information on hiding/displaying the Tools toolbar, and accessing ToolTips, see Toolbars.

To choose an action from the Tools Toolbar:

- Click the appropriate button. The button is highlighted.



Run MapBasic Program Access the Run MapBasic Program dialog box.



Show MapBasic Window Display or hide the MapBasic window.



Run Mapping Wizard Tool New to mapping? Run the Mapping Wizard to introduce you to mapping concepts and the power of MapInfo.



Launch MetaData Browser Use the MapInfo MetaData Browser to search data clearing-house Web sites for data products that meet your geographic analysis needs.



North Arrow Launches the North Arrow tool that has been loaded from the Tool Manager. Use this tool to designate where the North Arrow should display. Click this button to draw a rectangle in which the North Arrow will be placed.

For a full button description, see the appropriate button entry.

Autoscrolling

When you use a tool in the Map or Layout window, the window scrolls if you drag the tool outside of the window boundaries. The window will continue to scroll until you release the mouse or move the cursor back into the window.

Press **Esc** to stop scrolling; the tool remains active.

To cancel the tool, press **Esc** after the scrolling has stopped. Autoscrolling works with any tool that can be dragged; it does not work with single-click tools, such as the Grabber or Info tools.

Putting Your Data on the Map

As we saw in **Chapter 3: Data - Where MapInfo Professional Begins**, you can convert your existing data to a format that MapInfo Professional can use to display it on a map. Now you're getting somewhere! But how does MapInfo Professional know where to put the information on a map? That is the subject of this section of the *User Guide*.

Sections in this Chapter:

- ◆ **How Do I Get My Data on the Map? 149**
- ◆ **Geocoding - Assigning Coordinates to Records 162**
- ◆ **Putting Latitude/Longitude Coordinates on a Map 190**
- ◆ **Displaying Your Data on the Map 198**

How Do I Get My Data on the Map?

There are three steps to putting your data on a map:

- Creating a MapInfo .tab file from your data
- Geocoding or creating points for the data
- Displaying your points on a map

When Do I Geocode vs. Create Points?

There are two processes that MapInfo Professional uses to identify and plot your data on a map. During *Geocoding*, MapInfo Professional reads data such as street data, postal code data, and other non-coordinate information from your database and matches it against street or postal code information on a MapInfo data table. During the *Create Points* process, MapInfo Professional reads X and Y coordinate data (such as longitude and latitude data from a Global Positioning System) and plots data using those coordinates. Use the appropriate process to the type of data you have collected.

- For more about the geocoding process, see [Geocoding - Assigning Coordinates to Records on page 162](#).
- For more about the create points process, see [Putting Latitude/Longitude Coordinates on a Map on page 190](#).

Note: If your data is in non-MapInfo format before you geocode or create points, you must convert it before using either of these processes.

Creating a .tab File from your Data

The first step in using your data in MapInfo Professional is to create that .tab file from your data. This process takes the data you have created (either a spreadsheet or database) and extracts the information into a .tab file that MapInfo Professional can use. Your data remains in tact as we go through this process. The process that MapInfo Professional uses depends upon the type of format your data is in. You can create a MapInfo table of the following data file format types:

- Microsoft Excel (.XLS)
- Microsoft Access (.MDB)
- d-Base (.DBF)
- Lotus 123 (.WKS, WK1)
- ASCII (.TXT)
- RDBMS (Oracle, Informix, SQL Server)
- XML (Web Map Service)

Note: The process for creating a .tab file from ASCII data is called “registering” instead of creating because we are actually making a series of pointers to the ASCII data. The process is different but your resulting files behave the same way.

Creating .tab Files from your Excel (.XLS) Data

You can create a .tab file from an Excel file that is up to 64K in size.

To create a .tab file from your Excel (.XLS) data:

1. In MapInfo Professional on the **FILE** menu, click **OPEN** to display the Open dialog box.
2. In the Files of Type list, select the format (.XLS), navigate to your data, and click **OPEN**.
3. Select the worksheet you want in your MapInfo data table. Make sure that this data includes either postal codes or longitude/latitude coordinate values.

Note: If there are column headings above each column in this worksheet, select the **USE ROW ABOVE SELECTED RANGE FOR COLUMN TITLES** check box. Then, select **OTHER** from the drop-down box and specify the cell range of the data you want to include in the MapInfo Professional table.

4. Click **OK** to convert your selected data to a MapInfo table (.tab) format. Now that you have converted your data, you can plot your data; see the next section to continue.

Creating .tab Files from your Access Data

To convert your Microsoft Access (.MDB) data into a MapInfo Professional table:

1. On the **FILE** menu, click **OPEN** to display the **OPEN** dialog box.
2. In the Files of Type list, select the format (.MDB), navigate to your data, and click **OPEN**.
3. Select the Access table you want to create the .tab file from and click **OK**.
4. We recommend you save your Access database to a temporary file so you can edit it as necessary. To do this, on the **FILE** menu, click **SAVE COPY AS** and save your current database with a new name. Then, on the **FILE** menu, click **CLOSE TABLE** and close the original table. Finally, open the editable copy to continue.

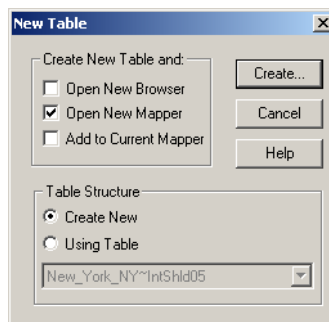
Working with Access Data in MapInfo Professional

There is a wide range of work you can do with Microsoft Access files in MapInfo Professional. This section covers that work.

Creating an Access Table in MapInfo Professional

To create an Access table in MapInfo Professional:

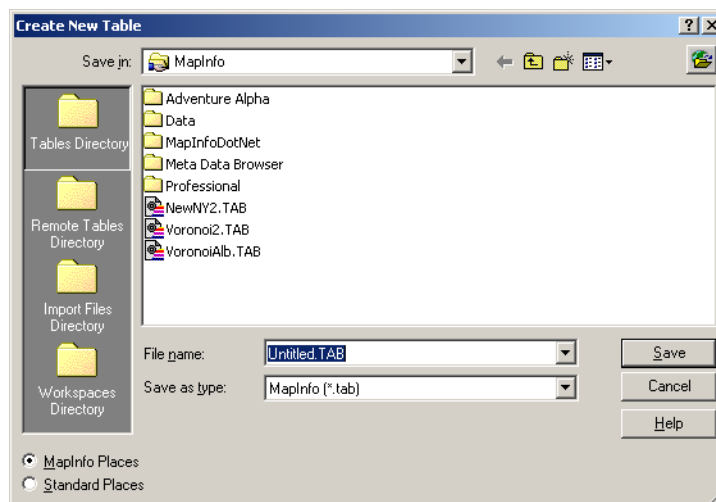
1. On the **FILE** menu, click **NEW TABLE**. The New Table dialog box displays.



2. Decide how you want to display the new table and select from the following check boxes. You can choose more than one and MapInfo Professional will add the new windows accordingly.

- **OPEN NEW BROWSER** — Select this check box to display the new table as a Browser window.
 - **OPEN NEW MAPPER** — Select this check box to display the new table as a Map window.
 - **ADD TO CURRENT MAPPER** — Select this check box to add the new table to the current Map window.
3. Decide the table structure you want for your new Access table. Select one of the following:
 - **CREATE NEW** — Select this button to create a new table structure.
 - **USING TABLE** — Select this button to create the new table based on the table structure of an existing table. Select the table you want to copy from the drop-down list.
 4. After you complete these selections, click **CREATE**. The New Table Structure dialog box displays.

Note: If you selected the **USING TABLE** button in the previous step, the fields in the table you copied display in the New Table Structure list.
 5. Do one of the following:
 - If you are adding an entirely new table, click the **ADD FIELD** button and add the fields you want this table to contain. Continue to add fields until your table is complete.
 - If you are copying an existing table, click the **ADD FIELD** button to add fields, or highlight a field you want to remove and click the **REMOVE FIELD** as appropriate.
 6. When the table structure is complete, click **CREATE** to create the table. The Create New Table dialog box displays.



7. In the **SAVE IN** field, specify the location where you want to create the MapInfo Professional table definition of your Access file. The MapInfo Professional table definition is the .tab file. MapInfo Professional uses this to keep information about an Access file registered in MapInfo Professional.
8. In the **SAVE AS TYPE** field choose **MICROSOFT ACCESS DATABASE** and click **SAVE** to display the Save Access Table dialog box.

The default database displays in the dialog box. The default is determined by the name of the .tab file you entered. The default has the same name as the .tab file. A database for this file may or may not exist.

If the database you specified does not exist, you can use the Save Access Table dialog box to specify the version of Microsoft Access you want to use for the database. Choose either **MICROSOFT ACCESS 2000** or **MICROSOFT ACCESS '95/'97** from the Version drop-down list.

If a database does exist, the Save Access Table dialog box indicates the version of the database. It also lists the tables in the database.



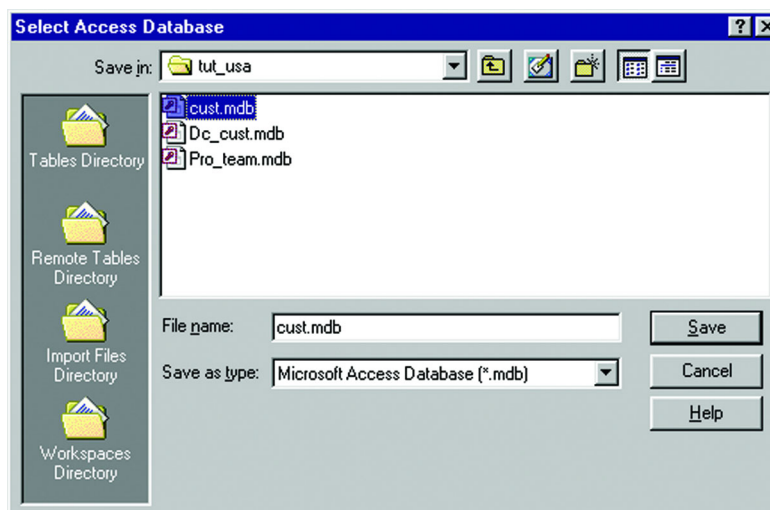
9. To create your table in the default database, use the default file name or enter a new one in the **ENTER THE NAME OF THE NEW ACCESS TABLE** field.

The default file name is the same name specified in the Create New Table dialog box.

Click **OK** to create the new table to the default database.

To save this table into another database, proceed to the next step.

10. Click the **DATABASE** button. The Select Access Database dialog box displays.



11. In the **SAVE IN** drop-down list, specify the location of the Access database. This is where you will create the table.

12. Click the database you want to create the table in. The name displays in the File Name box. To specify a new database, enter the name in the File name box.
13. Choose **SAVE**. The Save Access Table dialog box displays again.
If you chose an existing database, the name and version display in the dialog box. Any tables already in the database are listed in the Existing Tables box.
If you specified a new database, select the database version from the Version drop-down list. Choose either **ACCESS 2000** or **ACCESS '95/'97**.
14. The file name you chose in the Create New table dialog box is displayed in the Enter the name of the new Access table box. You can use this name or specify a different name. Click **OK**. MapInfo Professional creates the table as a Microsoft Access table in the database you specified.

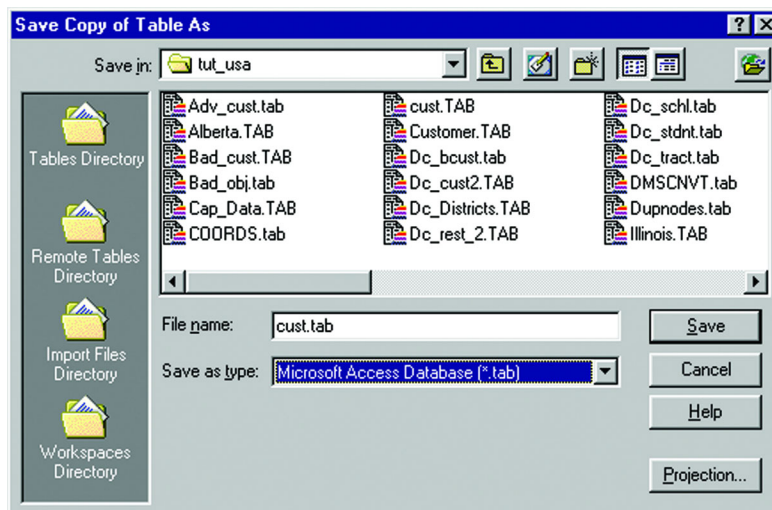
Saving Access and MapInfo Professional Tables

You can save a MapInfo Professional table as an Access table, save an Access table as a MapInfo Professional table, and save an Access table as an Access table using the Save Copy As menu command.

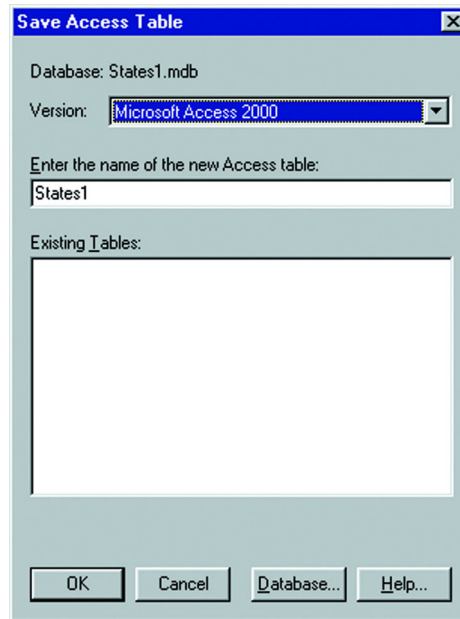
Saving a MapInfo Professional Table as an Access Table

To save a MapInfo Professional table as an Access table, do the following:

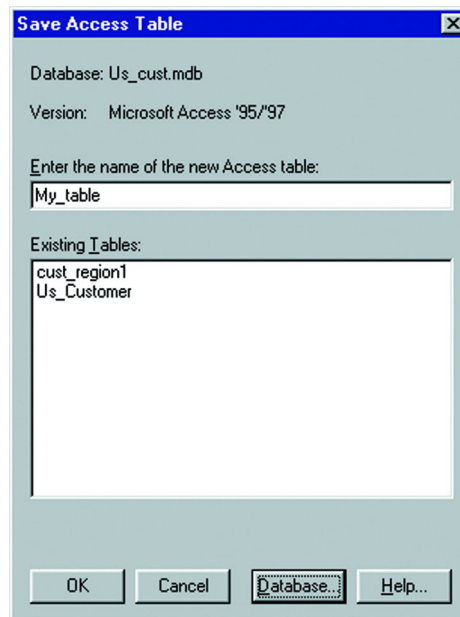
1. On the **FILE** menu, click **SAVE COPY AS**. The Save Copy of Table As dialog box displays.



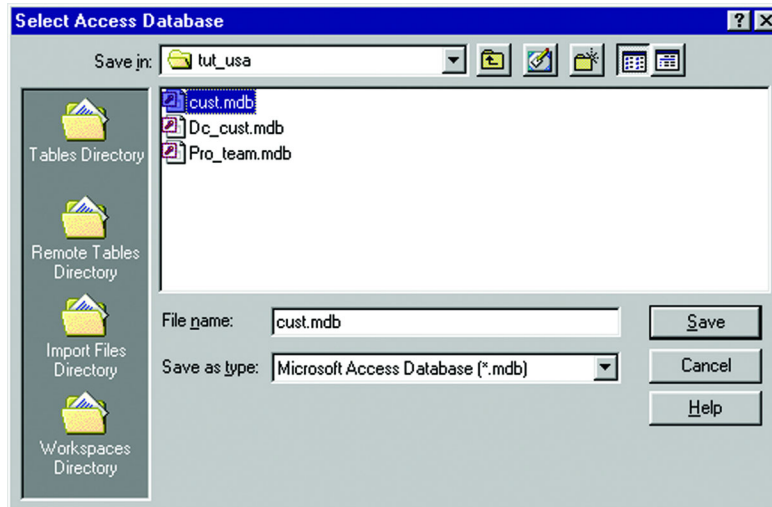
2. In the **SAVE IN** field, specify the location where you want to save the MapInfo Professional table definition of your Access file. The MapInfo Professional table definition is the .tab file. It is used by MapInfo Professional to keep information about an Access file registered in MapInfo Professional.
3. In the **SAVE AS TYPE** field choose Microsoft Access Database.
4. Choose **SAVE**. The Save Access Table dialog box displays. The default database displays in the dialog box. The default is determined by the .tab file you selected. It has the same name as the .tab file. A database for this file may or may not exist.
If the database you specified does not exist, the Save Access Table dialog box enables you to specify the version of Microsoft Access you want to use for the database. Choose either Microsoft Access 2000 or Microsoft Access '95/'97 from the Version drop-down list.



If a database does exist, the Save Access Table dialog box indicates the version of the database. It also lists the tables in the database.



5. To save your table to the default database, use the default file name or enter a new one in the **ENTER THE NAME OF THE NEW ACCESS TABLE** box. The default file name is the same name specified in the Save Copy As dialog box.
Click **OK** to save the new table in the default database.
To save your table to a database other than the default, go to step 6.
6. Click the **DATABASE** button. The Select Access Database dialog box displays.



7. In the Save in drop-down list, specify the location of the Access database. This is where you will save the table.
8. Click the database you want to save the table in. The name displays in the File Name box. To specify a new database, enter the name in the File name box.
9. Choose **SAVE**. The Save Access Table dialog box displays again.
If you chose an existing database, the name and version display in the dialog box. Any tables already in the database are listed in the Existing Tables box.
If you specified a new database, select the database version from the Version drop-down list. Choose either Access 2000 or Access '95/'97.
10. If you want to use a different file name, enter the name in the Enter the name of the new Access table box, and click **OK**. MapInfo Professional saves the table as a Microsoft Access table in the database you specified.

Saving an Access Table as Another Access Table

This option is used to save an Access table to a different database. The process is similar to saving a native MapInfo Professional table. Use the Save Copy of Table As dialog box to specify the database path and name, then use the Save Access Table dialog box to specify the name of the new table.

Limitations of Working Directly with Access Tables

The following limitations apply when working directly with Access tables:

- There is no decimal data type support. If you modify the table structure of a Microsoft Access table within MapInfo Professional and change a FLOAT type to a DECIMAL, the type changes to FLOAT.
- The MapBasic Pack Table statement will save a copy of the original Microsoft Access table without columns that MapInfo Professional does not support. If a MS Access table has a MEMO, OLE, or LONG BINARY type column, it will be lost during a pack.
- Compact your database. Each time a table is renamed disk space is used up. The space used up is the space the original table was taking up. MapInfo Professional renames the table when the structure is altered and when the rename statement is issued. An Access database may be compacted using the ODBC Administrator or Microsoft Access. To compact a MS Access database using the ODBC Administrator, see the ODBC Administrator's online help for compact database. To compact a MS Access database

using Microsoft Access, see Access's online help for Compact a database to de-fragment and free disk space.

- MapInfo Professional can only use and create Access tables compatible with Microsoft Access '95, '97, 2000, and XP.
- Access recognizes Time in a Date/Time field. MapInfo Professional only recognizes Dates. Therefore, any Time value is translated by MapInfo Professional to 12/30/1899.

Creating .tab Files from your dBase Data

When you convert your data to a MapInfo Professional table, you do not in any way change the original data. MapInfo Professional simply creates a conversion table (.tab) of your data.

To open your dBase (.DBF) data into a MapInfo Professional table:

1. On the **FILE** menu, click **OPEN** to display the Open dialog box.
2. In the Files of Type list, select the format (**.DBF**), navigate to your data, and click **OPEN**.
3. Select the appropriate character set for your MapInfo data table. Windows U.S. and Western Europe ("ANSI") is the default option.
4. Click **OK** to convert your selected data to a MapInfo table (.tab) format.
5. On the **FILE** menu, click **SAVE COPY AS** to make an editable copy of your table. Then, on the **FILE** menu, click **CLOSE TABLE** and close the original table. Finally open the editable copy.

Creating .tab Files from your Lotus 1-2-3 Data

To open your Lotus (.WKS, WK1) data into a MapInfo Professional:

1. On the **FILE** menu, click **OPEN** to display the Open dialog box.
2. In the Files of Type list, select the format (**.WK1, .WKS**), navigate to your data, and click **OPEN**.
3. Choose the worksheet you want to convert to a MapInfo data table.

Note: If there are column headings above each column in this worksheet, select the **USE ROW ABOVE SELECTED RANGE FOR COLUMN TITLES** check box. Then, select **OTHER** from the drop-down box and specify the cell range of the data you want to include in the MapInfo Professional table.

4. Click **OK** to convert your data to MapInfo Professional table format.

Registering Your ASCII Data

When you are working with ASCII data in MapInfo Professional, you don't actually create the table as you would in the other file formats we have discussed. MapInfo Professional registers your ASCII table by creating a MapInfo (.tab) file that points to the fields in it.

Note: Registering your data using MapInfo does not change the original data in any way.

If your delimited ASCII file has an extension other than .TXT (such as .ASC, .CSV, or .DAT, etc.), rename a copy of the file to <FILENAME>.TXT before you begin.

To register your ASCII (.TXT) data:

1. Open the data file using Wordpad/Notepad (on the **START** menu, point to **PROGRAMS** and click **ACCESSORIES**) or some other text editor. Check to see whether you have column

headings and what delimiter (character that separates each piece of data from the next) is used in the data file.

2. In MapInfo Professional, open **FILE** menu and click **OPEN** to display the Open dialog box.
3. In the Files of Type list, select the format (**.TXT**), navigate to your data, and click **OPEN**.
4. Choose the type of delimiter and the character set you want for your MapInfo data table. Select the **USE FIRST LINE FOR COLUMN TITLES** check box if you have column headings.
5. Click **OK** to register your data in MapInfo Professional.
6. On the **FILE** menu, click **SAVE COPY AS** to make an editable copy of your table. Then, on the **FILE** menu, click **CLOSE TABLE** and close the original table. Finally open the editable copy.

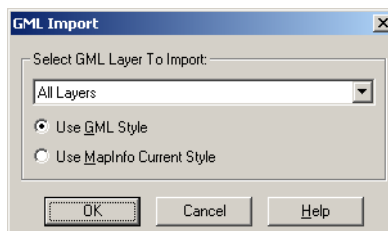
Importing GML File Data into .tab Files

Many of our international customers want to display MasterMap GML files developed by the Ordnance Survey of Great Britain (OSGB). Customers using versions 7.0 and 7.5 can display these GML files using the Import command. In version 7.0, we provided support for some of the Topography features (OSGB version 2.0), Topographic Area, Lines and Points, Cartographic Symbols and Boundary Lines. In version 7.5, we maintain support for these features and add support for Cartographic Text and Departed Features.

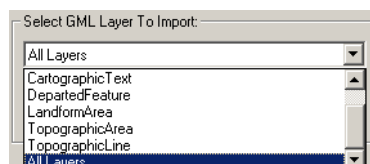
Currently, we support the OSGB recommended styles by mapping the style definitions to existing MapInfo Professional styles. Where it is not possible to render complicated fill patterns, we use the simple dot screen that the OSGB recommended to us. You cannot change the OSGB style mapping to MapInfo styles.

To import GML data into a .tab file:

1. On the **TABLE** menu, click **IMPORT** and navigate to the folder containing your GML files.
2. In the **FILES OF TYPE** drop-down list, select the OS MasterMap (*.GML) option to display the available GML files in the directory. Select the file you want to open and click **OPEN**. The GML Import dialog box displays.



3. Click the **SELECT GML LAYER TO IMPORT** drop-down list to display the layer options.



Note: When you select the DepartedFeature layer, MapInfo Professional imports only the changed features of the selected layer.

4. Do one of the following:
 - Select the layer in the list you want to import.

- Select the **ALL LAYERS** option to import all of the layers and convert them to individual .tab files.

MapInfo Professional 7.0 Users: You may only see the Topographic Area feature type in this list.

MapInfo Professional 7.5 Users: You may notice that both the TopographicArea feature type and the LandformArea feature type display in this list. You can choose to save each of these feature types as a separate table as of this version.

For more about these layers and feature types and how MapInfo Professional handles the Topographic Layer, see [Understanding MapInfo Professional's Use of the Topography Layer on page 158](#).

5. Choose the style you would like to use to display the GML file. Choose one of the following:
 - Click **USE GML STYLE** to display the selected file using the OSGB GML styles
 - Click **USE MAPINFO CURRENT STYLE** to display the selected file using your currently established styles. MapInfo Professional uses the current styles established in the Region Styles dialog box.
6. After you have made these selections, click **OK**. One of these dialog boxes displays:
 - If you selected one layer in [step 4](#), the Import to Table dialog box displays. Choose the directory and file name you want for this file and click **SAVE**. MapInfo Professional saves the file to this directory. Go to [step 7](#) to continue.
 - If you selected **ALL LAYERS** in [step 4](#), the Choose Directory dialog box displays. Select the directory you want MapInfo Professional to place the new .tab files in and click **OK**. A status box displays showing the progress as each layer is converted and saved into a separate .tab file.
7. To open the GML files that are now .tab files, choose **OPEN** from the **FILE** menu and navigate to the directory you specified.

Understanding MapInfo Professional's Use of the Topography Layer

OSGB MasterMap's Topographic Layer contains nine themes including roads, tracks and paths, buildings, landforms, water, height, heritage, structures, and administrative boundaries. You can import these themes as TopographicArea, LandformArea, TopographicLine, TopographicPoint, CartographicText, CartographicSymbols, BoundaryLines, and DepartedFeatures. The TopographicArea feature type contains two 'complexes', Topography and Landform, which contain different polygons of information. The Landform polygons overlap the Topography polygons (which represent land features like slopes and cliffs).

In MapInfo Professional 7.0, we imported the TopographicArea and LandformArea into a single table, which can result in the features displaying in random order. This can lead to TopographicAreas masking Landforms.

In version 7.5, we split the TopographicArea feature type output into two layers so it is possible to save them in different tables. The TopographicArea table now contains only output whose areas defined in the OSGB user guide as being part of the Topography complex or *Structuring Layer*. There is a feature type in the GML Import dialog box called LandformArea, which allows the creation of the LandformArea table. See [Importing GML File Data into .tab Files on page 157](#) for a clearer picture of this process in action.

Displaying Your Remote DBMS Data

The process for displaying spatialized data from Oracle, Informix, or SQL Server is different from the tables we have discussed so far. For more information about accessing remote data, see [Working with Remote Tables and Databases in Chapter 6 on page 225](#).

Displaying and Importing Data from a Web Map Service

A Web Map Service (WMS) is a technology that gives you a source for data over your Intranet or over the Internet. This innovation is based on a specification from the Open GIS Consortium (OGC) and allows you to use raster map images from servers that also comply with the specification. You must specify the coordinate system within your data request to ensure that the images you retrieve “sync up” or register with your other map data.

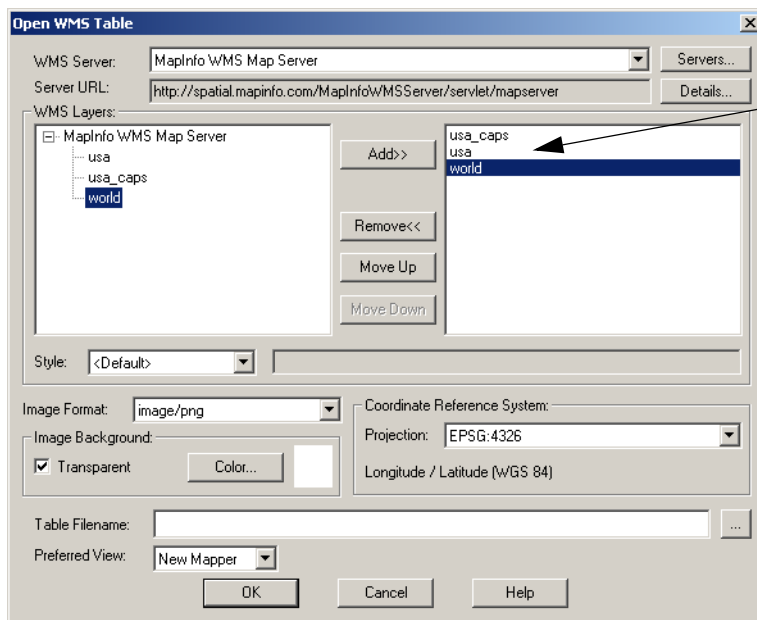
This specification supports transparent pixel definition for image formats as well. This allows you to use the images you retrieve as overlays and not solely as the bottom layer of your map.

This is a very new technology and WMS may not exist for the geography you are looking for. Further, the data that is provided is determined by the WMS Server.

Note: You must have a working Internet connection whenever you retrieve or use WMS data.

To access WMS data and build a .tab file:

1. On the **FILE** menu, click **OPEN WMS** or click  to display the Open WMS Table dialog box.



The order of these layers determines their display order.

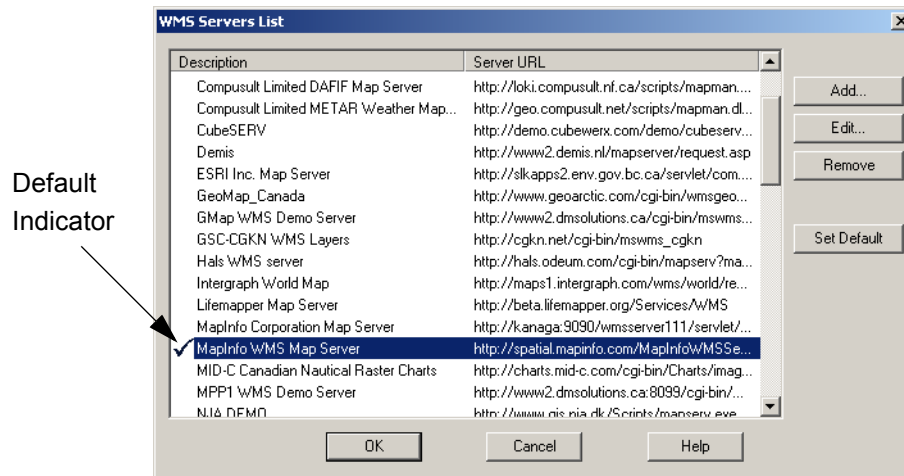
Click the **MOVE UP** and the **MOVE DOWN** buttons to arrange the layers appropriately.

Note: The WMS Servers that display in the WMS Server list are based on a list we have compiled for you. MapInfo has no control over the availability of these servers at any given time. The availability of WMS data depends upon the status of the server and the status of the maps on those servers. You can customize this list to suit your needs.

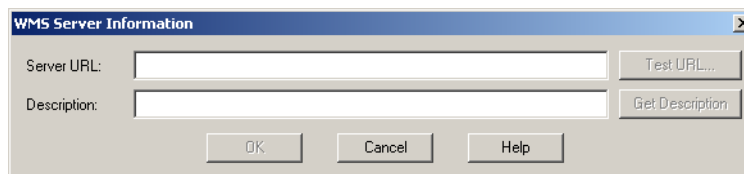
2. To work with the layers from a particular server, select a WMS Server from the WMS Servers drop-down list.

To see the details of a particular WMS Server, including the Server URL, the Server Name, version, and usually a server supplied description, click **DETAILS**.

If you do not see the server you are looking for in the WMS Server drop-down list, click the **SERVERS** button to display the WMS Servers List.



To add new WMS Servers to the WMS Servers List, click the **ADD** button to display the WMS Server Information dialog box. Here you can add the new web server address and description in the fields provided. The WMS Server Information dialog box also displays when you click the **EDIT** button in the WMS Servers List to allow you to change these entries.



Type the URL you want to add in the Server URL field. Click **TEST URL** to ensure that MapInfo Professional can find the server. Click **GET DESCRIPTION** to get the server provided description or type in a description. Click **OK** to return to the WMS Servers list.

In the WMS Servers list, click the **SET DEFAULT** button to select a default server in the list. The default server will be selected the first time you open the WMS Table dialog box. When you set a default WMS server, a check mark displays beside it. If you do not select a default server, MapInfo Professional displays the first server in the list when you begin your WMS Server session.

Note: If you work with a WMS Server that is not the default, MapInfo Professional remembers that new server for the rest of the session and returns to it whenever you return to the Open WMS Table dialog boxes.

3. When you have completed your work in the WMS Servers List, click **OK** to return to the Open WMS Table dialog box.
4. Review the list of available layers for the server you selected and do one of the following:
 - Double-click one or more layer(s) you want to retrieve in the WMS Layers list to move them to the right pane
 - Click each layer you want to retrieve from the server and click **ADD** to move them to the right pane

Note: The topmost layers display over the bottom most layers.

5. Decide how you want to use these WMS server layers and do one of the following:
 - To create a single .tab file with several WMS layers in it, select all of the layers for that .tab file so they display in the right pane. Then organize them in the order you want them to display using the **MOVE UP** and **MOVE DOWN** buttons.
 - To create individual .tab files for the WMS server layers you want, select one layer at a time, select the appropriate Style, Format, and Projection options from their drop-down lists and save the .tab file. Repeat this process for each layer you want to retrieve.

Using either method, you move the layer(s) you selected to the right pane. The Style, Projection, and Image Format information associated this layer or layers change to reflect either the attributes of the single layer or the attributes that all the layers have in common. We describe the process for changing and selecting these attributes below.

Note: To remove a layer from the list in the right pane, select the layer you want to remove and click the **REMOVE** button.

6. If there are styles associated with the layer(s) you selected, they display in the **STYLE** drop-down list. Styles indicate the visual display options available with this layer and are supplied by the web server. Initially, we display the selected layer in the server's default style. The style that displays pertains to the currently selected layer.
To change the style of a layer, click it in the left or right pane and select the style from the **STYLE** drop-down list. The styles you select for a layer do not pertain to any other layer in the list.


Note: You can also change these image display style attributes later (on the **MAP** menu, point to **LAYER CONTROL** and click **DISPLAY** override options. In this dialog box you can change the image's translucency and transparency as well as other raster display properties available in MapInfo Professional.

7. Choose a format for the layer from the **IMAGE FORMAT** drop-down list. The options that display in this list may differ depending upon the formats the server supports and the formats we support. We support: PNG, JPEG (JPG), TIFF (GeoTIFF and TIFF) and GIF formats, in that order of priority.
8. To change the background options, specify them in the **IMAGE BACKGROUND** box. To make the background of your layer transparent, click the **TRANSPARENT** check box and select the color of the background. Click the **COLOR** button to display the list of colors.

Note: The more color depth the image has, the more difficulty you have isolating the background for transparency purposes. If you experience problems with transparency with one image format, try another, if it is available.

9. The **COORDINATE REFERENCE SYSTEM PROJECTIONS** drop-down list displays all of the projections that the selected layers have in common. This list is disabled when the selected layers do not have any projections in common. If the **PROJECTIONS** drop-down list is disabled, you cannot make a map request.

Note: To enable this list, try removing layers one at a time to see if the problem is caused by layers not having projections in common.

10. To enter a name for this table, do one of the following:
 - Click the  button at the end of the **TABLE FILENAME** field to display the Please specify a TAB filename dialog box. Select the path and type the file name in the **FILENAME** field and click **OK**.
 - Type the path into the **TABLE FILENAME** field

- Note:** There are three conditions that might prevent you from saving the .tab file at this point. To save the .tab file you must:
- a. Select at least one valid layer from the WMS Server list
 - b. Layer(s) must contain a supported projection
 - c. Type a valid .tab file name
11. Select the view for this map in the **PREFERRED VIEW** drop-down list to determine where the WMS table should display after you open it. Options include: Automatic, Current Mapper, New Mapper, and No View.
 12. Click **OK** to generate the WMS map request.

Once you have saved a WMS table name, you can change its WMS layer settings using the WMS Table Properties dialog box. To access this dialog box, go to the **TABLE** menu and click **WMS TABLE PROPERTIES**. When the WMS Table Properties dialog box displays, select the layer you want to edit and change the settings for that layer. You can also add, remove, and reorder the WMS layers, change the projection, image formats, and background options of the layers. Remember, you can edit the display attributes for the WMS table using Display Style override commands in Layer Control.

How Does MapInfo Professional Use WMS Servers?

When you create a .tab file from WMS Server layer(s), you are actually creating a pointer to an XML file that keeps track of the data you selected, (the server address, the selected layer(s), the styles, the format, and the projection settings). You never actually retrieve the data and save it on your computer. Every time you add a WMS Server table as a layer in a Map window or you change the view of the Map, the system generates a map request and retrieves the layer information. To do this, the .tab file points to an XML file which retrieves the information from the WMS Server and displays it on your computer. If you are not connected to the Internet, the server is unavailable, or the WMS layer(s) you are retrieving are not available, you cannot use the WMS .tab file.

Projection Issues Associated with WMS

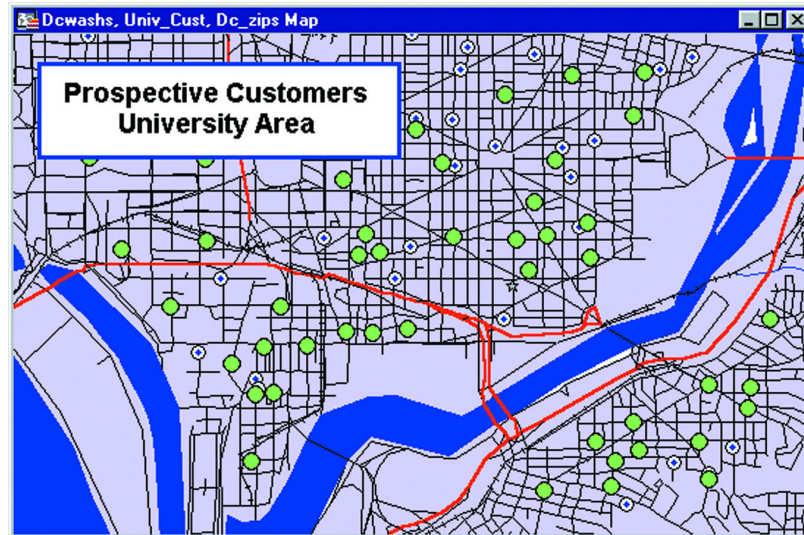
The coordinate system used in the map image is very important. It is what enables various layers to line up properly. Make sure you retrieve WMS Server images that you can use with the other maps you use. Keep in mind that the raster layer always determines the projection of the map. If there is more than one raster layer in a map, the largest raster layer determines the projection of the map.

Geocoding - Assigning Coordinates to Records

To display your data on a map, you must first assign X and Y coordinates to each record. One way that MapInfo Professional assigns these coordinates is by matching geographic information in your database table to geographic information in another table (referred to as a *search table*) that already has X and Y coordinates associated with it.

For example, you want to assign X and Y coordinates to a customer record whose address is 127 Winston Ave. MapInfo Professional reads that address and looks for a matching address in the search table, such as a StreetPro table. (This search table already has X and Y coordinates associated with its records.)

When MapInfo Professional matches 127 Winston Ave in your table to 127 Winston Ave in the search table, it assigns the corresponding X and Y coordinates to your record. The geocoded point becomes part of your database. You can then view these points by displaying your table in a Map window.



What Should I Ask First?

It is important to know your data and what you want to use it for before you select a method of geocoding. Ask yourself these questions:

What kind of geographic information do I have in my database?

Do you have street addresses, towns, cities, postal codes, states, countries? Do you have potentially ambiguous information? For example, if you have a database of customer street addresses, will you have 125 Main Street in Smithtown and a 125 Main Street in Nassau? If so, you may have to refine your search using town boundaries or postal codes.

What kind of maps do I have to work with?

You will need computerized maps that are at the level of detail that match your data. For example, if you want to geocode a database of customers in specific counties by street address, you will need maps of the desired counties that go to street level. A map of the United States that only goes to a county level would not work for you. You can purchase the appropriate maps for your geocoding application from MapInfo Professional or your reseller.

How geographically accurate does the placement of my data have to be?

Taking into account the first two questions, you must decide how accurate the geocoding must be. If you are trying to pinpoint the locations of cable wires, crime scenes, or fire hydrants, a high degree of accuracy is needed. In this case, you should geocode your data to street level.

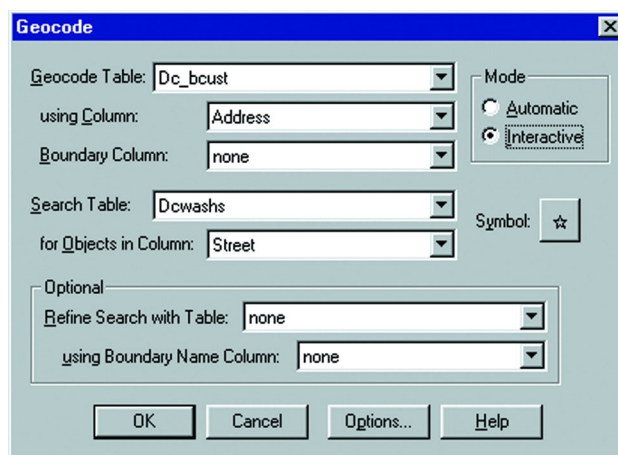
If, however, you are going to use your data to thematically shade postal code boundaries, town boundaries, county boundaries, state boundaries, or country boundaries, you may not need a high degree of accuracy.

In this case, geocoding against boundary files such as USZIPBDY.tab, which we provide, would be sufficient for your needs. Since this file does not include point postal codes (postal codes assigned to a single building or company), the hit rate may not be as good as when you geocode by street.

Understanding the Geocoding Process

To assign X and Y coordinates to the records in your table, choose Geocode from the Table menu. MapInfo Professional displays the Geocode dialog box, where you enter the following information:

- The name of your table for which you want to assign X and Y coordinates.
- The column in *your table* that contains the geographic information that will be used for matching.
- The name of the *search table* containing the geographic information that will be used for matching.
- The search table column containing the geographic information for matching:



The dialog box also offers you the option of geocoding your data in two modes: *automatically* or *interactively*. When you geocode a table automatically, MapInfo Professional geocodes exact matches only and ignores all other records. It is the faster method, since MapInfo Professional requires no user interaction once the geocoding process begins. When you geocode a table interactively, MapInfo Professional pauses when it fails to match a record and lets you select from a list of close matches. For more about the automatic and interactive geocoding modes, see [Modes of Geocoding on page 165](#).

Note: We recommend that you geocode your table automatically first and then go back and geocode interactively to match the remaining records.

Not Getting Geocoding? Try this Example...

The objective of geocoding is to place point objects into your database. Let us call this table the *target* table. The geographical coordinates are from a *source* table, which is a mappable table. To geocode a record:

- MapInfo has to match an address in the target table with an address in the source table

and

- Get geographic coordinates from the source table and use them to create a point object in the target table

Most of the problems in geocoding occur in the first step, matching addresses in the source and target tables.

Modes of Geocoding

MapInfo has two geocoding modes: automatic and interactive. The process MapInfo uses to match target addresses with source addresses is the same in both modes.

Automatic mode matches addresses based on the choices in the Geocode dialog box.

Interactive mode stops at each address that does not meet the geocode parameters and permits you to assist in the matching process.

In most cases, the best geocoding strategy is to:

- Geocode in automatic mode then
- Geocode in interactive mode to deal with the records MapInfo was unable to handle automatically.

Geocoding Automatically

For this example, we use the US_ZIPS.tab as a search file. This is a file that is included with MapInfo Professional which contains the ZIP Code points for every postal code in the U.S. If your data includes zip codes, this might be an effective way for you to geocode your data. Automatic geocoding is the default mode.

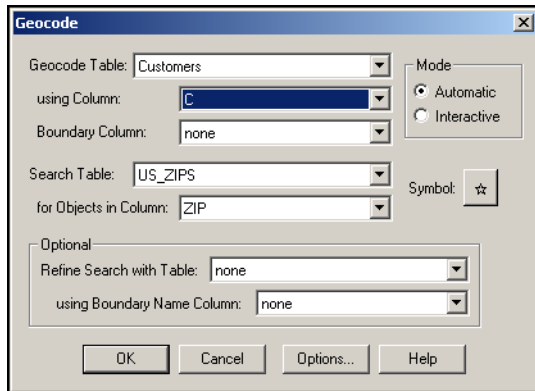
Note: Make sure you have created a .tab file for your data before beginning the geocoding process. For more about this process, see [Creating a .tab File from your Data on page 149](#).

To geocode using the US_ZIPS.tab file:

1. On the **FILE** menu, click **OPEN** and navigate to the US_ZIPS.tab. This data is available on the MapInfo web site in the MapInfo Professional Tutorial Data.

Note: You can use a wide variety of tables to geocode against. Use a street map when you are geocoding to addresses.

2. On the **TABLE** menu, click **GEOCODE** and complete the dialog box.



Select your target table from this list.

Identify the column your data is in. (In this example, postal codes are in column C of the Customers table.)

Select the source table name in this list. (In this case US_ZIPS.tab.)

3. Set every other entry to **NONE**.
4. Click **OK** to geocode the data.

Geocoding Interactively

When you geocode interactively, **you are not changing the data**. You are merely redirecting MapInfo Professional to look for different information.

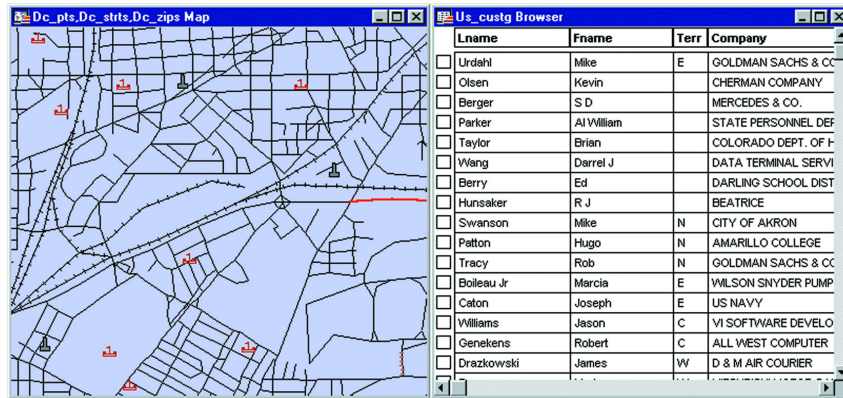
For example, your data record reads Cherryville St. When you geocode interactively, you find that the data record should read Cherry Vale St. You select Cherry Vale St from the list of alternatives. Although MapInfo Professional assigns X and Y coordinates from Cherry Vale St to that record, you have not altered the record in any way. To change the spelling in your database, you must edit the record in a Browser window.

Geocoding Manually

Automatic and interactive geocoding work well for databases with “clean” data. Sometimes, however, you know where a point should be on the map, but the location data does not allow for a match. Manual geocoding is the process of placing your data records on the map by clicking its location on the map. This method works best when you have a small table which contains data that you are very familiar with.

To geocode a table manually:

1. Open the table with the reference map in it.
2. Open your table and add it to the current Map window.
3. On the **MAP** menu, click **LAYER CONTROL**.
4. Select your table and make that layer editable. Click **OK**.
5. On the **WINDOW MENU**, click **NEW BROWSER WINDOW**. Select the table to geocode.
6. On the **WINDOW MENU**, click **TILE WINDOWS** to display your Map and Browser windows side by side.



7. Scroll through the Browser to find the record that you would like to geocode. Click in the box to the left of the row to select the record.
8. Click in the title bar of the Map window. The Symbol tool on the Drawing Toolbar is now available.
9. Select the **SYMBOL** tool.
10. Click the map where you want the point placed for the selected record.
11. On the **FILE** menu, click **SAVE**. The selected record is now geocoded. Repeat steps 7–10 for each record you would like to manually geocode.

Methods of Geocoding

In addition to geocoding automatically and manually, you have choices in how precise you want the geocoded record to be. Let's look at the variety of ways you can geocode your table.

Geocoding by Address

Street addresses typically consist of two or three components:

- Street number
- Street name
- Apartment, Suite, Floor, Room number or some other piece of information. Many addresses do not have this component

MapInfo has one procedure for dealing with the street number and another procedure for dealing with the street name. MapInfo deals with the third component, if present, as though it were a part of the street name.

When you geocode your table with street addresses, MapInfo Professional matches the addresses in your table to the street names and address ranges in a street table, such as StreetPro (MapInfo's premier streets data product) and assigns X and Y coordinates to your records. When you display your records, MapInfo Professional will spot the record at the location of the record's address. MapInfo Professional places the record on the proper side of the street, offsets it from the side of the street to the specified distance, and insets it from the end of the street the specified percentage of the line. The Options dialog box controls these parameters. For more about setting the street offset in the Options dialog box, see [Street Offset on page 170](#).

Geocoding by Boundary

In computer mapping, the term boundary is used to designate enclosed regions or areas such as countries, cities, and postal codes. When you geocode your table with boundaries, MapInfo Professional matches the boundary name in your table with the boundary name in the search table. MapInfo Professional assigns the boundary centroid X and Y coordinates to your data records. The *centroid* of a boundary is its approximate center point.

For example, you have a table of wholesale outlet stores. You want to assign X and Y coordinates to each record according to county. MapInfo Professional reads the county name from your table, matches it with the county name in the search table, and assigns the county centroid coordinates to each of your records. The outlet locations will display at the county centroid in a Map window.

Geocoding by US_ZIPS.tab (Postal Code Centroid File)

US_ZIPS.tab is a point file that is included with the base MapInfo Professional package. The file consists of postal code centroid points for every postal code in the United States. This file can be used to geocode any database that includes postal code information. This file includes point postal codes that are assigned to single buildings or companies.

You can use any of the above methods to geocode your records, or you can use a combination of address and boundary geocoding to increase the potential for a successful match.

Finding an Exact Street Match

When MapInfo geocodes, it attempts to find an exact match between source and target street names. That means that the addresses must be the same, character for character. However, matching is not case sensitive; upper and lower case letters are successfully matched with one another. MapInfo does not get an exact match in many cases and uses a file of abbreviation equivalences to improve its “hit rate”. Once you understand the various ways in which a match can fail, you are in a better position to understand what you can do to improve things.

The next table illustrates exact matching. The first column contains a street name from a target table and the second column contains the corresponding street name from a source table. The third column says why they do not match. The fourth column indicates whether the particular problem is one which can be corrected through using the abbreviation equivalence file. This table assumes that the addresses are the contents of a single column in a table. While the street number would often be in the same column, we don't indicate street numbers here because they are handled differently than street names.

Target Address	Source Address	Comment	Correctable with Abbreviation File?
LaSal St	LaSalle St	“LaSal” is the wrong spelling.	No
La Salle St	LaSalle St	“La Salle” is the wrong spelling.	No
LaSalle Ave	LaSalle St	“Ave” does not match “St”.	No

Target Address	Source Address	Comment	Correctable with Abbreviation File?
LaSalle Street	LaSalle St	"Street" does not match "St".	Yes
LaSalle Ave	LaSalle Av	"Ave" does not match "Av".	Yes
LaSalle St.	LaSalle St	The target address has a period after "St". That period is not in the source and causes the match to fail.	Yes
LaSalle	LaSalle St	"St" is missing from target.	No
LaSalle St	LaSalle	Target has "St" and source does not.	No
LaSalle St North	LaSalle St	Target has "North," which is not in source.	No
LaSalle St North	LaSalle St N	Target has "North" instead of "N".	Yes
North LaSalle St	N LaSalle St	Target has "North" instead of "N".	Yes
North LaSalle St	LaSalle St	Target has "North," which is not in source.	No
LaSalle St Apt 3	LaSalle St	Target has an apartment number which does not match anything in the source.	Yes
Tenth St	10th St	"Tenth" and "10th" do not match.	Yes
10th Av	Tenth Av	"10th" and "Tenth" do not match.	Yes
Saint John's Lane	St John's Lane	"Saint" and "St" do not match.	Yes

MapInfo's matching process is not case-sensitive; it does not care whether a letter is upper case or lower case. This means that MapInfo treats the following as the same: Main, MAIN, main, maIN.

MapInfo Professional has a file called the Abbreviations File (MAPINFOW.ABB), which you can use to record acceptable alternate spellings for abbreviations. For example Av for Ave. or BL for Blvd. etc. Using this file increases your hit rate because there are more acceptable spellings for the same abbreviations. For more about the Abbreviations File, see [Solving Problems with Abbreviations and Substitutions on page 180](#).

Placing Geocoded Points

When you are geocoding to street level (by address), you can specify certain aspects of the resulting points' position in relationship to the street. You can specify the offset of the point from the side of the street, and the inset of the point from the end of the street.

Street Offset

The street offset is the distance the geocoded point is set from the side of the street. To set this distance:

1. On the **TABLE** menu, click **GEOCODE**. The Geocode dialog box displays.
2. Fill in the table and column information for the dialog box.
3. Click the **OPTIONS** button. The Geocode Options dialog box displays.

4. In the Offset Address Location group, specify a distance and distance unit.
If you choose 12 meters, the point will be offset 12 meters back from the side of the street. You can specify any distance from 0–32,767 and a wide variety of units including meters, miles, yards, U.S. Survey feet.
5. You can also specify a street inset, or click **OK** to return to the Geocode dialog box.

Street Inset

The street inset is the distance a geocoded point is set from the end of the street. You can specify a distance, or you can set the inset to be a percentage of the length of the street. To avoid skewing the position of inset points, MapInfo Professional performs a proportional calculation that insets the points located at either end of the street the specified percentage or distance, but that decreases the inset as point locations approach the center. Points located at the center of the street remain in their original position.

To set the street inset:

1. With the Geocode Options dialog box still open, choose how you want to specify the street inset in the Inset Address Location group: as a percentage of the length of the street, or as a distance.
2. Click the radio button next to the option you want. Specify one of the following:
 - **PERCENTAGE** – Specify a percentage (0–50) to calculate the street inset.
 - **DISTANCE** – Specify a distance (0–32,767) and distance unit.
3. Click **OK** to return to the Geocode dialog box.

4. Double-check your geocoding settings, and click **OK** to geocode the table.

MapInfo Professional uses the last inset and offset settings you specified as the default settings for your next session.

If you specify a street offset of a given distance and set the street inset to zero, you may get unexpected, albeit correct, display results. Points located at the end of adjoining or intersecting streets might overlap each other. On your screen, they will look like they are located on the wrong street. If you specify a street inset, the problem will correct itself.

Matching Street Names

MapInfo begins by comparing the street address in the target table with the street addresses in the source table. When it finds an exact match, it may be finished or it may have to deal with region information, such as town, county, or postal code area.

When MapInfo cannot match the street name for a particular row, it applies the abbreviation file to the target address. This file consists of pairs of items, such as “STREET ST” and “AVE AV”. When MapInfo finds “STREET” in a target address, it changes it into “ST”; similarly it changes “AVE” to “AV”. MapInfo doesn’t actually change your data in the target table. It substitutes abbreviations only for the purpose of making matches. The substitution is only effective during the matching process. The address in your table remains the same. It does not write the correct address form back to your table.

Once MapInfo has made an abbreviation substitution it attempts to match the resulting street name against the street names in the source table. When it fails to find an exact match at this point it:

- Moves to the next row (when it is geocoding in automatic mode).
- Presents you with the closest matches (when it is geocoding in interactive mode). You then pick the best match. MapInfo then goes to the next row.

At this point MapInfo will have done the best it can at identifying street names. The next step is to deal with address numbers for those addresses where it has matched a name.

Matching Address Numbers

Given that MapInfo has identified a street, it now has to deal with street numbers. MapInfo stores address ranges with each street segment. MapInfo takes the street number from the target address and compares it to the ranges for each segment in the source table. For example, assume that we are trying to match “343 LaSalle St”. MapInfo stores the beginning and ending address for each segment, differentiating between left and right sides of the street, as follows:

Name	FromLeft	ToLeft	FromRight	ToRight
LaSalle St	269	331	268	330
LaSalle St	333	375	332	374
LaSalle St	377	401	376	400

To match “343 LaSalle St” MapInfo would scan the address ranges until it finds the one where “343” goes. Since 343 is between 333 and 375, MapInfo will locate this address on that street segment (the middle one in the table).

Once MapInfo has matched an address number to a street segment it moves to the next row. When it fails to match a target street number to an address range on the appropriate street it:

- Moves to the next row if it is geocoding in automatic mode.
- Presents you with the closest matches if it is geocoding in interactive mode. You then pick the best match. MapInfo will then go to the next row.

At this point MapInfo will have done the best it can at locating address numbers. Note that one of the options (on the Geocode Options dialog box) is to have MapInfo automatically pick the closest address range in those cases where there is no exact match—Use The Closest Address Number. For example, you might have “412” as an address number, but no range which includes that number. However, there is a range which goes from 346 to 400. Since that is the range closest to 412, that is where MapInfo will geocode 412 if you have chosen this particular option.

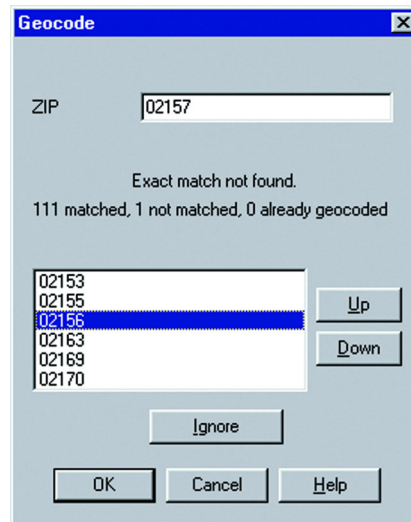
The next step is to deal with addresses which have been located on more than one street.

Matching to Region

When MapInfo is geocoding it checks to see how many occurrences of the target address exist. If there is more than one, MapInfo must decide which source address to use. If the user’s target table has a column with region data, MapInfo can refine geocoding within a boundary.

For example, assume that you are geocoding a database of records in Cook county, Illinois. The address in the database reads 200 Washington St. Within the county of Cook, there are eight towns. Four of these towns have a Washington St. Three of the four have a 200 Washington St. MapInfo must now place the target address in the appropriate town. MapInfo uses region information to do this. MapInfo now matches a region designation for the target address against the region designator for the source addresses.

When you originally set up your geocoding operation, you had an opportunity to specify a region (boundary) to use in refining your geocoding operation. This dialog box displays when you choose Refine Search with Table and using Boundary Name Column. If you specified a postal code table you enter the postal code and MapInfo Professional returns possible matches.



You could use any one of several different region types, including county name, town name, and postal code. Since almost all addresses contain postal codes, this is the most reliable way to refine your search.

When you set MapInfo to use postal codes to refine its address matching, MapInfo will match the postal code of the target address against the postal code of the various matching source addresses. When it finds the correct match, it is finished with the geocoding process. MapInfo can now get coordinate information from the source table and use it to place a point object into the target table.

However, once MapInfo has completed this process, many addresses may be unmatched. You can match each one of them individually by geocoding in interactive mode. However, if you are working with a large database, you want to do as little of this as possible. There are other ways of improving MapInfo's geocoding performance.

In the Geocode Options dialog box, you can specify that MapInfo automatically pick a different boundary, providing there is only one, from the one you specify (Use A Match Found In A Different Boundary). You might have had MapInfo geocode addresses to Northtown. One particular address, "223 Locust Ct." is not in Northtown, but it is in Westville, and no place else. In this case, MapInfo would geocode "223 Locust Ct." to Westville. However, if MapInfo had found a "223 Locust Ct." in Westville and another one in Center Valley, it would not geocode the address to either town. It would leave "223 Locust Ct." ungeocoded.

After Geocoding

This section includes some tasks that will be useful in handling records after you have geocoded your table.

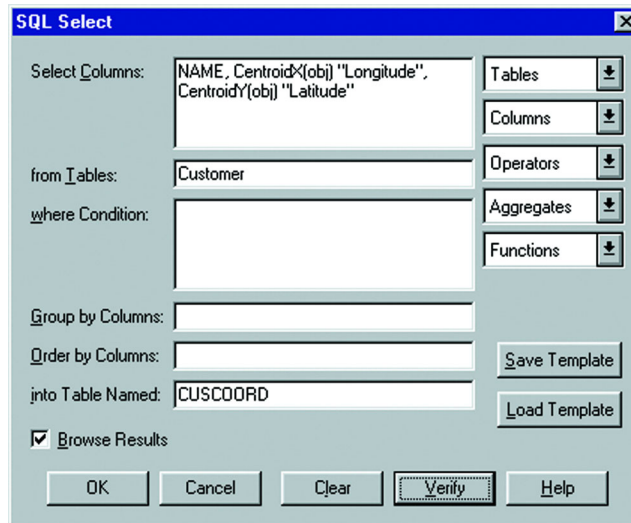
Extracting Longitude and Latitude from a Geocoded Table

To extract the longitude and latitude coordinates from a geocoded table, you can either create a new table containing the latitude and longitude for each of the points in your original table, or use the update command to put the longitude and latitude into the original table. The original table must be geocoded for these processes to function correctly.

Extracting Latitude and Longitude into a New Table

In this example we will create a new table, called CUSCOORD, that contains the latitude and longitude for each of the points in the original table, Customer.

1. On the **FILE** menu, click **OPEN** and open the table as a Browser.
2. On the **QUERY** menu, click **SQL SELECT** and fill in the SQL Select dialog box.



Note: Any columns from the CUSTOMER table that you would like to appear in the CUSCOORD table should be listed in the Select Columns box; then add the centroidX(obj) and centroidY(obj) functions to this list.

3. Click **OK** to execute the query.
4. On the **FILE** menu, click **SAVE COPY As** and save the resulting CUSCOORD table.
Original Table:

LNAME	FNAME
<input type="checkbox"/> Urdahl	Mike
<input type="checkbox"/> Olsen	Kevin
<input type="checkbox"/> Berger	S D

Resulting Table:

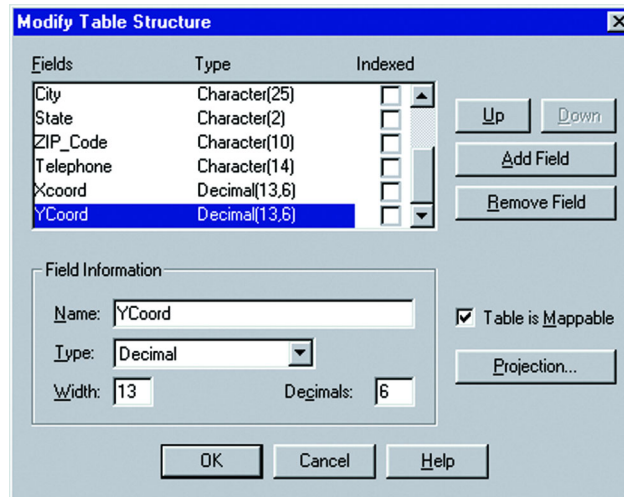
FNAME	LNAME	Longitude	Latitude
<input type="checkbox"/> Mike	Urdahl	-76.8521	39.172
<input type="checkbox"/> Kevin	Olsen	-96.7904	32.8651
<input type="checkbox"/> S D	Berger	-118.396	33.8652

Extracting Latitude and Longitude into the Original Table

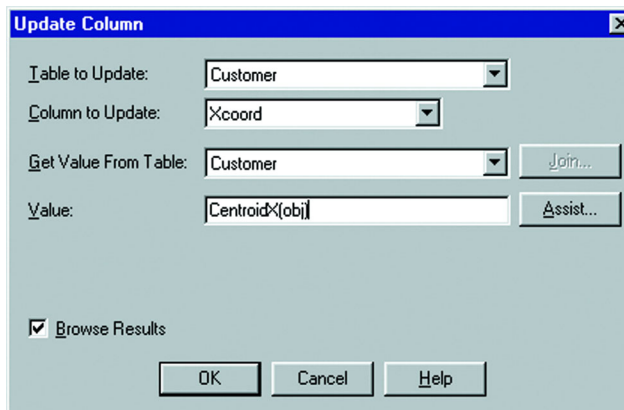
The following process will let you update your original table with the latitude and longitude coordinates.

1. On the **TABLE** menu, point to **MAINTENANCE** and click **TABLE STRUCTURE**.

- To add two new columns to your table, click **ADD FIELD** and name the columns. They should be defined as decimal (13,6). For this example, the columns are called Xcoord and Ycoord.



- After adding the columns, click **OK**. When you return to your main MapInfo Professional window, the file will not be displayed. To redisplay your table, on the **WINDOW** menu, click **NEW BROWSER WINDOW**.
- On the **TABLE** menu, click **UPDATE COLUMN**. Specify your table and your column to update. In the next example, we are updating the Xcoord column. The Get Value from Table portion of the dialog box will be the same table as specified in the Table to Update box. In the Value portion of the dialog box, you can type in Centroidx(obj) or you can click the **ASSIST** button to display the Expression dialog box. Click **FUNCTIONS** and choose **CENTROIDX** from the list and click **OK**.
- Fill in the Update Column dialog box and click **OK**.



- Repeat step 3 to update the Ycoord column. Substitute Centroidy(obj) instead of Centroidx(obj).

Table in a Projection Other than Longitude/Latitude

MapInfo Professional maps have two attributes that affect the coordinates of objects within the map; these are the coordinate system of the map and the coordinate settings of the Map window. To correctly extract the x and y coordinates of a projected earth map, both the Map window and

the map's internal coordinates must reflect the same coordinate system. In MapBasic, the SET MAP statement sets the coordinate system for the Map window, while the COORDSYS clause sets the internal coordinates.

To extract coordinates from a projected map in the native coordinate system of the table:

1. Display a map of the geographic area that you are working in.
2. On the **OPTIONS** menu, click **SHOW MAPBASIC WINDOW** to open the MapBasic window.
3. Type: "SET COORDSYS TABLE <TABLENAME>". Tablename is the table that you are extracting coordinates from.
4. Press **ENTER**. This sets the internal MapBasic coordinate system equal to the table given.
5. Now update the x, y values with the CentroidX and CentroidY functions.

Displaying your Coordinate Data in a Browser

The Coordinate Extractor tool is another MapBasic tool that ships with MapInfo Professional. Coordinate Extractor offers you another way to display the coordinate information in your mappable table in a Browser. The program extracts the coordinates from the objects in a table and places them in columns using the table's native projection or a different one of your choice. It will also create the coordinate columns for you if you specify it. Coordinate Extractor is loaded from the Tool Manager. For more about adding a tool using the Tool Manager, see [Accessing and Loading the Tool Manager Tools on page 143](#).

To use the Coordinate Extractor:

1. On the **TOOLS** menu, point to **COORDINATE EXTRACTOR** and click **EXTRACT COORDINATES**. The Coordinate Extractor dialog box displays.
2. Select the table that you want to extract the points from.
3. Indicate the columns you want to use for the X and Y coordinates, or click the **CREATE NEW COLUMNS TO HOLD COORDINATES** button to have the tool add the columns. When you click this button, a dialog box displays asking you to name the columns.
4. Select the **BROWSE RESULTS** check box to have the results displayed in a Browser window after the operation is completed.
5. Click **OK**.

The Coordinate Extractor tool can be used on mappable tables that contain at least one geographic object. This tool cannot be used on the following types of tables:

- Query
- Read-Only
- Seamless
- Remote
- Raster

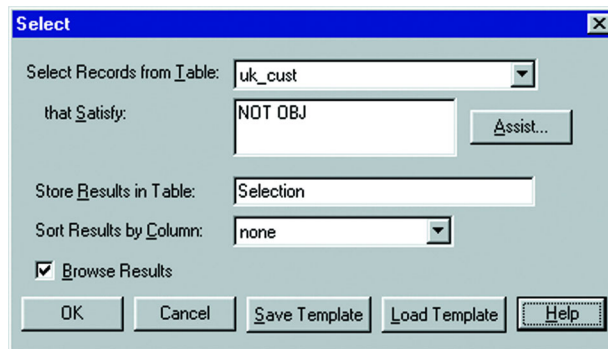
It is recommended that you use float type columns for the coordinates. Other column types may not be able to fit all the coordinate information in the column. If you select character columns, the coordinate values will include six digits after the decimal place.

To take out the coordinate information after you have used Coordinate Extractor, revert the table.

Selecting Records Not Geocoded

Your geocoded table may have records that did not geocode, or you may have added new data to your table that have yet to be geocoded. There is a simple selection that can be performed to get a Browser list of the records not geocoded.

1. Open your table if it is not open already, and on the **QUERY** menu, click **SELECT**.
2. Fill in the Select dialog box. The expression used is "NOT OBJ." This selects all of the records that are not objects, i.e., not geocoded. Click **OK**.



Locating Newly Geocoded Points

One of the most satisfying results of geocoding is seeing your points displayed correctly on the map. Depending on the settings of your map, newly geocoded points may or may not be visible immediately. Follow these steps to attempt to locate newly geocoded points on the map.

1. Make sure that the Map window is active by clicking in its title bar.
2. On the **MAP** menu, click **LAYER CONTROL**. Make sure that the table you geocoded is listed in the Layer Control dialog box.
If the layer you are looking for is not listed, click the **ADD** button and add that layer.
3. In the Layer Control dialog box move the geocoded table to the top, just below the Cosmetic layer, to ensure that the points are not obscured by any other layer.
4. Make sure that the geocoded layer is set to visible. Click **OK** and exit Layer Control.
If your points are still not visible, proceed to step 5.
5. On the **MAP** menu, click **VIEW ENTIRE LAYER**. Select your table and click **OK**. This should put all of the points from your table in view. You may see that your points are on the map, but are not in the location you expected them to be. If they seem misplaced, see [Ungeocoding a Table on page 178](#).
6. If your points still do not display, on the **MAP** menu, click **LAYER CONTROL**. Select the layer containing your geocoded points, and click **DISPLAY**.
7. Select the **STYLE OVERRIDE** check box and choose a symbol style that will stand out on your map. Click **OK**, and click **OK** again to exit Layer Control.

After following these steps, if you have not found the points that you geocoded, try to select all of the ungeocoded records as described in the section [Selecting Points Not Geocoded](#).

Result Codes

When you are using the result code option (in Geocode Options dialog box) MapInfo will generate a code for each record. These codes indicate the steps MapInfo Professional took to geocode the record, whether or not the geocoding was successful, and whether or not the match was exact. You can use return codes to diagnose MapInfo's geocoding performance. It will help you spot "false positives" resulting from using various geocoding options and to analyze why some records have not been geocoded.

Ungeocoding a Table

Ungeocoding is the process of removing objects that have been attached to data records. There are times when it will be necessary to ungeocode an entire table or selected records in a table. For example, you have geocoded a database of customers using US_ZIPS.tab. Later, you want to geocode the database again, using street addresses instead of postal code centroids since the geocoding will now be more precise. MapInfo Professional allows you to delete all graphic objects associated with this table. You can then geocode your database again, using more specific coordinates. Ungeocoding only selected records from your table is useful when the location information changes for a relatively small number of records, such as address changes in a geocoded list of customers.

To ungeocode an entire table:

1. On the **TABLE** menu, point to **MAINTENANCE** and click **TABLE STRUCTURE**. The Modify Table Structure dialog box displays.
2. Clear the **TABLE IS MAPPABLE** check box. Click **OK**.

CAUTION: This action will remove all graphic objects from your table. This action cannot be undone. If you are unsure of losing your points, save a copy of the table first.

3. A warning dialog box appears. If you are sure about removing all the objects, click **OK**. All graphic objects have now been removed from your table.

Make sure that you don't ungeocode your source tables. Unless you have created a backup of that table, you will no longer be able to display that table as a map or use it for geocoding.

Ungeocoding Selected Records

To ungeocode selected records:

1. Display your geocoded table as a map, and select the records that you would like to ungeocode.
2. On the **MAP** menu, click **LAYER CONTROL** and set the layer to be editable.
3. On the **EDIT** menu, click **CLEAR MAP OBJECTS ONLY**. This removes the object on the map while maintaining the record in the browser.

Note: To this operation, on the **EDIT** menu, click **DELETION**.

Resolving Geocoding Issues

MapInfo Professional can rarely assign X and Y coordinates to all of your records on the first try, especially when geocoding to street level. It is not uncommon to have a geocoding hit rate of under 50% on your first attempt. The information in your database may not exactly match the information in the search table. MapInfo Professional-based maps are updated regularly, but may not include the most recent changes (for example, new subdivisions or postal code boundaries).

And there can be other problems. The abbreviations that you use in your table may not match the abbreviations that MapInfo Professional recognizes. For example, the records in your table may use abbreviations like Circ. for Circle and Pl. for Plaza. MapInfo Professional only recognizes Circle or Cir for Circle and Plaza or Plz for Plaza. When it cannot match an abbreviation, it does not geocode the record.

That is why MapInfo Professional gives you the option of geocoding your database interactively. There are a number of methods for geocoding records that don't have an exact match. The following is a list of potential geocoding pitfalls and how to avoid or rectify them.

Spelling Errors in Your Data Records

Keep in mind that MapInfo Professional looks for exact matches. If the information in your database does not exactly match the information in the search table, MapInfo Professional ignores that record during an automatic geocoding pass. Lasalle St and La Salle St are not exact matches nor are Main St and Maine St.

If you go through the geocoding process again using the interactive mode, MapInfo Professional will give you a list of close alternatives. Choose the closest match by scrolling through the list with the Up and Down buttons. You can also choose Ignore if the correct alternative is not listed.

MapInfo Professional generates its list of close alternatives alphabetically. For example, if MapInfo Professional cannot find Booker St in its database, it will generate a list of alternatives that are close to Booker St alphabetically (Bookman St, Brooker Ave, Brooks St). However, if the spelling error occurs in the first letter of the address (Booker St should really be Zooker St), you will either have to use the Up and Down keys to scroll to the correct spelling or enter the correct spelling directly.

Incorrect Address Number in Your Data Records

If your record has an address number that does not match the one in the table you are matching against, MapInfo Professional skips the address during automatic geocoding and gives you a list of known address ranges during interactive geocoding. Select the closest address range from the list or press Ignore to skip the record. Depending on the precision with which you want your records to spot on the map, choosing a close address range is probably fine.

You can also have MapInfo Professional select the closest address from the list automatically. Select Options in the Geocode dialog box. MapInfo Professional gives you the option of assigning the closest address number when an exact match cannot be found.

Choosing the closest address does not change the address in your table. MapInfo Professional only uses the coordinates from that address to spot your record at that location.

Incompatible Abbreviations

If you geocode automatically and find that you have an extremely low hit rate, your database of street addresses may use abbreviations that MapInfo Professional does not recognize. For example, all of your records might use Str as the abbreviation for Street. MapInfo Professional, on the other hand, uses the abbreviation St for Street. Another example: Your database contains addresses that spell out the street numbers (127 Fourteenth St) while MapInfo Professional's table uses the numbers (127 14th St).

Instead of editing all your records, a potentially time-consuming task, you can change which abbreviations are recognized. There is an abbreviation file (MAPINFOW.ABB) that you can modify so that MapInfo Professional will recognize your abbreviations.

Solving Problems with Abbreviations and Substitutions

Your target table may contain address components which MapInfo cannot handle with its abbreviation file. For example:

Ave.	Does not recognize the period.
Suite	Does not recognize this at all.
WK	Does not recognize this at all.
#	Does not recognize this at all.

You can deal with this problem in two ways:

- Edit addresses in your target table so that it contains items MapInfo can handle.
- or
- Edit MapInfo's abbreviation file so that it can deal with your addresses.

In many cases, the second alternative is easier. MapInfo's abbreviation file consists of pairs of items. The second item in each line is the abbreviation for the first. In working with street files MapInfo searches through the address file to match an item in a target address with the first element in one of the pairs in the abbreviation file. When it finds a match it replaces the matching items with the proper abbreviation.

MapInfo supplies this abbreviation file:

```
!Version 3.0
FIRST 1ST
SECOND 2ND
THIRD 3RD
FOURTH 4TH
FIFTH 5TH
SIXTH 6TH
SEVENTH 7TH
EIGHTH 8TH
NINTH 9TH
```

```

TENTH 10TH
NORTH N
SOUTH S
EAST E
WEST W
ALLEY AL
AVENUE AV
AVE AV
BOULEVARD BLVD
BRIDGE BR
CIRCLE CIR
COURT CT
DRIVE DR
EXTENSION EXT
HIGHWAY HWY
INTERSTATE I
LANE LN
MOUNT MT
PARK PK
PARKWAY PKWY
PLACE PL
PLAZA PLZ
POINT PT
RAILROAD RR
ROAD RD
ROUTE RT
SAINT ST
SQUARE SQ
STREET ST
STR ST
TERRACE TER
!EOLNOSPACE
'
;
#
!EOLSPACE
FLOOR
SUITE
"P.O. BOX"
!NOSPACE
.
\"
\!
\\
!SPACE
"STATE HIGHWAY"STHWY"
"N ST"NORTH ST"
"S ST"SOUTH ST"
"E ST"EAST ST"
"W ST"WEST ST"
"N AV"NORTH AV"
"S AV"SOUTH AV"
"E AV"EAST AV"
"W AV"WEST AV"

```

You can make additions to this file to take care of various problems. Most importantly, you can make several different kinds of additions. MapInfo recognizes four classes of substitution items and it interprets these classes differently. Each class is preceded by the keyword used to identify it in the abbreviation file:

Substitution Class	Keyword
Space-delimited simple substitution	!SPACE
Simple truncation	!EOLNOSPACE
Space-delimited truncation	!EOLSPACE
Simple substitution	!NOSPACE

In order for MapInfo to know how to interpret a line, or set of lines, in the abbreviation file, you have to precede the line with the keyword which indicates the appropriate interpretation strategy.

When all of the entries in the abbreviation file use the default interpretation, there is no need to precede any of them with a keyword. When there is no keyword at the beginning of the abbreviation file, MapInfo will treat the initial entries as requiring the default interpretation. Once you add other types of substitution pairs, however, you have to start adding keywords.

Ambiguous Address Produces More Than One Location

Sometimes your table may contain records that have the same address, but lie in different towns. If you only geocode by street address, MapInfo Professional cannot differentiate among the records to give each one unique coordinates.

To solve this problem, MapInfo Professional allows you to geocode against a boundary in addition to the street address to find the correct match.

For example, you want to geocode your database of records in Cook County, Illinois. One address in the database reads 200 Washington St. Within the county of Cook, there are eight towns. Four of these towns have a Washington St. Three of the four towns have a 200 Washington St.

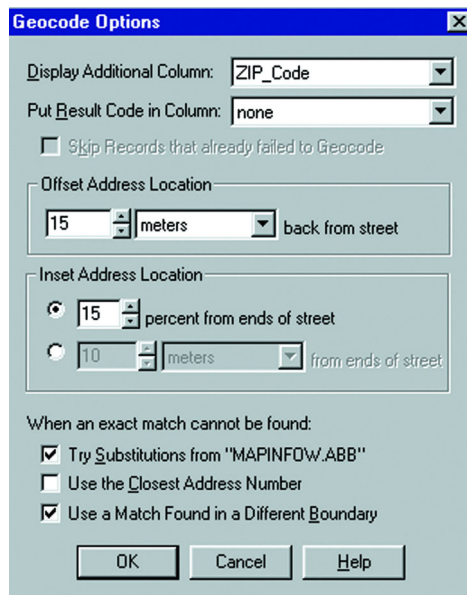
By telling MapInfo Professional to search against the street table **and** a boundary table, there is a much better chance of finding a correct match. MapInfo Professional can then differentiate between 200 Washington St in Chicago and 200 Washington St in Urbana.

To refine a search, select the column in your table that contains boundary information (TOWN, CITY, POSTALCODE). Next, select a MapInfo Professional table that also contains that boundary information you need. If you purchased your county street map from MapInfo Professional, two of the files included are *FILENAMES.tab* (where filename is the state and county abbreviation), which contains the street information, and *FILENAMEMC.tab*, which contains the town boundaries (minor civil divisions) for that county and *FILENAMECB.tab* (city boundaries). Use these files to refine your search.

When refining your search, it is sometimes better to use postal codes rather than town boundaries. Town boundaries tend to fluctuate more than postal code boundaries. Furthermore, town boundaries are subject to regional interpretation.

If refining the search with a boundary is still not enough, you can tell MapInfo Professional to search in additional boundaries for the match. Choose the Options button in the Geocode dialog box to bring up the Geocoding Options dialog box. Select the item that is labeled Use a match found in a different boundary.

Note: Keep in mind that even though postal codes are more effective for geocoding than town boundaries, you cannot use the US_ZIPS.tab file to refine your search because it is a point file. Searches can only be refined using *boundaries*. Use USZIPBDY.tab for this purpose.



Solving Problems of Space-Delimited Simple Substitution

Space-delimited simple substitution is MapInfo's default. What that means is this: MapInfo compares spaced-delimited tokens in target addresses with the rows in the address file. A space-delimited token is a string of characters with a space before and a space after. For example, MapInfo will replace "Ave" with "Av" in "Park Ave" but it will not change "Avery Blvd" to "Avry Blvd." Both street names contain the string "Ave". But that string is bordered by spaces only in "Park Ave", not in "Avery Blvd." In "Avery Blvd", "Ave" is followed by "r", not by a space.

All of the entries in the abbreviation file will receive this default interpretation. You can add other items to receive the same treatment. For example, you might want to add the pair "WK WALK" so that MapInfo knows to interpret "WK" in a target address as though it were "WALK". Similarly, you might want to add a pair such as: "CIRCLE CIR".

Use the keyword "!SPACE" to indicate space-delimited simple substitution. Entries following "!SPACE" are given the default interpretation (this allows you to arrange the Abb.file contents in some other order). When MapInfo encounters another keyword, it switches to the indicated interpretation strategy.

Resolving Simple Truncation

In simple truncation, MapInfo finds an item in the address and simply ignores it and everything after it. These items do not have to be space-delimited. This strategy is useful for dealing with addresses such as:

123 Appian Way, Mail Stop 829
7305 Van Zandt # 23

In the first case, you want MapInfo to ignore the comma and everything after it. In the second case you want MapInfo to ignore the number sign and everything after it. To deal with such cases add the following to your abbreviation file:

```
!EOLNOSPACE  
,  
#
```

“!EOLNOSPACE” is the keyword indicating that the following items are to be treated as cases of simple truncation. After that we have one line with a comma and one with a number sign. Whenever MapInfo encounters a comma or a number sign in an address it will ignore it and everything after. The examples become:

123 Appian Way
7305 Van Zandt

Resolving Space-Delimited Truncation

In space-delimited truncation MapInfo looks for items which are space delimited and eliminates those items and everything following. For example:

73 Appian Way Suite 829
3033 Van Zandt Room 202

To deal with such cases add the following to your abbreviation file:

```
!EOLSPACE  
SUITE  
ROOM
```

“!EOLSPACE” is the keyword indicating that the following items are to be treated as cases of simple truncation. After that we have one line with “Suite” and one with a “ROOM”. Whenever MapInfo encounters those tokens it will truncate the address. The examples become:

73 Appian Way
3033 Van Zandt

Resolving Simple Substitution

MapInfo uses simple substitution to remove items from an address and otherwise does nothing. Use it to deal with:

433 Van-Rensselaer
91 St Albans'

The goal is to strip out the hyphen and the apostrophe. Make the following entries to the abbreviation file:

```
!NOSPACE
-
'
```

“NOSPACE” is the keyword calling for simple substitution, and the hyphen and apostrophe on the following lines are the tokens to be removed. The examples become:

```
369 VanRensselaer
91 St Albans
```

Handling Legitimate Spaces

There are cases where you want to indicate a substitution in which the searched for string contains spaces. You can use double quotes in such cases. Place a double quote:

- at the beginning of the line
and
- between the searched for string and the substitution
and
- at the end of the line

For example, you might want to substitute “STHWY” for “State Highway”. To do that, use the following line:

```
"State Highway"STHWY"
```

This provides a solution to a subtle problem, that of street names which match items in the abbreviation file. For example, “North St” and “Park Av” both have initial strings which match terms in the abbreviation file. Consequently, MapInfo will substitute “N” for “North” to yield “N St” and “Pk” for “Park” to yield “Pk Av.” You could add the following lines to the Abbreviation file to rectify these substitutions:

```
"N ST"North ST"
"PK AV"Park AV"
```

Note that these lines have to come *after* the entries which substitute “N” for “North” and “PK” for “Park”. If they came before, they would have no effect. Thus:

```
...
...
NORTH N
...
...
PARK PK
...
...
"N ST"North ST"
"PK AV"Park AV"
...
...
```

When MapInfo encounters NORTH N it will turn NORTH ST into N ST. When it encounters “N ST”NORTH ST” it will then turn N ST into NORTH ST. PARK AV is treated similarly.

Handling Special Characters

MapInfo uses the exclamation point (!), the double quote (") and the backslash (\) as special characters. These characters tell MapInfo how to treat strings which follow them, but are not themselves ordinarily treated as characters in substitution strings. The exclamation point tells MapInfo that the string should not be interpreted as an abbreviation. The double quote tells MapInfo that spaces in the string are legitimate. And the backslash tells MapInfo to treat a special character as an ordinary character.

When you want to use any of these in a line where they are to be treated as simple characters, precede them by a backslash. Thus:

```
\!  
\  
\\
```

Adding Lines to the Abbreviation File

You can add a new item to the file by adding a new row. The order in which you add rows is not significant, except in those cases where you expect one substitution pair to compensate for the effects of another. The number of spaces between the first and second items in a row is not significant either.

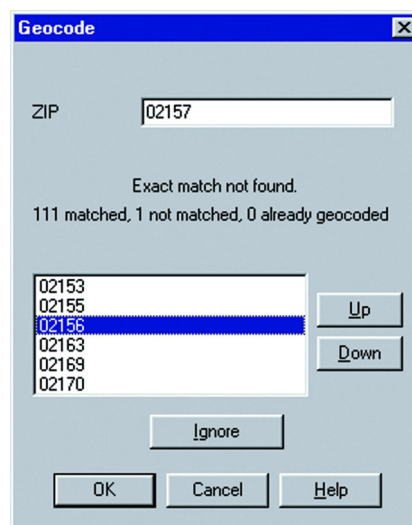
The abbreviation file is a simple ASCII file — MAPINFOW.ABB. You can edit it in any text editor or word processor. Open the file and make your additions, adding keywords as necessary.

Correcting Spelling Errors in Street Names

When your target table has an address name spelled differently than the source table, MapInfo cannot make a match. There are three possibilities to consider:

- Geocode interactively

When you are geocoding interactively, MapInfo displays a dialog box that lists close alternatives.



Use the Up and Down keys to scroll through the list and choose a street.

- Edit the target table

When you think there are too many errors in your target table, you can edit the target table before geocoding it. MapInfo's Update Column function is useful for editing tables.

However, it is possible that the street is spelled incorrectly in the source table.

- Edit the street name in the source table

Resolving Alternate Street Names, Street Name has Changed

Since a street name may change, your map will reflect the old name and so it will not match addresses which employ the new name. You can edit the map to reflect the name change, but then it will not reflect addresses using the old name. You want to be able to match addresses using both the old and new names.

You can deal with the problem by adding another row to the file of street names, as follows:

1. Open the *filename.tab* file – the street name file of your street map (not the segment file).
2. Find the row with the street name you want an alternate for and note its MI_REFNUM value.
3. Add a new row with the alternate name AND the same MI_REFNUM as the primary name.
4. Save and close the file.

MapInfo will now recognize both names in addresses being geocoded.

Resolving Incorrect Address Ranges

When a target record has an address which is not in any of the ranges in the source table, MapInfo will not be able to match it. Such an address might fall into a gap in range numbers or it might be beyond the ends of the ranges. There are three possibilities for handling this problem:

- You can enable the option to Use The Closest Address Number in the Geocode Options dialog box. MapInfo will then geocode unmatched address numbers to the closest existing range, placing the record at the center of that range.
or
- You can deal with such cases in Interactive mode. MapInfo will give you a list of known address ranges. Select the closest address range from the list or click Ignore to ignore the record.
or
- It is possible that the address is for a street segment that was added after your source map was made. In that case, you may want to edit the source map so that it reflects the full range of addresses for that street.

Geocoding Post Office Boxes

StreetPro tables do not contain Post Office boxes. When your database contains Post Office boxes, you will not be able to geocode them to a StreetPro table. You have to geocode these records in a different way.

For example, if you know that a table contains many addresses with Post Office boxes, you could first select all the rows containing Post Office boxes and geocode those rows to postal code. Then you can geocode the remaining records to street address.

To find all the addresses containing Post Office Box numbers you need to have some way of identifying them. One plausible indicator is the word “box”. Use MapInfo’s InString\$ function to select all records containing the substring “ Box ”. Note the spaces on either side of “box”. By telling MapInfo that we want those spaces, we make sure we will not include, for example, addresses on Boxwood Street. Using either Select or SQL Select, you want all records which meet this test:

```
InString$(1, ADDRESS, " BOX ") > 0
```

The number “1” tells MapInfo to search address entries starting with the first character. “ADDRESS” is the column containing the street address. “ BOX ” is the substring MapInfo is searching for. When MapInfo finds “ BOX ” in an address, it returns a number indicating the position of the first character of “ BOX ” in the address. It follows that, for any record where the value of Instring\$ is greater than zero, that address contains

```
" BOX "
```

You can now geocode this Selection to postal code. That will take care of those records. Then you can geocode the whole database to addresses. Since those with Post Office boxes have already been geocoded, MapInfo will skip over them.

Correcting Inaccurate Town Names

MapInfo’s last geocoding step is to determine in which region to place a matched street address. MapInfo only takes this step if you have so specified when you set up the geocoding process. It is common to use town or city name as the refining boundary. This causes problems because people often do not use the town name which the Census Bureau assigns to their address. Since almost all electronic maps of the United States are based on Census Bureau maps, this will cause problems.

For example, the address “50 Wolf Rd., Albany, NY” is actually in the town of Colonie. Thus the address town name in the target address will not match the appropriate town in the source file against which it is being geocoded.

One way to deal with this problem is to enable the Try Searching In A Different Boundary option on the Geocode Options dialog box. When this option is enabled, MapInfo will geocode an address to whatever boundary that address is in, providing that address is in only one boundary. When the address is in more than one boundary, the geocoding will fail.

Another way to deal with this problem is to use the postal code as the refining boundary, rather than the town or city name.

Correcting Geocoding Errors Using Result Codes

Specify a numeric field (Geocode Options dialog box) in which MapInfo will write a code indicating which steps were taken to geocode the record or why the record did not match. These codes can be very useful in catching “false positive” matches and in improving the “hit” rate by diagnosing problems and correcting them.

The return code is a three-digit number, with each digit indicating a particular aspect of the geocoding operation.

MapInfo “scores” each record on each aspect and adds the three numbers together to get the result code for that record. For example, a result code of 122 means:

- The address was found in one other boundary: 100
- The exact address range was not found: 20
- Abbreviation file substitutions were made: 2

These tables indicate the significance of each element in the code.

<0	Not matched
0	Not tried
1	Exact match
>1	Inexact match

The return codes have been designed so that non-matches will have a negative value and matches will have a positive value.

A record which has not been tried will have a return code of zero.

1	Exact match found
2	Abbreviation file applied
3 (-)	Exact match not found
4 (-)	No street specified
5	User picked a name from the list

Codes indicating how MapInfo has treated street names appear in the one's place of the result code.

00	Exact address range and side of street found
10	Address range found, but could not determine side of street
20 (+/-)	Address range not found, but within minimum and maximum ranges
30 (+/-)	Address range not found, but beyond minimum and maximum ranges
40 (+/-)	Address range not specified, but matched to minimum range
50 (-)	Streets do not intersect
60 (-)	Signifies the row has no object
70	User picked an address from the list

Codes indicating how MapInfo has treated address ranges appear in the ten's place of the result code.

	Refining-Boundary Codes
100 (+/-)	Address range found in only one boundary other than specified boundary
200 (-)	Address range found in more than one boundary other than specified boundary
300 (+/-)	No boundary specified, but found in only one
400 (-)	No boundary specified, and found in more than one
500	Exact street address found more than once in the specified boundary
600	User picked a boundary from the list
1000000 (+/-)	User typed something new

Codes indicating how MapInfo has treated refining boundaries appear in the hundred's place of the result code.

Once you have result codes, you need to find out how your records were handled. You can use the following SQL Select statement to find out which result codes appeared in your table and how many records were returned with each code value:

Select columns	Result_Code, count(*)
from tables	SomeData
group by columns	Result_Code

The resulting query table will have a row for each different three-digit result code and a count of how many records had that code. You can then use Select or SQL Select to select all the records with a particular code. You can then browse these various selections and determine how to handle each class of records.

Examples of Result Codes

675 User pick street name, address range, and boundary.

101 Exact match found in exactly one boundary other than boundary specified.

Putting Latitude/Longitude Coordinates on a Map

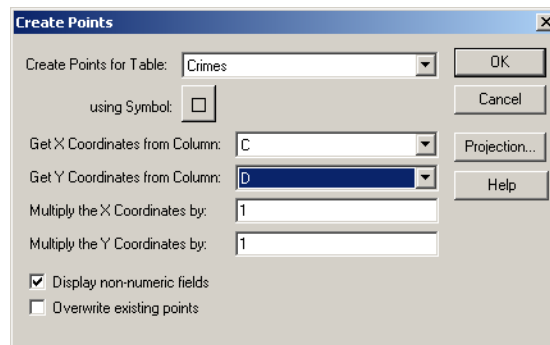
You may have a file that already contains X and Y coordinates, but not the point objects themselves that you want to display in MapInfo Professional. While the geographic information exists in the table, MapInfo Professional needs to create points to represent these coordinates before displaying them in a Map window. The Create Points command under the Table menu allows you to create points for each record in your database that has X-Y coordinate information.

Note: MapInfo Professional uses the coordinate fields in your table to create point objects. Records that already have graphic objects associated with them will be skipped during the Create Points operation.

For example, you have a table showing transmitter tower locations that was created by recording coordinates using a global positioning system. You want to display the locations on a map in MapInfo Professional. The table already has X and Y coordinate information but MapInfo Professional cannot display this information until you create points for that coordinate data that MapInfo Professional can read.

To create points:

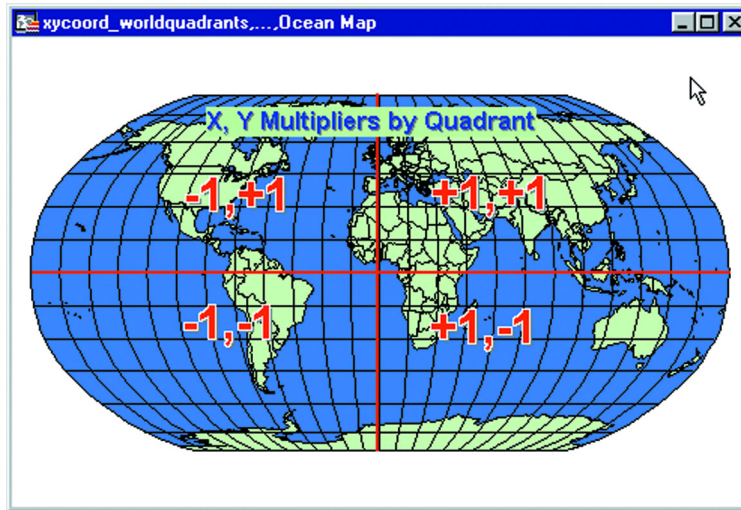
1. Open the table for which you want to create points.
2. On the **TABLE** menu, click **CREATE POINTS**. The Create Points dialog box displays.



3. Choose the appropriate table from the drop-down list.
4. Select the columns in which the X and Y coordinates display from the Get X and Y coordinate information lists, the lists default to XCOORD and YCOORD.

Note: If you select the same table for the X and Y coordinates, a warning message displays, prompting you to make a change. Click **OK** and change the selections in these drop-downs.

5. The Multiply X and Y coordinates by options allow the user to place a multiplier on the coordinate columns if necessary. To specify a projection other than longitude/latitude or the default Table Projection preference, choose projection. In some cases you will need to specify a negative multiplier depending on the locations quadrant. For locations in North America the X coordinate is negative. In Africa and Australia, the Y coordinate is negative. For locations in and around South America both coordinates are negative.
6. Select the appropriate check boxes:
 - **DISPLAY NON-NUMERIC DATA** — Select this check box if the data you want to create points for is in text fields in the original table. MapInfo Professional will attempt to convert the text values to numbers. If the values are not numbers, MapInfo Professional will not create an object for that record. This check box is automatically selected and disabled when the table you have selected does not contain two numeric fields.
 - **OVERWRITE EXISTING POINTS** — Select this check box to replace the existing objects in the current map with points based on the data contained in this table.
7. Click **OK**. MapInfo Professional updates the table to create point objects.
8. To display the table, on the **WINDOW** menu, click **NEW MAP WINDOW**, or choose **MAP** menu, point to **LAYER CONTROL** and click **ADD** to add the table to an existing map.



Creating Points from an Excel or Lotus Table

There are some extra steps to the create points process when your data exists in Excel or Lotus 1-2-3 format.

To create points for an Excel or Lotus table:

1. On the **FILE** menu, click **OPEN**.
2. In the **FILES OF TYPE** drop-down list, choose the type of table that you want to open, **EXCEL** or **LOTUS** and select a file from the list. Click **OPEN** to display the appropriate dialog box.
3. Specify the portion of the worksheet you wish to access. You may use a named range or choose **OTHER** from the drop-down list and specify the rows and columns to include.
4. If your worksheet uses the first row for column names, select the Use Row Above box. Click **OK**. Remember to use the drop-down box to modify the range accordingly, such as "A1" to "AZ".

You now have a browser view of your worksheet in MapInfo Professional. This table is currently a read-only table and cannot be edited in MapInfo Professional.

Note: Make sure that your coordinate information is in decimal degrees (if longitude/latitude) and not in degrees, minutes, seconds. If your coordinates are in degrees, minutes, seconds format, see [Converting Coordinate Information with the Degree Converter Tool on page 194](#) for conversion information. If it is a different coordinate system, it must be in numeric columns.

If you are using the latest version of this application, MapInfo Professional can use your numeric data even if it is in a non-numeric column. However, if you are using a version of MapInfo Professional earlier than 7.5, you still need to change the table structure of your original file to ensure that your coordinate columns are numeric. Many times, numeric columns containing coordinate information are brought in as character columns because the first row is used as a header.

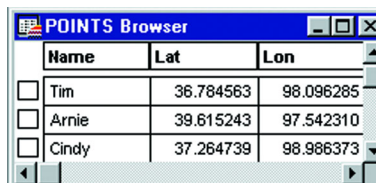
5. On the **TABLE** menu, point to **MAINTENANCE** and click **TABLE STRUCTURE**. The Modify Table Structure dialog box displays listing each field name and type.
 - If the coordinate fields are decimal, integer or float, click **OK** and go to [step 10](#).
 - If your coordinate fields are listed as character, go to step 6.

6. On the **FILE** menu, click **SAVE COPY AS**. Give your table a new name, e.g., SAMPLES2.tab. Click **SAVE**. A copy of your worksheet is saved.
7. On the **FILE** menu, click **CLOSE** and close the worksheet that was opened.
8. On the **FILE** menu, click **OPEN**. Choose the new table that you saved, e.g., SAMPLES2.tab. Click **OPEN**. An editable copy of your original worksheet displays.
9. On the **TABLE** menu, point to **MAINTENANCE**, and click **TABLE STRUCTURE**. The Modify Table Structure dialog box displays. Select your coordinate columns and change the type to **FLOAT**. Click **OK**.
10. You will be asked to verify the changes. Click **OK**. Your browser closes, indicating that the changes have been made.
11. Next, determine whether your points are in longitude/latitude or in another projection. Follow the instructions in the next section for each of these cases. If you are unsure of what projection your coordinates are in, contact the source of the data.

Creating Points, Longitude/Latitude

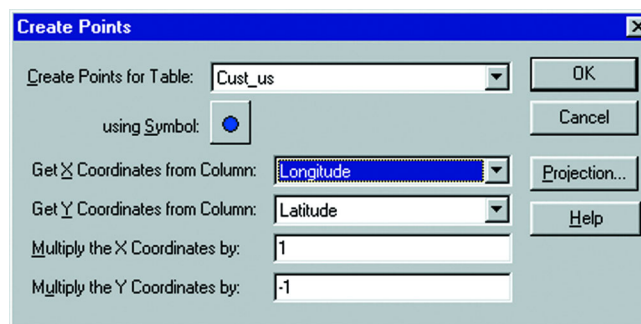
If your point information is in longitude/latitude, do the following:

1. Examine the browser for your data to determine which columns contain the latitude coordinate (Y), and the longitude coordinate (X).



Name	Lat	Lon
<input type="checkbox"/> Tim	36.784563	98.096285
<input type="checkbox"/> Arnie	39.615243	97.542310
<input type="checkbox"/> Cindy	37.264739	98.986373

2. Determine the multiplier for the X and Y columns based on the quadrant of the Earth in which the points fall. For example, if the points are expected to fall in Kansas, the X value is expected to be between -102 and -94. In the above browser, the data for X (Lon) is close to +98. The multiplier should be -1 to create the points correctly. The Y (Lat) values are in the correct range and require a multiplier of +1 (+1 will not change the value).
3. On the **TABLE** menu, click **CREATE POINTS**.
The Create Points dialog box displays.

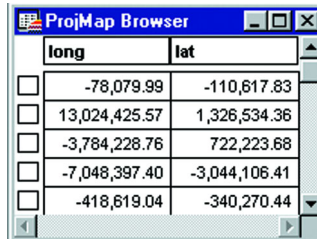


4. Insert the proper values in the Get X coordinates, Get Y Coordinates boxes, and the Multiply X and Multiply Y boxes. Click **OK**.

Creating Points in a Projection

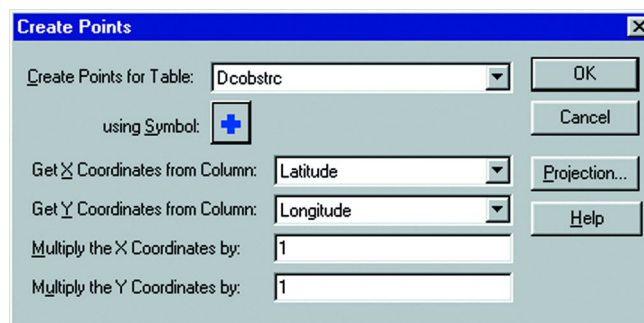
To create points using a projection, do the following:

1. Examine the browser for your data to determine which columns contain the Y and X coordinates. In this example, the easting (x) and northing (y) values are in US State Plane Coordinate System (1927) Mass Mainland Zone.



	long	lat
<input type="checkbox"/>	-78,079.99	-110,617.83
<input type="checkbox"/>	13,024,425.57	1,326,534.36
<input type="checkbox"/>	-3,784,228.76	722,223.68
<input type="checkbox"/>	-7,048,397.40	-3,044,106.41
<input type="checkbox"/>	-418,619.04	-340,270.44

2. On the **TABLE** menu, click **CREATE POINTS** to display the Create Points dialog box.



Create Points

Create Points for Table: Dcobstrc [OK]

using Symbol: [Symbol Icon] [Cancel]

Get X Coordinates from Column: Latitude [Projection...]

Get Y Coordinates from Column: Longitude [Help]

Multiply the X Coordinates by: 1

Multiply the Y Coordinates by: 1

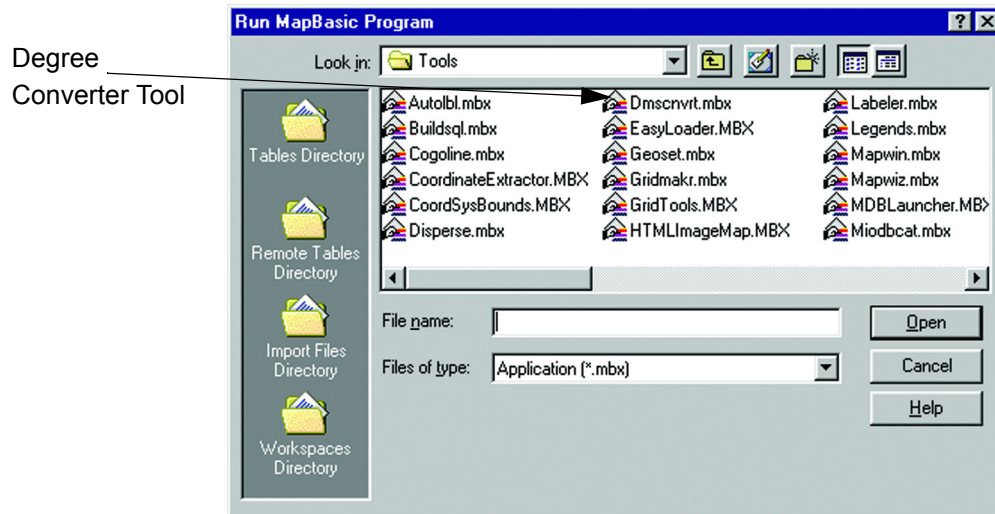
3. Click the **PROJECTION** button and choose the projection category and member.
4. Click **OK**.

Converting Coordinate Information with the Degree Converter Tool

The Degree Converter tool is part of the toolset that ships with MapInfo Professional. It converts coordinate information to decimal degrees from a degrees, minutes, seconds (d/m/s) format. It can also convert the columns back to degrees, minutes, seconds from decimal degrees. For instructions about loading this tool in the Tool Manager, see [Accessing and Loading the Tool Manager Tools in Chapter 3 on page 143](#).

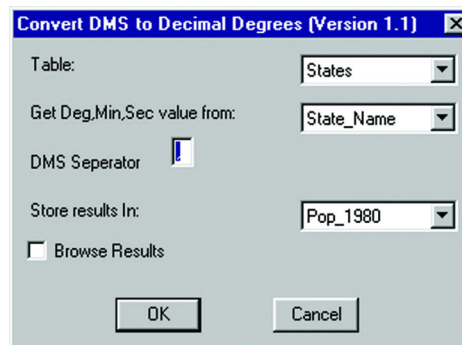
Before using this program, make sure that there are two new columns available to hold the converted data. You can also use the Degree Converter to convert a single Latitude/Longitude coordinate to either decimal degrees or D/M/S. You can also run this program with the Run MapBasic Program command, as well as any of the other tools in the Tool Manager.

On the **TOOLS** menu, click **RUN MAPBASIC PROGRAM**. Select DMSCNVRT.MBX from the Tools directory, and click **OK**. The Degree Converter tool is added to the Tools menu.



To convert degrees, minutes, seconds coordinates to decimal degree coordinates:

1. On the **TOOLS** menu, point to **DEGREE CONVERTER** and click **CONVERT COLUMN TO DECIMAL DEGREES**. The Convert DMS to Decimal Degrees dialog box displays.
2. Select the table containing the columns for conversion.
3. Choose one of the columns containing the coordinate information. You have to run the program once for the longitude (X) column and once for the latitude (Y) column.



4. Enter the **DMS SEPARATOR**. You should be able to look at your table and identify the character separating the degrees, minutes, and seconds entries.
5. Choose the column for the converted results and click **OK**. This must be a decimal or float field in older versions (pre-7.5) of MapInfo Professional.
6. Browse your table to see the new column of coordinate information in decimal degrees. Repeat this procedure for your other coordinate column. You are now ready to use the **TABLE** menu to click the **CREATE POINTS** command.

Note: You can also use the Degree Converter to convert decimal degrees back to degrees, minutes, seconds format. Use this feature if you must return the data to its original format.

Dispersing Points Located in the Same Place

Depending on how you have geocoded your table, you may have several points that are placed at the same location, making it difficult to tell if you are viewing one point or many. For example, if you geocode a table of students by census tract, and view the results on your map, it appears that there is one dot at the center of each tract when there actually may be several there. To see all of

your data, you may want to disperse the points over a small area. There are three methods for dispersing points: the Disperse Points tool (a tool that comes with MapInfo Professional), equal dispersion, and dispersion to the right.

Dispersing Points in the Same Position using the Disperse Points Tool

You can disperse points in the same position either systematically or randomly using the Disperse Points tool. This tool is a MapBasic program that ships with MapInfo Professional. For instructions on loading this tool in the Tool Manager, see [Accessing and Loading the Tool Manager Tools in Chapter 3 on page 143](#).

To disperse points:

1. On the **TOOLS** menu, point to **DISPERSE** and click **DISPERSE POINTS**. A dialog box displays showing your tables.
2. Choose the table containing the points to be dispersed. Click **OK**.
3. A warning displays suggesting that you save a copy of the table if you have not already done so. If you are working with a copy of the original table, click **CONTINUE**.
4. Choose the appropriate method for dispersing points and click **OK**. Each method is described:
 - **SYSTEMATICALLY N, S, E, W, NE, SW, NW, SE**: Points are dispersed roughly one symbol width away from the original point in eight possible directions.
 - **SYSTEMATICALLY "AROUND THE CLOCK"**: Points are dispersed roughly one symbol width away in a clockwise fashion.
 - **RANDOMLY**: Points are clustered around the original location in a random pattern. In this case, the points can end up overlapping each other.
 - **RANDOMLY WITH CALL OUT LINES**: Random dispersion with a callout line to indicate the original location of the point.

The Zoom Level dialog box displays.

5. Enter the zoom level at which you will typically view the table. This is so the dispersal distance can be customized to that particular zoom level.
6. Click **OK**.

Note: The program works slightly faster if you do not display the table you are dispersing.

CAUTION: This program permanently changes the table. Save a copy of the table before running this program.

Dispersing Points using the Equal Point Dispersion Method

The equal dispersion method disperses points at equal distances from the center.

1. First, select all of the points that have the same location. This can be done with either the Radius Search Select tool or the Marquee Select tool.
2. On the **OPTIONS** menu, click **SHOW MAPBASIC WINDOW** to open the MapBasic window.
3. Click so that your cursor is in the MapBasic window. Type **RANDOMIZE** and press **ENTER**.
4. Type the code below and press **ENTER**:

```
UPDATE SELECTION SET OBJ = CREATEPOINT(CENTROIDX(OBJ) + (0.01)/
(COS(CENTROIDY(OBJ) * .01745)) * (RND(1) - .5), CENTROIDY(OBJ) +
0.01*(RND(1) - .5))
```

Dispersing Points using the Dispersion to the Right Method

The dispersion to the right method disperses points to the right of the point.

1. First, select all of the points that have the same location. This can be done with either the Radius Search Select tool or the Marquee Select tool.
2. On the **OPTIONS** menu, click **SHOW MAPBASIC WINDOW** to open the MapBasic window.
3. Click so that your cursor is in the MapBasic window. Type `RANDOMIZE` and press **ENTER**.
4. Type: `UPDATE SELECTION SET OBJ = CREATEPOINT(CENTROIDX(OBJ) + 0.01 * RND(1), CENTROIDY(OBJ))` and press **ENTER**.
The table will be automatically updated.
5. If the new Map window has not distributed the points satisfactorily, click the title bar of the Map window and choose **EDIT** and **UNDO UPDATE** to restore the objects to their original positions.
6. To disperse points for the entire table, substitute your tablename in the above examples wherever it says `SELECTION`.

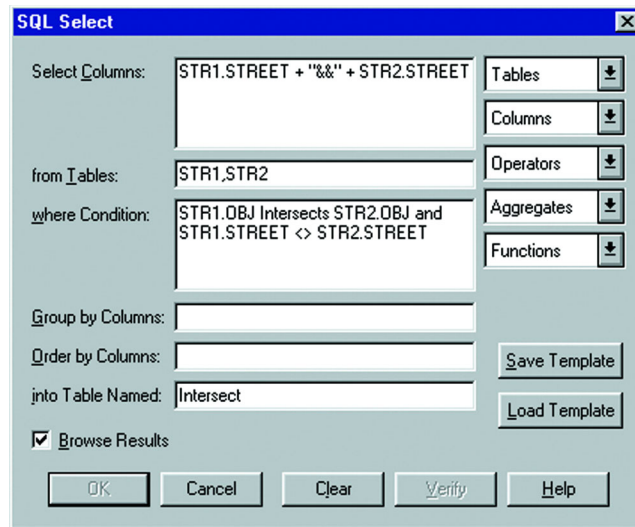
Note: The dispersal weight, in the equation of the update statement above, is a number that regulates the object's new X and Y coordinates. In the above example, the dispersal weight is 0.01 degrees (longitude and latitude). The maximum X or Y distance (in miles) that the point is dispersed is equal to (69 * the dispersal weight). The dispersal weight is adjustable — the larger the weight, the greater the dispersal distance. In the example above, the dispersal weight is about right for dispersing points on a county-wide or state-wide basis, but not for a street-level dispersal. If you find that your objects are not being dispersed enough or are dispersed too much, increase or decrease the weight.

Creating Points for Intersections

Many people working with street files are often interested in information that is located at intersections. For some, their only concern is the intersections. In MapInfo Professional you can geocode to intersections in your street file with the Geocode command, but it would be easier to work with a table that contained only intersections. For example, a municipality is interested in tracking the types of traffic control devices at each street intersection. It would be beneficial for them to make an entire layer that contains the intersection of every street.

To create points for every intersection in your table:

1. On the **FILE** menu, click **OPEN** and open your street file.
2. Make two copies of the street file and give each copy a new name by choosing the **FILE** menu and clicking **SAVE COPY AS**.
3. Repeat Step 2 and save the file under a different name.
4. On the **FILE** menu, click **OPEN** and open the two files that you created.
5. On the **QUERY** menu, click **SQL SELECT**.
6. Fill in the following SQL Select statement. This query matches the two street files against each other where the streets intersect and are not the same named street.



7. On the **FILE** menu, click **SAVE COPY AS** and save the resulting table.
8. Open the newest table and ungeocode it.
9. On the **TABLE** menu, point to **MAINTENANCE** and click **TABLE STRUCTURE**. Clear the **TABLE IS MAPPABLE** box.
10. Then geocode the unmapped table to one of the copies of the street file.

Note: You may have duplicate points at the same location if a street intersects another street of the same name more than once.

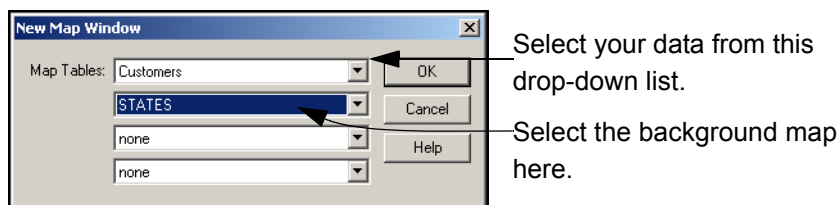
You can review directions for extracting longitude and latitude from a geocoded table [Extracting Latitude and Longitude into a New Table on page 174](#). For more about querying and selecting data, see [Selecting and Querying Data in Chapter 8 on page 274](#).


Displaying Your Data on the Map

Once you have converted your data and geocoded or created points for it, you are ready to display the results.

To display your data on a new Map window:

1. On the **WINDOW MENU**, click **NEW MAP WINDOW** and select the tables you want to display in your map. The order in which you select these tables determines the order they display.



2. Click **OK** to display your data on the map you selected.
3. To change the symbol used to display your data, click the **LAYER CONTROL** , select the row with your data in it, and click the Display button to select new display options.

To display your data on an existing Map window:

1. Open the .tab files or .WOR files you want to plot your converted data onto.
2. Open the .tab files or .WOR files you just created and in the Preferred View drop-down box select the **CURRENT MAPPER** option.
3. Click **OPEN**.

After Displaying Your Data on the Map

Now that your data is there to see, make it say something to your audience. The whole world of MapInfo Professional functionality is open to you. For details on analyzing your data, see **Creating Thematic Maps, Legends, and Other Maps in Chapter 9 on page 310** or see **Drawing and Editing Objects in Chapter 7 on page 252** for more about customizing your map. For printing your map, see the next section.

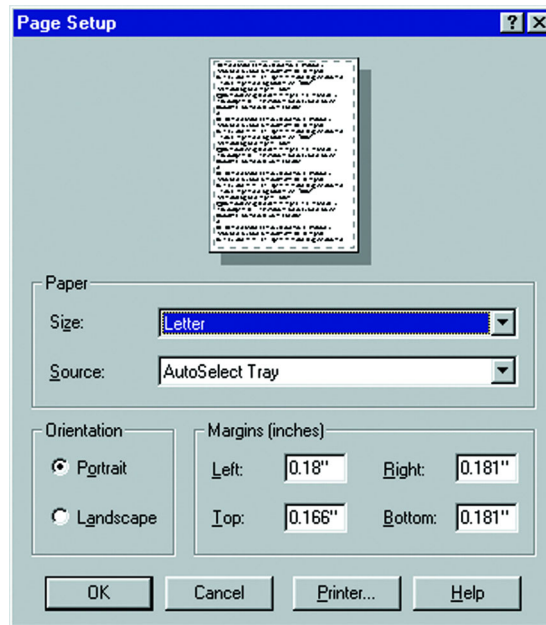
Printing Your Results

Once you have created the perfect map or graph, you can easily print the individual windows.

For presentation, use the Layout menu to bring together all views of your mapping session. Here, you can combine different types of windows to create an attractive and more informative presentation. On the **WINDOW MENU**, click **NEW LAYOUT WINDOW** to display a Layout window that you can use to arrange your maps, browse tables, graphs, legends, titles, logos, etc. See **Working in the Layout Window in Chapter 12 on page 422**, for tips and techniques about working in the Layout window.

Setting Up the Page

Before you print your map or layout, you will need to set up your page. In the Page Setup dialog box (on the **FILE** menu, click **PAGE SETUP**), specify the paper size, orientation, and margins.

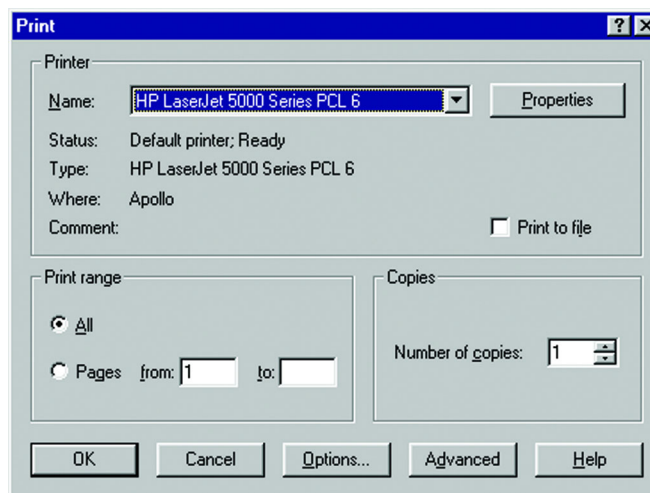


Printing Your Map

When you have your page set up the way you want, you are ready to print.

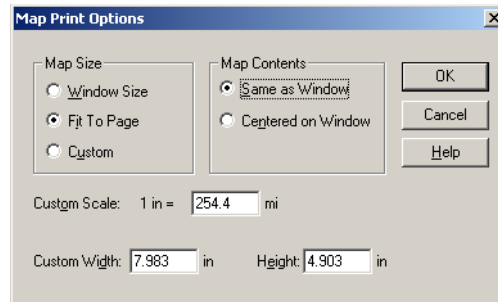
To print your map:

1. On the **FILE** menu, click **PRINT** to display the Print dialog box. This dialog box allows you to specify printer properties, a page range for printing, and the number of copies to print.



2. If you need to change the size of the map, the orientation of your map or want to specify the scale or a custom width or height, click the **OPTIONS** button. If you are printing a map, the Map Print Options dialog box displays.

Note: If you are printing a graph or a browser or a 3DMap, your options will be different. See [Graph/Browser/3DMap Printing Options on page 201](#) for more information.



3. Here you can specify the size of the map, how its contents will display, the scale, and its width and height. For details on the other print options, see [Graph/Browser/3DMap Printing Options on page 201](#). When you have completed your selections in this dialog box, click **OK** to continue.
 - **MAP SIZE** — Select the size of the map you are producing in this group; the options are Window Size, Fit to Page, and Custom. As you make selections, the Custom Scale, Custom Width and Custom Height entries change.
 - **WINDOW SIZE** — Click this button to print the map as it displays on your computer screen.
 - **FIT TO PAGE** — Click this button to fit the current map to the page size you have selected in your preferences.
 - **CUSTOM** — Click this button to enter your own custom scale, width, and height entries in the fields provided. Then, type the appropriate entries in the Custom Scale, Custom Width and Height fields.
 - **MAP CONTENTS** — Select an option in this group to determine the map contents you want to print; the options are Same as Window and Centered on Window.
 - **SAME AS WINDOW** — Click this button to print the map contents as it appears in the Map window, with the same proportions and content as you see.
 - **CENTERED ON WINDOW** — Click this button to center as much of the current map that fits on the page. When you select this option, the image may print on more than one page depending upon fit. In general when you select this option, MapInfo Professional assumes you want to select the Fit to Page radio button and selects this for you.
4. If your map is particularly complex (a large map, 3D, or one with 10 or more colors) there are more options available using the Advanced button. The Advanced Printing Options dialog box displays. (See [Advanced Printing Options on page 203](#)). When you have completed your selections, click **OK** to continue.
5. After you complete your selections, click **OK** on the Print dialog box to print your results.

Graph/Browser/3DMap Printing Options

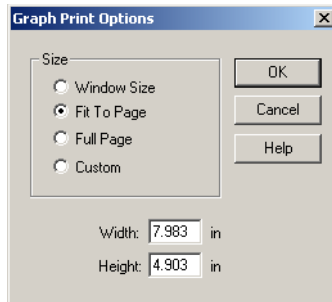
In this section we review the options you have in printing your graphs, your browsers, and your 3DMaps. These options that display in the Print dialog box depend upon the type of window or map you are trying to print. Not all options display, whenever you are in the Print dialog box.

Graph Print Options

You must be printing a graph to display the Graph Print Options box.

To use the graph print options:

1. In the Print dialog box, click the **OPTIONS** button. The Graph Print Options dialog box displays.



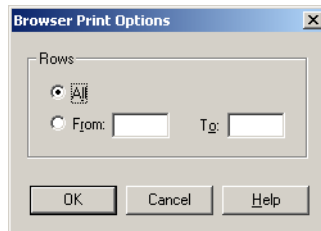
2. Select from these options and click **OK** to save them.
 - **MAP SIZE** — Click the size of the graph you have produced; the options are Window Size, Fit to Page, Full Page, and Custom. As you make selections, the Custom Width and Height entries change.
 - **FIT TO PAGE** — Click this button to fit the current graph to the page size you have selected in your preferences or in your Print dialog box.
 - **FULL PAGE** — Click this button to print the graph on the full page as set in the printer parameters on the Print dialog box.
 - **CUSTOM** — Click this button and enter your own custom width and height entries in the fields provided.

Browser Print Options

Use these Browser Print Options to ensure that you get the printing results you want. The Browser Print Options dialog box only displays when you are printing a Browser window.

To use the graph print options:

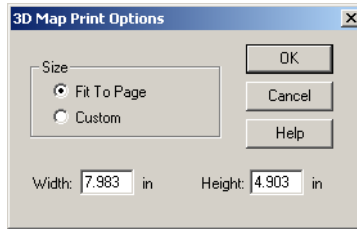
1. In the Print dialog box, click the **OPTIONS** button. The Browser Print Options dialog box displays.



2. Select from these options and click **OK** to save them.
 - **ALL** — Click this button to print all of the rows and columns in your browser.
 - **FROM/TO** — Click this button to specify the print range of the rows and columns in your browser.

3D Map Print Options

Use these 3D Map Print Options to ensure that you get the printing results you want. The 3D Map Print Options dialog box only displays when you are printing a 3D map.



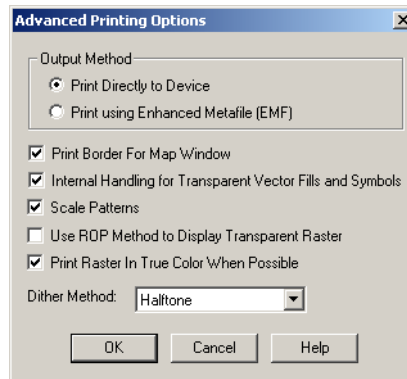
3. Select from these options and click **OK** to save them.
 - **FIT TO PAGE** — Click this button to fit the current 3D map to the page size you have selected in your preferences or in your Print dialog box.
 - **CUSTOM** — Click this button and enter your own custom width, and height entries in the fields provided.

Advanced Printing Options

Advanced printing options enable you to specify how you want MapInfo Professional to print your map or layout, and tell MapInfo Professional how to handle color and transparency for raster and grid images.

To set the advanced printing options:

1. On the **FILE** menu, click **PRINT** to display the Print dialog box.
2. Click the **ADVANCED** button to display the Advanced Printing dialog box.



3. Select from these options and click **OK** to save them.
 - **OUTPUT METHOD** — There are two output methods, Print Directly to Device and Printing using the Enhanced Metafile (EMF).
 - **PRINT DIRECTLY TO DEVICE** — Use this option to print your image file directly from MapInfo Professional. (We recommend that you use this option if you are using MapInfo Professional 6.0 or earlier only.) This is the default setting.
 - **PRINT USING ENHANCED METAFILE (EMF)** — Use this option to generate an enhanced metafile of your MapInfo Professional image before sending it to the printer. This option takes advantage of current technology to shrink the spool size and print your file quicker without sacrificing quality.
 - **PRINT BORDER FOR MAP WINDOW** — Select this check box to print a black border around the image you are printing. Clear this check box to print the image without a border. This check box is selected by default.
 - **INTERNAL HANDLING FOR PRINTING TRANSPARENT VECTOR FILLS AND SYMBOLS** — Special programming has been added to handle transparent fill patterns and bitmaps for vector images when you print. Select this check box to use this functionality or

clear it to let the printer or plotter to manage this type of work. This check box is selected by default.

- **USE ROP METHOD TO DISPLAY TRANSPARENT RASTER** — Select this check box to allow the internal ROP (Raster Overlay by Pixel) to manage the transparent pixels when printing raster images. Since the ROP Method is largely a display method, not all printers and plotters can use it. We recommend that you experiment with this setting until you get the results you want.
- **SCALE PATTERNS** — Select this check box to scale the fill patterns you see on the screen more closely to what the printer will produce. This option is selected by default. For advice about setting this option, see [Recommendations for Effective Pattern Scaling in Chapter 2 on page 95](#).
- **PRINT RASTER IN TRUE COLOR WHEN POSSIBLE** — Select this check box to print your 24-bit raster or grid file images in true color. Make sure your printer settings are set to greater than 256 colors. This check box is selected by default.

The options that are selected when you initially display this dialog box are the default settings, which are set in the Output preferences. The Advanced Printing dialog box enables you to override the default print settings for individual windows. To actually change the default print settings, you must go to the Output preferences (on the **OPTIONS** menu, point to **PREFERENCES AND CLICK OUTPUT**) and change the print settings there. See [Setting the MapInfo Professional Preferences in Chapter 2 on page 81](#) for more information.

Output Methods

You can choose from two types of output methods. Click the button next to the method you want to use. The Print Directly to Device method is the printing method used in previous versions of MapInfo Professional. The Print using Enhanced Metafile (EMF) method generates an Enhanced Metafile from the print contents, which is then sent to the printer. This method produces good quality output while reducing printing time and spool sizes, but your printer must be able to handle the metafile.

Note: If you are printing a map/layout that contains a translucent image, you must select **PRINT USING ENHANCEMENT METAFILE (EMF)**. The **PRINT DIRECTLY TO DEVICE** option does not support translucent images.

Display and Color Options

Additional settings control Map window borders, transparency in vector and raster images, and color in raster images. Select the check boxes next to the option(s) you want.

To have MapInfo Professional handle transparent fill and bitmap symbols in vector images internally, check the Internal Handling for Transparent Vector Fills and Symbols box. If you clear the box, transparency will be handled by your printer.

When the ROP method is selected, the transparent image is rendered using a raster operation (ROP) to handle the transparent pixels. This method is used to draw transparent (non-translucent) images on-screen. This method may or may not work well when printing. You will need to determine if your particular print driver handles ROPs correctly.

Check the **PRINT RASTER IN TRUE COLOR WHEN POSSIBLE** box to use 24-bit true color to print raster and grid images. To be able to print a raster image in true color, the image must be 24-bit and the printer must support more than 256 colors.

Select a dither method from the **DITHER METHOD** list to use when your image must be converted from 24-bit to 256 colors. Choose either the **HALFTONE** or **ERROR DIFFUSION** dither methods.

Overriding the Default Printer

The printer listed in both the Print and Page Setup dialog boxes is the default printer that MapInfo Professional uses for all print jobs. This can be either the Windows default printer or a MapInfo Professional preferred printer that you select. Set the default printer in the Printer preferences (on the **OPTIONS** menu, point to **PREFERENCES** and click **PRINTER**). Both of these dialog boxes include the option of overriding the default printer for an individual print job.

Note: You can get additional printer advice in the MapInfo Professional *Printing Guide* on the installation CD.

To use a printer other than the one indicated in the Printer preferences to print a particular window (Map, Layout, etc.), choose either:

- On the **FILE** menu, click **PRINT**. Click the **NAME** drop-down list to see a list of the printers you have access to, and select the one you want to use. This selection overrides the default printer settings for this print job.
- On the **FILE** menu, click **PAGE SETUP**. In the Page Setup dialog box, click the Printer to display the Preferences dialog box for the default printer. Click the **NAME** drop-down list to see a list of the available printers, and select the one you want to use. This selection overrides the default printer settings for this print job.

Note that the printer override applies only to the window you are currently printing. To actually change the default settings, you must go to the Printer preferences and specify a new default printer. See [Setting the MapInfo Professional Preferences in Chapter 2 on page 81](#) for more information.

Troubleshooting Print Problems

Good first steps in troubleshooting a printing problem are to make sure you have downloaded and installed the latest patch for MapInfo Professional and are using the latest printer driver for your printer/operating system.

Note: You can get additional printer advice in the MapInfo Professional *Printing Guide* on the installation CD.

When we discuss printer issues, we make the following assumptions about your print environment:

- The printer/plotter has been installed properly
- The printer/plotter drivers have been installed correctly
- The printer/plotter is connected to the computer or to the network properly
- There is sufficient memory (on the print device and on the computer) to print your files

Any of these issues can affect your ability to print/plot your MapInfo Professional output. Our Technical Support professionals may be able to identify these difficulties, but they are not within their control.

Note: Whenever we use the terms *print* or *printer* we also mean *plotter*.

When Printing a MapInfo Professional Object From Another Application

When you embed a MapInfo map or graph in another application (such as Word or PowerPoint), click outside the map/graph before you use the Print or Print Preview commands. This allows the container application to take over previewing or printing properly. This is particularly true if you have just made changes to the map or graph you are printing.

Working with Fill Patterns

Note that fill patterns on the first row of the Region Style dialog box are Windows standard and tend to print faster. The other patterns are bitmaps MapInfo has created for your use. You might want to consider this when you are selecting fill patterns. See also [Recommendations for Effective Pattern Scaling in Chapter 2 on page 95](#) for more information regarding scaling and printing fill patterns.

Translucent Raster Maps/Grids and Windows 9X Don't Mix

You cannot print a translucent raster map or grid on Windows 9X platforms or export them to EMF or WMF file formats. You need to use a non-metafile (i.e. .BMP or .GIF) format to export raster images on Windows 9X.

Due to the support of Windows 9X, MapInfo Professional can only print up to a maximum of 28,000 pixels. If your image is large and you are printing at a resolution of 600 DPI or greater, it is possible that your image exceeds this limitation. To print the image, reduce the resolution of the printout or shrink the size of the image.

Sometimes the Older Driver is Better

When in doubt, if an older driver worked and the new one does not, go back to the older driver.

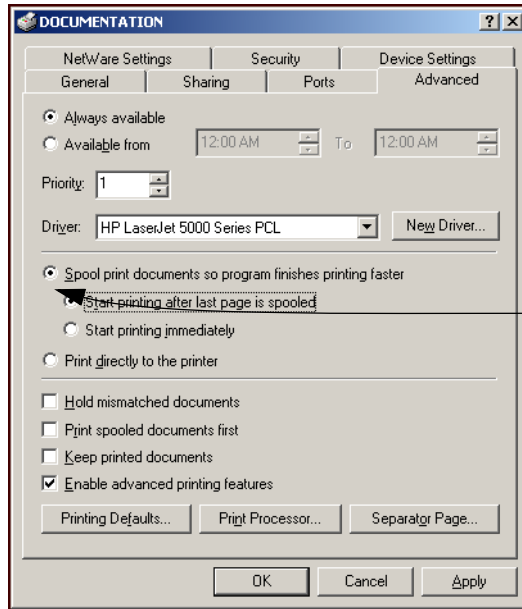
Make Room for the Metafile

Make sure you have plenty of temporary disk space, particularly if you are using the Print using the Enhanced Metafile option. The system is trying to create a layered bitmap locally on disk.

Spool Locally, Print Globally

Try spooling print jobs locally rather than at the plotter. This allows the computer to rasterize your output rather than the printer, which can be more efficient.

1. To set up local print job spooling, on the **START** menu, point to **SETTINGS** and **CONTROL PANEL** and click **PRINTERS**.
2. Right-click the printer to select it and choose Properties in the pop up menu to display the printer's properties.
3. Click the **ADVANCED** tab to display the advanced property options.



Click the **SPOOL PRINT DOCUMENTS** button and the **START PRINTING AFTER LAST PAGE IS SPOOLED** button.

Note: If you do not have administrative rights to your computer, you may not be able to use the spooling option. Contact your IT department if you want to make this change.

4. Click **OK** to save your changes.

Speeding up the Printer

If your printer has Fast, Normal, Best print quality options, we suggest you select **FAST** to improve printer speed. This will also lower your output resolution and may resolve the 28,000 pixel limitation.

Enhancing Your Data

You cannot work for long in MapInfo Professional® without wanting to add more or enhance your own data in some way. This chapter teaches you how to get the most from your MapInfo tables and how to create reports with your data.

Sections in this Chapter:

- ♦ **Working with MapInfo Tables** 209
- ♦ **Creating a Report of your Data** 222

Working with MapInfo Tables

After you have brought your data into MapInfo and created .tab files, you can manage them within MapInfo Professional. You can view any database table in MapInfo Professional, once you have converted it to MapInfo format. Additionally you can add or remove fields, change the order, name, type, width, or index of any field. You can also specify or determine the projection of the table from this dialog box. You can also check if the table is mappable (contains map objects). To make these types of changes, see [Editing a Table on page 217](#).

Keep in mind that you can only view the structure of a spreadsheet or database file that you convert into MapInfo Professional's table structure. See [Creating a .tab File from your Data in Chapter 4 on page 149](#) for these instructions.

To view a table:

- On the **TABLE** menu, point to **MAINTENANCE** and click **TABLE STRUCTURE**. The View/Modify Table Structure dialog box displays.

Accessing StreetPro Data

Now that you can display your data, you may want to display it on an existing map that has streets, hospitals, highways, and other landmarks to give your data relevance. MapInfo Corporation's premier data product, StreetPro contains all of this and more. There are actually two versions of StreetPro, StreetPro Display and StreetPro with Enhanced Address Layer. See which of these products is right for your needs.

StreetPro Display contains 30 layers of county-level display streets, highways and shields, railways, administrative boundaries, point locations, and water features. In addition, we have included several utilities (Autoloader, Shield Manager, Street Append tools) to help make StreetPro easy to work with. You can purchase this product by county, by state, by 6 state packs or the entire United States.

StreetPro with Enhanced Address Layer includes all the layers and tools in StreetPro Display, plus an address layer of streets and address ranges that you can use to more precisely geocode your data.

Adding to a Table

One important operation in maintaining tables is the ability to update the data contained in the table. MapInfo Professional's Update Column feature allows you to:

- Add a temporary column or update an existing column with data from another table
- Update a table
- Place graphic information into visible columns

Adding a Temporary Column using Update Column

If you need to bring data from one table into another, you can use the Update Column command in MapInfo Professional. In fact to bring this data into the table, you can either add a new temporary column or you can update an existing column. In both cases, use the **TABLE** menu to click **UPDATE COLUMN** to bring over the information.

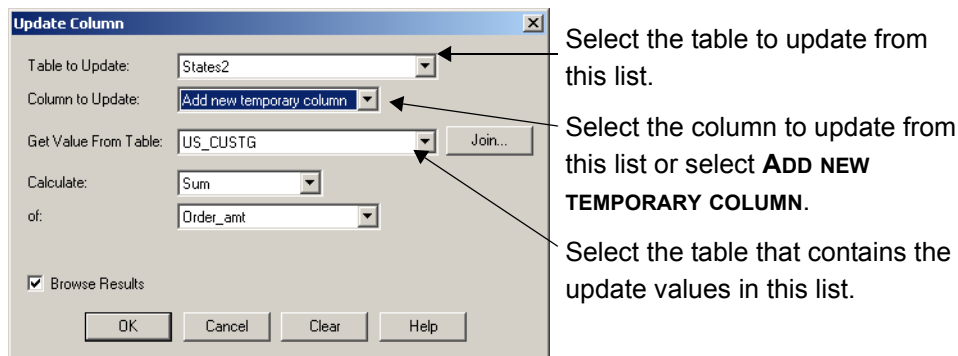
You have tremendous flexibility with how information is imported and what information is transferred. You can perform aggregate functions to transfer averages, minima, maxima, sums, weighted averages, and proportional sums. You can also create expressions to derive additional information from the data.

To illustrate the Update Column command, we have created the following example. In this company, maintains two tables, a table of states (STATES) and a table of customers' order amounts (US_CUSTG). You can use these files and the Update Column command to calculate the sum of your customers' order amounts and report that information by state. Update Column creates a temporary column in the STATES2 table to store the information from the Order_amt table. During the operation MapInfo Professional calculates each customer's order amount with the order amounts of other customers from the same state. A browser of the STATES2 table shows the sum of order amount by state.

You can follow along with similar tables of your own.

To calculate the sum of orders and report the amount using Update Column:

1. On the **TABLE** menu, click **UPDATE COLUMN** and fill in the Update Column dialog box as shown in the next figure:



Note: The STATES and US_CUSTG tables described in this example may refer to MapInfo Professional Tutorial data, which is available on the MapInfo web site, www.mapinfo.com/miprotutorial.

Notice the **JOIN** button is activated when you select **ADD** new temporary column. In this example the Join operation will match columns in each table based on equivalent columns that hold common information such as where State from table STATES2 table matches State from the US_CUSTG table. In other situations you can match information based on common geography.

Note: You can use this dialog box to create a temporary column in the original data source file. To do this, select the same table in both the Table to Update drop-down list and the Get Value From Table drop-down list.

2. At the Calculate list box, choose **SUM** for purposes of this example. You can also select: **VALUE, AVG, COUNT, MIN, MAX, SUM, WTAvg, PROPORTION SUM, PROPORTION AVG,** or

PROPORTION WTAvg from this list. (For a discussion of these functions, see [Aggregating Data on page 296](#).)

At the Of list box, MapInfo Professional automatically defaults to the first numeric field in the table when you choose any function other than Value. You can select another column, as appropriate.

3. Click **OK** to begin the update. MapInfo Professional updates the STATES2 table and reports the order amount by state in a Browser or in the table you selected.
When the order amount of a customer changes, you can simply make the change in the Order_amt table. MapInfo Professional automatically updates the sum of the order amount for that state in the STATES2 table.
4. To save the temporary column, on the **FILE** menu, click **SAVE COPY AS**.

You can also save the information if the table is part of a workspace that you save. If the information is saved with **SAVE COPY AS**, the values will remain the same. If saved in a workspace, MapInfo Professional recomputes the column whenever you open the workspace. Also, the Update Column dialog box defaults to the last column that was updated and the last expression that was used for updating the column, whenever you run the command.

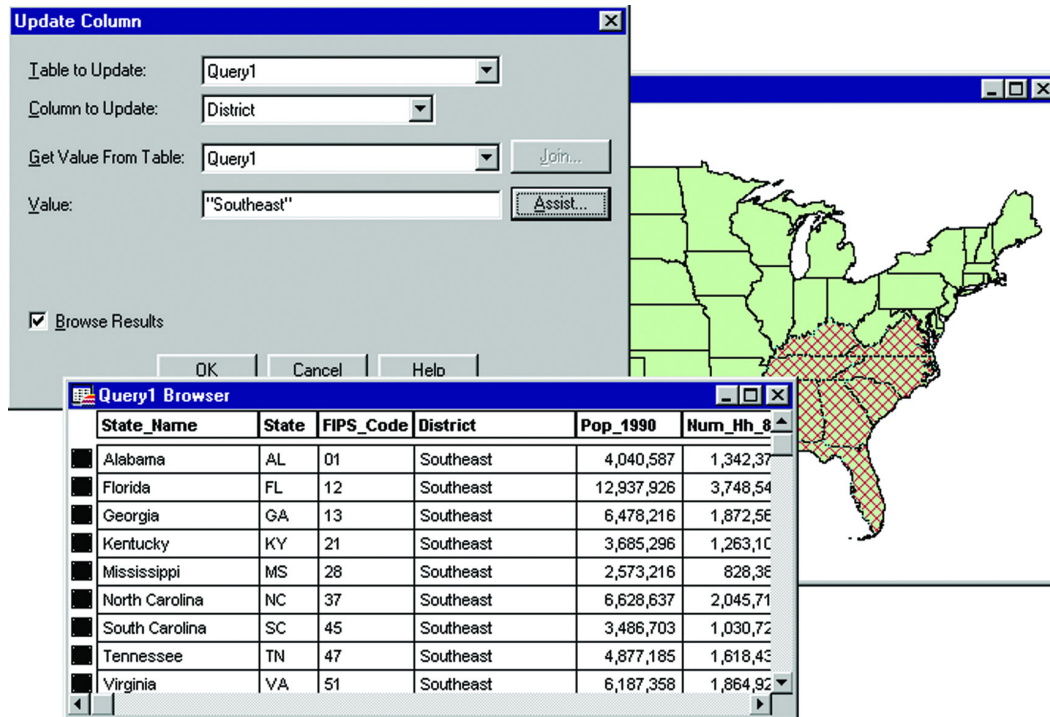
For additional details about saving a table, see [Saving a Table or Saving a Copy of a Table on page 137](#).

Updating a Table

For a quick visual way to update your table, select the objects in the Map window and use Update Column to update the table with the new value. This would be useful when you want to update a number of objects with the same value.

To include the District column in the STATES table:

1. Create the District column (on the **TABLE** menu, point to **MAINTENANCE** and click **TABLE STRUCTURE**) in the States table.
2. Add a field for Districts.
3. Re-display the STATES table in a Map window.
4. Select the appropriate states with the Marquee tool (or other selection method).
5. On the **TABLE** menu, click **UPDATE COLUMN** and fill in the dialog box as illustrated in the next figure. Be sure to put the value in quotes so MapInfo Professional does not treat it as a new column name.



6. Click **OK**. MapInfo Professional creates a query table of the southeastern states with the District column containing the value Southeast.
7. Save the table to preserve the new information.

Appending Rows to a Table

Use the Append Rows to Table command when you want to attach the records from one table to another. The two tables should have the same set of columns in the same order.

To append data to another table:

1. On the **TABLE** menu, click **APPEND ROWS TO TABLE**. The dialog box displays.
2. Specify the table containing the records you want appended.
3. Specify the table to which the records will be appended and click **OK**.

If the corresponding columns do not have the same data type, a best fit is done to convert the data to the appropriate type. If the order of the columns is not the same between the two tables, use the Table Structure command to reorder the columns before using Append Rows to Table.

Note: If tables are mappable, the bounds of the map in one table must be large enough to allow objects from the other table to fit within it. Otherwise, the objects will be distorted to the bounds of the Map window. Use the Check/Set Coordsys Bounds tool to alter the map bounds of the table if this occurs. See [Using the Tools in the Tool Manager in Chapter 3 on page 141](#) for more about the Coordsys Bounds tool.

Parsing Data from One Column to Multiple Columns

If you have imported data into MapInfo Professional from another format, there is always the chance that the data will not come in exactly the way you want it. In some instances, items that should appear in separate columns may be put together in one column. The following is a series of column updates that parses one column of full names (first, middle, and last) into three parts. It works even if there is no middle name, or if there is only a last name.

1. On the **FILE** menu, click **OPEN** and open the table to be modified.
2. Add three new columns to your table. On the **TABLE** menu, point to **MAINTENANCE** and click **TABLE STRUCTURE**. Add two character columns of size 15. Call them **FIRST** and **MIDDLE**. Then add a character column called **LAST** of size 30.
3. Put the full name into the column called **LAST** by choosing the **TABLE** menu, and clicking **UPDATE COLUMN**. Fill in the Update Column dialog box.

The screenshot shows the 'Update Column' dialog box with the following settings:

- Table to Update: Table1
- Column to Update: Last
- Get Value From Table: Table1
- Value: your_full_name_column
- Browse Results

The Column to update is **LAST**, and we get the Value from the column that has the full name in it. Remember we are only working with one table, so the Table to Update and Get Value From Table should be the same table. In the following example, the table is **TABLE1** and the full name column is **your_full_name_column**. You should fill in your own values for these two items.

4. To parse the first name out of the full name column, choose the **TABLE** menu and click **UPDATE COLUMN**. Fill in the Update Column dialog box.

The screenshot shows the 'Update Column' dialog box with the following settings:

- Table to Update: Table1
- Column to Update: First
- Get Value From Table: Table1
- Value: Left\$(Last, Instr(1, Last, " "))
- Browse Results

The Column to Update is: **FIRST**

The Value is: `left$(LAST, instr(1, LAST, " "))`

- To parse the last name out of the full name column, on the **TABLE** menu, click **UPDATE COLUMN**. Fill in the Update Column dialog box.

Update Column dialog box configuration:

- Table to Update: Table1
- Column to Update: Last
- Get Value From Table: Table1
- Value: `Right$(Last, Len(Last)-Instr(1,Last," "))`
- Browse Results:

The Column to update is: LAST

The Value is: `Right$(LAST, Len(LAST)-Instr(1, LAST, " "))`.

- To parse the middle name out of the full name column, on the **TABLE** menu, click **UPDATE COLUMN**. Fill in the Update Column dialog box.

Update Column dialog box configuration:

- Table to Update: Table1
- Column to Update: Middle
- Get Value From Table: Table1
- Value: `Left$(Last, Instr(1,Last," "))`
- Browse Results:

Update the MIDDLE column with the Value: `Left$(LAST, Instr(1, LAST, " "))`

- Then update the LAST column again by returning to the **TABLE** menu, clicking **UPDATE COLUMN**, and filling in the dialog box.

Update Column dialog box configuration:

- Table to Update: Table1
- Column to Update: Last
- Get Value From Table: Table1
- Value: `Right$(Last, Len(Last)-Instr(1,Last," "))`
- Browse Results:

The Value is: `Right$(LAST, Len(LAST)-Instr(1, LAST, " "))`

- Click **OK** to update the column.

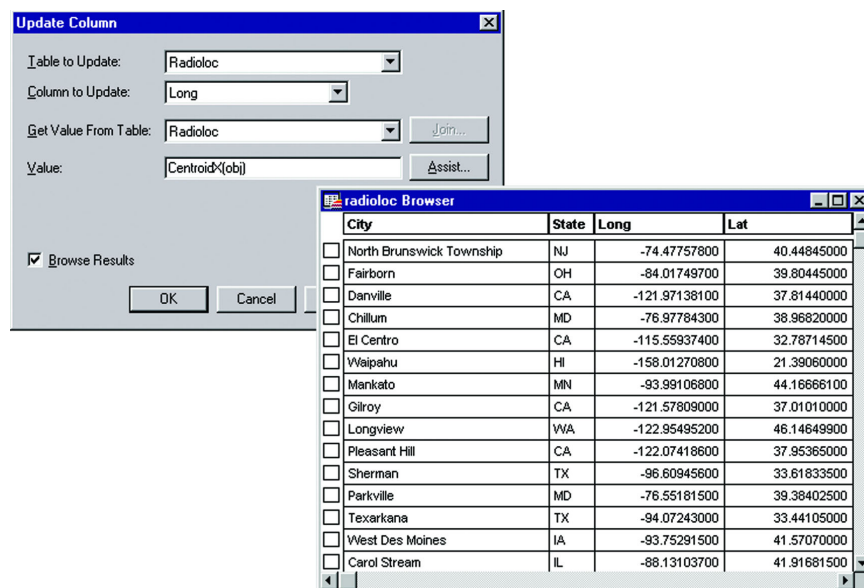
Placing Graphic Information in Visible Columns

Update Column is also useful to put graphic information into columns so that it is visible. Tables that contain map objects store the graphic information about these objects invisibly. By using Update Column, you can bring some of that information into a column so it can be viewed in a Browser. Update Column with CentroidX(Obj), CentroidY(Obj) uses the Session Projection Preferences (if set), otherwise it defaults to Longitude/Latitude.

For example, you want to display the longitude and latitude coordinates of a table of radio station point locations in a Browser. In this example, you are only working with one table, RADIOLOC. But you still use the same Update Column dialog box as in the Add Temporary Column example.

To display the longitude and latitude coordinates of a table in a Browser:

1. View the table structure (on the **TABLE** menu, point to **MAINTENANCE** and click **TABLE STRUCTURE**) to ensure that there are not already fields that contain longitude and latitude coordinates internal to the table.
Before you can update the table, you must add two columns (for instance, call them Long and Lat) to contain the coordinates. When you change the structure of the table in this way, the table will be removed from any open window. The table is still open, however, and ready for updating.
2. On the **TABLE** menu, click **UPDATE COLUMN** and specify RADIOLOC as the table to update and as the Get Value From Table.
3. Choose **LONG** as the Column to Update.
4. In the Value box you must specify an expression to retrieve the longitude.
5. Click the **ASSIST** button to bring up the Expression dialog box.
6. From the Functions drop-down list choose **CENTROIDX**. MapInfo Professional returns the expression CentroidX(obj).
7. Click **OK** to return to the Update Column dialog box. The expression is now stated in the Value box.
8. Click **OK**. MapInfo Professional calculates the information and places a longitude coordinate for each radio station in the Long column.



9. Repeat the process to retrieve the latitude coordinates using the expression CentroidY(obj).
10. On the **FILE** menu, click **SAVE TABLE** to permanently store the coordinates in the RADIOLOC table.

Note: If you edit the objects, which, in effect, changes the coordinates, you must go back into the columns to make the changes. It will not automatically update.

Adding a Row to a Table

You can add a temporary row to a MapInfo table. The table must be editable before you can add a new row.

To add a new row:

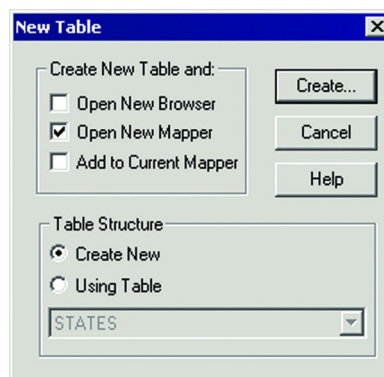
1. On the **WINDOW** menu, click **NEW BROWSER** window.
2. Choose an editable table from the drop-down list.
3. Click **OK** to display the table in a Browser window.
4. On the **EDIT** menu, click **NEW ROW** to add a new row to the bottom of the table.
5. Type the new data into each appropriate column of the new row.
6. When you are finished adding rows, on the **FILE** menu, click **SAVE TABLE** to save the new data. The Save Table dialog box displays.
7. Click **SAVE** to save the new row(s).

Creating a New Table

As you learned in [Chapter 4: Putting Your Data on the Map](#), you can bring in data tables from several outside sources: dBASE, Excel, Access, Lotus 1–2–3, Shapefiles, Grid, and delimited ASCII. You can also create your own database directly in MapInfo Professional. These databases can be opened and displayed as maps (providing they contain graphic objects), Browsers, or graphs.

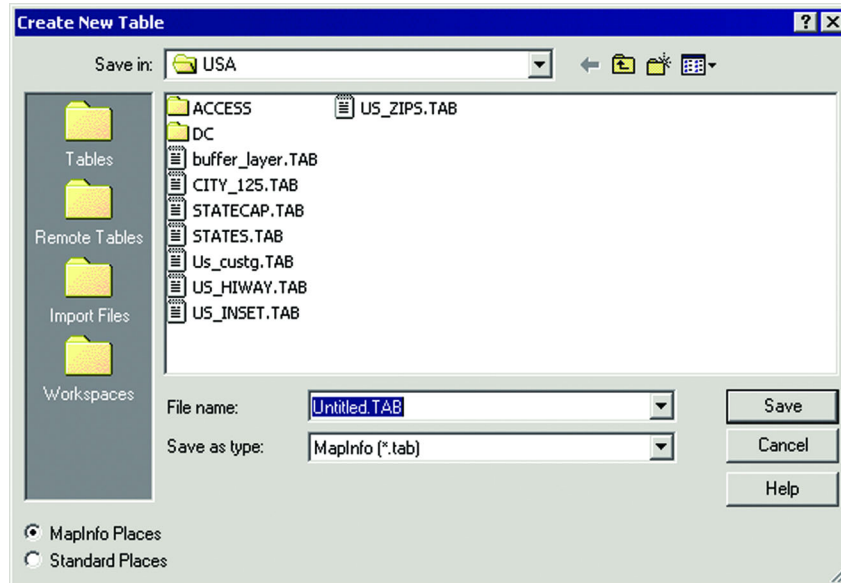
To create a new table in MapInfo Professional:

1. On the **FILE** menu, click **NEW TABLE**. The New Table dialog box displays.



2. Choose **OPEN NEW BROWSER** so that the new table will be open in its traditional tabular form in a window.
3. Choose **OK**. The New Table Structure dialog box displays.
4. Choose **ADD FIELD** to begin building the database's structure. Give the field a name, type, width, and specify whether the field will be indexed.

5. Continue to add fields until you have the number you want.
6. Use the **UP** and **DOWN** buttons to reorder the fields. Keep in mind that the order of fields in this dialog box (top to bottom) will actually display as columns (left to right) in the Browser window.
7. Choose **CREATE**. The Create New Table dialog box displays.



8. Specify a location for the new table in the Save in box.
9. Enter a name for the table in the File Name box.
10. Specify the file type in the Save as type drop-down list. You can choose from the following formats:
 - **MAPINFO (*.TAB)**
 - **DBASE DBF (*.TAB)**
 - **MICROSOFT ACCESS (*.TAB)**
11. Click **SAVE**. If you chose either of the MapInfo Professional formats, MapInfo Professional creates your table. You are finished. If you chose dBASE DBF, proceed to step 12. If you chose dBASE DBF, the dBASE DBF Information dialog box displays, asking you to specify a file character set. Choose the one appropriate for your language and click **OK**.
12. Click **SAVE** in the Create New Table dialog box. MapInfo Professional creates the new table.

Note: Do not use “Districts” as a name for your base tables. MapInfo Professional uses “Districts” internally as a system table when beginning a redistricting session.

See the section on Microsoft Access Tables later in this chapter for information on creating a new Access table.

Editing a Table

You can make changes to the structure of your table directly in MapInfo Professional. You can add or remove fields, change the order, name, type, width, or index of any field. You can also specify or determine the projection of the table from this dialog box. You can also check if the table is mappable (contains map objects).

To change the structure of the table:

1. On the **TABLE** menu, point to **MAINTENANCE** and click **TABLE STRUCTURE**. The View/Modify Table Structure dialog box displays.
2. Make the appropriate changes, or if you are simply viewing the structure use the scroll bars on the right of the field list to view the information about each field.
3. When you have completed your changes to the structure of the table, click **OK** to save the table.

Note: Keep in mind that you can only view the structure of a spreadsheet file that you bring into MapInfo Professional.

Copying and Renaming a Table

Because a MapInfo Professional table consists of two or more component files (STATES.tab, STATES.DAT, STATES.MAP, etc.), all of these files for a particular table must be in the same directory. If you move any of the component files to a different directory, you must move all of them. When you want to back up a table to diskette, you must back up all of the component files.

Because each table has at least two files associated with it, you cannot change one file name without changing all the other associated file names. Otherwise, MapInfo Professional would not know where to find all the files that constitute the table. Therefore, do not use a DOS command to rename files.

To rename a table:

1. On the **TABLE** menu, point to **MAINTENANCE** and click **RENAME TABLE**. The Rename Table dialog box displays.
2. Choose the table to rename and click **OK**.
3. Choose a new name for the table and click **OK**.

When you rename a table using this command, MapInfo Professional also renames all associated files.

Keep in mind that renaming a table will affect any workspaces that contain the original table. If you rename a table, you must also edit the workspace file (.WOR) in a text editor or word processor to change the name of the table to reflect the new table name. You can also rename the table before you build the workspace.

Renaming a raster file only changes the *.tab file name. Renaming a grid file changes both the *.tab and grid file name.

Deleting a Table

Deleting a table allows you to remove the .tab file and all component files associated with the table.

To delete a table:

1. On the **TABLE** menu, point to **MAINTENANCE** and click **DELETE TABLE**.
2. Choose the table to delete and click **OK**.

A message displays to inform you that the table will be permanently deleted and the operation cannot be undone.

3. Click **OK** and MapInfo Professional deletes the table.

Deleting a raster table will only delete the *.tab file. Deleting a grid file removes both the *.tab and grid file.

Packing a Table

Packing a table allows you to compress tables to take up less disk space. You can choose to pack only tabular data or graphic objects or both. Packing tabular data removes deleted records.

When you pack a table, MapInfo Professional requires that you have twice as much free space as the table takes up to handle a copy of the database as a scratch file.

To pack a table:

1. On the **TABLE** menu, point to **MAINTENANCE** and click **PACK TABLE**. The Pack Table dialog box displays.
2. Choose the appropriate table and whether you want to pack tabular or graphic data, or both.
3. Click **OK**.

Note: Packing a table can corrupt customized labels saved to a workspace. If you are going to be working with customized labels, pack the table before you create the labels.

Collecting Data into the Table using Update Column

MapInfo Professional provides a number of powerful aggregating functions that allow you to derive new information. These features are available in Update Column when you specify two tables in the Update Column dialog box. The aggregate expressions include Average, Count, Minimum, Maximum, Sum, Weighted Average, Proportion Sum, Proportion Average, and Proportion Weighted Average. Each is defined in the next table.

Aggregate Expressions	Description
AVERAGE	Calculates the average of the values for all records in a group.
COUNT	Counts the number of records in a group.
MINIMUM	Finds the lowest value for all records in a group.
MAXIMUM	Finds the highest value for all records in a group.
SUM	Calculates the sum of the values for all records in a group.
WEIGHTED AVERAGE	Gives more weight to one value over another when averaging.
PROPORTION SUM	A sum calculation that is adjusted based on how much of one object is within another object.
PROPORTION AVERAGE	An average calculation that is adjusted based on how much of one object is within another object.
PROPORTION WEIGHTED AVERAGE	A weighted average calculation that is adjusted based on how much of one object is within another object.

Note that average, count, min, max, sum, and weighted average operate on data values only. The proportion functions take geographic relationships into account.

Note: To find instructions for using the Update Column feature, see [Adding a Temporary Column using Update Column on page 210](#).

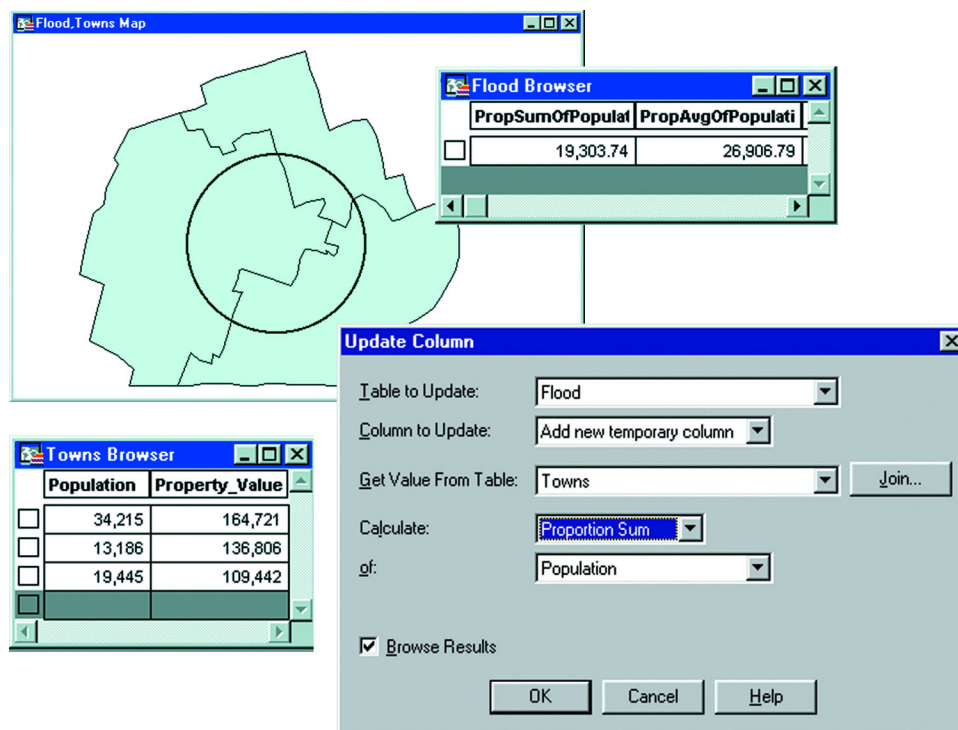
Example Using Proportion Sum and Proportion Average

To illustrate the proportion sum and proportion average functions, consider this example.

You want to determine what proportion of the population in your county is covered by a flood zone. You have two tables: a Towns table that contains town boundaries and population statistics, and a Flood table that contains a region object (circle in illustration) that represents the area of past flooding.

The flood zone covers three towns. As shown in the following illustration, MapInfo Professional calculates the proportion of the population in those three towns that is within the flood zone and reports the sum in a temporary column in the Flood table. Similarly, MapInfo Professional calculates the proportion average of property values for the same areas.

Proportion sum is best used for raw data (population, housing units, etc.) while proportion average is used for derived data (median income, average housing costs, etc.).



Example Using Proportion Weighted Average

Proportion Weighted Average is similar to proportion average except that you add a weighting factor to the average calculation. That weighting factor is another data column in your table.

For example, you want to find the best location in the area to build a new upscale shopping mall. You believe the mall will draw people from a 20-mile radius. You are considering five potential sites and you want to place the mall where you can find the optimum combination of population and income.

To do this, create a temporary column in your Mall table with data from your Towns table that contains the proportion of each town's population affected by the potential mall. Use the median income for each town as the weighing factor. In this example MapInfo Professional determines the join automatically to be where the town boundaries intersect the 20-mile buffers around the potential sites.

The best location of the mall will be at the site that returns the highest value of the temporary column, as shown in the Browser in the next figure.

The screenshot displays the 'Update Column' dialog box with the following settings:

- Table to Update: Mall
- Column to Update: Add new temporary column
- Get Value From Table: regions
- Calculate: Proportion WtAvg
- of: Population
- Weighting Expression: Median_Income
- Browse Results

The 'Specify Join' dialog box is also shown with the following settings:

- Join: where mall from table Mall matches County from table regions
- where object from table regions intersects object from table Mall

The map below shows five potential sites (Site1, Site2, Site3, Site4, Site5) marked with stars and surrounded by red circular buffers. Site3 is highlighted with a red cross-hatch pattern.

The 'Mall Browser' table shows the following data:

mall	PropWtAvgOfPopula
<input type="checkbox"/> Site1	60,035.92
<input type="checkbox"/> Site2	86,660.79
<input type="checkbox"/> Site4	90,239.7
<input checked="" type="checkbox"/> Site3	130,869.62
<input type="checkbox"/> Site5	97,211.16

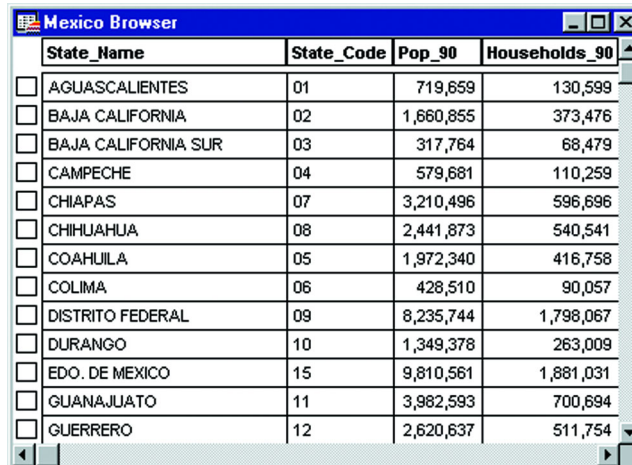
Browsing a Table

There are times when viewing the tabular data in a table is necessary. In MapInfo Professional, this is called browsing the table.

To browse a table:

1. On the **WINDOW** menu, click **NEW BROWSER WINDOW**.
2. Choose the table you wish to browse and click **OK**.

The Browser shows the fields of the data table (column headings) and the records of data (rows).



State_Name	State_Code	Pop_90	Households_90
<input type="checkbox"/> AGUASCALIENTES	01	719,659	130,599
<input type="checkbox"/> BAJA CALIFORNIA	02	1,660,855	373,476
<input type="checkbox"/> BAJA CALIFORNIA SUR	03	317,764	68,479
<input type="checkbox"/> CAMPECHE	04	579,681	110,259
<input type="checkbox"/> CHIAPAS	07	3,210,496	596,696
<input type="checkbox"/> CHIHUAHUA	08	2,441,873	540,541
<input type="checkbox"/> COAHUILA	05	1,972,340	416,758
<input type="checkbox"/> COLIMA	06	428,510	90,057
<input type="checkbox"/> DISTRITO FEDERAL	09	8,235,744	1,798,067
<input type="checkbox"/> DURANGO	10	1,349,378	263,009
<input type="checkbox"/> EDO. DE MEXICO	15	9,810,561	1,881,031
<input type="checkbox"/> GUANAJUATO	11	3,982,593	700,694
<input type="checkbox"/> GUERRERO	12	2,620,637	511,754

A Browse menu item gives you further functionality. On the **BROWSE** menu, click **PICK FIELDS** to display only the columns of data you want to see. If you wish to show information that is only implicit in the base table, in the Pick Fields dialog box choose Expression from the Fields in Table list. For more on expressions see Deriving Columns in [Deriving Columns in Chapter 8 on page 293](#), or [Creating Expressions in Chapter 8 on page 283](#).

If you wish to show or hide the Browser window grid, on the **BROWSE** menu, click **OPTIONS**.

You can add new records to the Browser.

1. On the **EDIT** menu, click **NEW ROW** to add a row (or use **CTRL-E**).
2. Enter text directly into each field. As you type, press **TAB** or **SHIFT-TAB** to move from field to field.
3. You must remember to save the new information to the base table before exiting the program.

The square box to the left of each record in the Browser window is the select box. Click it to select the record in the Browser window. If the Map window for the table is open, the record is selected as well.

To add records to the selection, **SHIFT** and drag to select consecutive records, or **SHIFT-CLICK** non-consecutive records.

Selecting records creates a subset of the table that you can browse, map, or graph, just like the full table. More on selecting is found later in [Chapter 8: Selecting and Querying Data](#). You can also create a report of your tabular data using the Crystal Reports functionality included with MapInfo Professional. The Crystal Reports *User Guide* has also been included on the installation CD to help you get the most out of this powerful report writing program.

Creating a Report of your Data

MapInfo Professional includes the full report-writing functionality of Crystal Reports. Crystal Reports enables you to create reports of your tabular data. The Crystal Reports *User Guide* is included online so that you can get the most from this program.

To create a report and print it:

1. On the **TOOLS** menu, point to **CRYSTAL REPORTS** and click **NEW REPORT**. The New Report dialog box displays. It lists all the open tables.
2. Click the table you want to create a report for, and click **REPORT**. The Crystal Reports user interface displays.
3. In Crystal Reports, **CHOOSE REPORT** and click **REPORT EXPERT** to display the Create Report Expert dialog box. The Report Expert walks you through the selection of data, fields, fields to sort by, fields to total, and styles for your report.
Click **PREVIEW SAMPLE** to see a sample of your report on the screen.
4. On the **FILE** menu, click **PRINT** to print your report.

For information on creating a report using the program's full complement of features, please consult the Crystal Reports *User Guide*, which is available on your installation CD.

Accessing Remote Data

When your data is remote, whether it is a remote Excel file or an Oracle table, the issue of retrieving data gets more complex. This chapter addresses the special circumstances that surround remote data access for use with MapInfo Professional®.

Sections in this Chapter:

- ♦ **Working with Remote Tables and Databases. 225**
- ♦ **Preparing to Store / Retrieve Remote Spatial Databases 225**
- ♦ **Accessing Remote Databases using ODBC 236**
- ♦ **Opening a DBMS Table 238**
- ♦ **Working with DBMS Tables 249**

Working with Remote Tables and Databases

MapInfo Professional DBMS connectivity requires many pieces to be in place to function properly. MapInfo Professional does not install the following:

- Your database management system of choice (Oracle, MS Access, Informix, etc.) — required only if your DBMS is on the same PC as MapInfo Professional.
- Network support as required by your DBMS (Oracle-SQL*NET; MS Access-none required).

MapInfo Professional installs the following as part of the custom installation process:

- MapInfo Professional ODBC support (see [Custom Workstation Installation in Chapter 2 on page 70](#) for these instructions)
- MapInfo Professional Oracle Spatial Object Support (via OCI)

If the prerequisites which MapInfo Professional does not install are not in place when you install the MapInfo Professional portion of the DBMS support, various warning messages will appear explaining that you do not have the required DLLs. It is safe to finish your MapInfo Professional installation, then add the prerequisite support. You can then customize your data sources in the DBMS Administrator instead of returning to the MapInfo Professional installation media.

Note: MapInfo Professional's support for live access to remote tables includes SpatialWare 4.6 on SQL Server 7 and 2000.

Preparing to Store / Retrieve Remote Spatial Databases

To use your RDBMS tables with MapInfo Professional most effectively, you need to set them up so that you can store coordinates or more complex spatial data and then retrieve them. This will also allow you to geocode your remote table and assign coordinates to each record in the table.

There are four prerequisites for storing and retrieving spatial objects in a DBMS table:

- Coordinate values for the objects must be stored in columns of the remote table as numbers, or as a spatial column if the database supports it, such as SpatialWare, Oracle Spatial, or Sybase. See [Prerequisite 1 – Storing Coordinate Values in a Remote Table on page 226](#) for these instructions.
- A spatial index column may be included to increase performance on queries against the coordinates. See [Prerequisite 2 – Creating a Spatial Index Column on page 228](#) for these instructions.
- You must create a special table on the DBMS system known as the MapInfo_MapCatalog. (MapInfo Professional creates this automatically when you use the EasyLoader.) You create only one catalog per database. See [Prerequisite 3 – Creating a MapInfo_MapCatalog on page 229](#) for these instructions.
- You must supply information about mappable tables to the MapInfo MapCatalog using the Make Table Mappable command. (This is for tables the EasyLoader does not upload.) See [Prerequisite 4 – Making a Remote Table Mappable in MapInfo Professional on page 231](#) for these instructions.

Prerequisite 1 – Storing Coordinate Values in a Remote Table

The coordinate values for the spatial data must be stored in columns of the remote table. This is a data creation task and can be done at any time. Possible methods for adding the spatial columns include:

- There may already be existing coordinate data.
- Use the MapInfo Professional EasyLoader application to upload an MapInfo Professional table to a database supported by MapInfo Professional.
- Make a remote table mappable in order to geocode. See **Making a DBMS Table Mappable on page 231** in this chapter.
- Add coordinate values to an MapInfo Professional table, export it to a text file, and import it to your database.

Using the EasyLoader Tool

The MapInfo Professional upload tool, MapInfo Professional EasyLoader, uploads MapInfo .tab files into a database table. This is a stand-alone, client-side tool that is specific to MapInfo Professional data sets. MapInfo Professional uses a DBMS link on the client side for data transfer. EasyLoader supports all MapInfo-supported databases.

EasyLoader runs on Windows 98, Windows NT, Windows 2000, Windows XP Professional and Windows XP Home, and supports connections to the following spatial Database Management Systems:

- INFORMIX – Dynamic Server (IDS) with the SpatialWare DataBlade (The IUS driver must have a version of 2.8 or higher.)
- Oracle Spatial version 8.1.6 or later
- SpatialWare 4.6 for SQL Server

EasyLoader has been expanded to run with the following spatial schemas on standard databases:

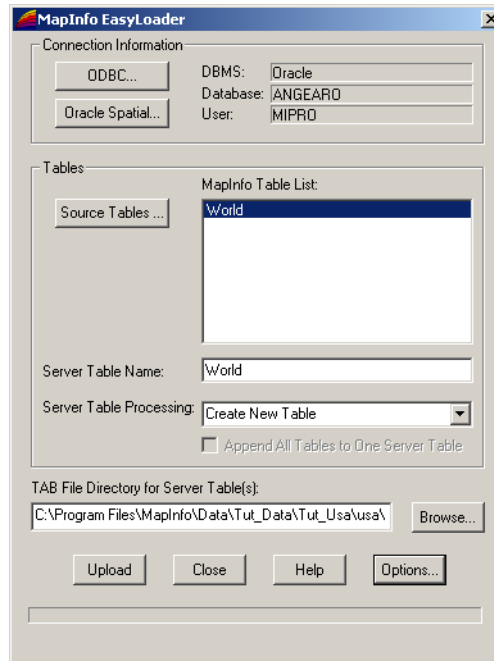
- XY tables (Oracle, Informix, Access, SQL Server)
- MICODE tables (Oracle, Informix, Access, SQL Server)

These schemas utilize spatial points in standard databases.

In MapInfo Professional, you can install and run the EasyLoader easily using the Tool Manager in the Tools directory:

1. On the **TOOLS** menu, click **TOOL MANAGER**. The Tool Manager dialog box displays.
2. Choose **EASYLOADER** from the Tools List and select the **LOADED** check box. Select the **AUTOLOAD** check box to load the tool automatically when you start MapInfo Professional.
3. Click **OK**. The EasyLoader tool is added to the Tools menu.
4. On the **TOOLS** menu, point to **EASYLOADER** and click **EASYLOADER** to open the tool.

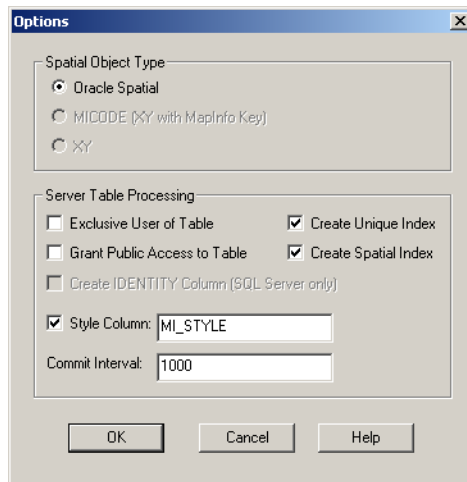
When you open the tool, the MapInfo Professional EasyLoader dialog box displays. The user interface enables you to connect to a server (using ODBC) or Oracle Spatial server and select the tables that you want to upload.



When you connect to a server using ODBC, select a data source (see [Creating New Data Sources \(ODBC\) on page 236](#)). To connect to the Oracle Spatial server, you must have the Oracle client installed.

When you connect to a server, the **SOURCE TABLES** button enables. It displays a dialog box that enables you to select the MapInfo Professional tables to upload. The selected tables display in the MapInfo Professional tables list. To change the tables in this list, you must use the **SOURCE TABLES** button.

The **UPLOAD** button becomes available after you have selected the tables to upload. Be sure to specify your table options before you upload the tables using the **OPTIONS** button.



The Options include:

- **APPEND TO TABLE** – The MapInfo Professional table will be appended to the server table if the server table exists and the structure of the two tables match. Otherwise, you will get an error and the table will not be uploaded.

- **REPLACE/CREATE TABLE** – The server table of the same name is first dropped if it exists, then a new table is created to match the MapInfo Professional table being uploaded.
- **APPEND ALL TO ONE TABLE** – All MapInfo Professional tables listed are uploaded to a single server table. The server table name is the one visible in the Server Table box. This feature is meant to be used to upload tables with the same structure and symbology to one table.

For example, instead of creating a new table for each street layer, select the **APPEND ALL TO ONE** check box, and only one table will be created. Then all of the tables will be appended to this table.

Note: It is possible that some tables will not be appended if their structure differs.

When used with the **APPEND TO TABLE** option, the tables will all be appended to the existing server table.

When used with the **REPLACE/CREATE TABLE** option, the server table will be dropped, a new table created, and all tables listed will be appended to that one.

Note: All tables should have the same projection.

- **GRANT PUBLIC ACCESS TO TABLE** – PUBLIC is granted all access to the server table.
- **EXCLUSIVE USE OF TABLE** – You can speed up load time on large tables significantly if you know that you will be the only one attempting to update the table. Note, however, that specifying this option does not guarantee that the loader will obtain exclusive use, you must guarantee that to the loader.

The loader checks on the current maximum value of the primary key column (prinx) after each commit to ensure that it detects any other entries that may have been made by other processes. This option will prevent that check from occurring, which can make a significant change to the run time for large tables.

- **CREATE UNIQUE INDEX** – A unique index is created on the column sw_member for SpatialWare or mi_prinx for Oracle Spatial. The mi_prinx column is a sequential number that is generated by the loader.
- **CREATE SPATIAL INDEX** – For SpatialWare tables the index is created on the geometry column and is called HG<TABLE_NAME>IND. A spatial index is created and Update Statistics is executed after an rtree index is created for SpatialWare.

For Oracle Spatial tables the spatial index is created on the geometry column and is called <TABLE_NAME>_SX. The index tiling level is based on the SDO_TUNE.ESTIMATE_TILING_LEVEL function. For tables with fewer than 7500 rows, the tiling level is restricted to 8. After the index is built the ANALYZE table function is run on the index table.

You may also build your own spatial index to suit your specific needs. If you choose to do this, clear this check box to save time in loading.

For more information on how to run EasyLoader, please view the online help provided with this tool, "EasyLoader.HLP".

Prerequisite 2 – Creating a Spatial Index Column

To increase performance on queries against the coordinates, a spatial index column can be included. This is done as part of the sample upload applications, if it is desired. This is a data creation task and can be done at any time.

Prerequisite 3 – Creating a MapInfo_MapCatalog

Use EasyLoader to create a MapInfo_MapCatalog while you are uploading tables. MapInfo Professional stores information about where the spatial columns are located in a special table on the DBMS known as the MapInfo_MapCatalog. There must be one catalog per database. The application EasyLoader can be used to create this catalog for each database: Oracle 8, 9, Informix, SQL Server, and MS Access. These applications will need to be customized for any other DBMS, or you can follow the procedure for manually creating a map catalog.

This is a one-time only task per database and is required before any tables on that database can be mapped in MapInfo Professional.

Automatically Creating a MapInfo_MapCatalog

To create a MapCatalog automatically, use the EasyLoader tool. This tool is part of the toolset that ships with MapInfo Professional and is available from the Tool Manager.

To load the EasyLoader tool:

1. On the Tools menu, click Tool Manager. In the Tool Manager dialog box.
2. Select the Loaded check box next to the EasyLoader tool and click OK. The tool is now located as a command in the Tools menu for the current MapInfo Professional session.
To have the tool load automatically every time you start MapInfo Professional, select the Autoload check box next to the tool.

3. Run the EasyLoader tool from the Tools menu.

When you upload the first table the MapInfo_MapCatalog will automatically be created. If the map catalog does not exist, EasyLoader will attempt to create it under the MapInfo user. If this user does not exist EasyLoader will attempt to create it. If a user does not have adequate permissions then the creation of the MAPINFO.MAPINFO_MAPCATALOG will not succeed, and the table(s) will not be loaded.

Manually Creating a MapInfo_MapCatalog

If you need to manually create the MapInfo_MapCatalog, it should be created by your database administrator.

1. Create the user MAPINFO with the PASSWORD MAPINFO in the specific database where the mappable tables are located.
2. Create the table MAPINFO_MAPCATALOG in the database.

The Create table statement needs to be equivalent to this MapInfo Professional create statement for the specific remote database.

```
Create Table MAPINFO_MAPCATALOG(
  SPATIALTYPE          Float,
  TABLENAME          Char(32),
  OWNERNAME           Char(32),
  SPATIALCOLUMN       Char(32),
  DB_X_LL              Float,
  DB_Y_LL              Float,
```

DB_X_UR	Float,
DB_Y_UR	Float,
COORDINATESYSTEM	Char (254),
SYMBOL	Char (254),
XCOLUMNNAME	Char (32),
YCOLUMNNAME	Char (32),
RENDITIONTYPE	Integer,
RENDITIONCOLUMN	VarChar (32),
RENDITIONTABLE	VarChar (32),
NUMBER_ROWS	Integer)

It is important that the structure of the table is exactly like this statement. The only substitution that can be made is for the databases that support varchar or text data types. These data types can be substituted for the Char data type.

3. Create a unique index on the TABLENAME and the OWNERNAME, so only one table for each owner can be made mappable.
4. Grant Select, Update, and Insert privileges on the MAPINFO_MAPCATALOG to Public. This allows the users to make the table mappable. The delete privilege should be reserved for database administrators.

Spatial Index Types

This table lists the supported Spatial Index types.

Spatial Index Type	Type Number
MapInfo MICODE schema (any database)	1
XY schema (any database)	4
MapInfo IUS_MM_SW	9
MapInfo IUS_MM_XY	10
SpatialWare blade for IUS	11
Oracle Spatial	13

Updating Data Bounds in the MapInfo_MapCatalog

The MapInfo_MapCatalog currently contains the bounds of the data within the table. This is used to determine the map view if the table is opened as the first map in a window. The bounds are set either by the EasyLoader when the data is loaded or from the MapInfo Professional tool, Set Minimum Bounding Rectangle tool.

In previous version of MapInfo Professional, the bounds were not reset if new objects outside the current bounds were added to the table. The bounds are now automatically adjusted when inserting or updating spatial objects. If the object is outside the MBR, it will expand the MBR and update the MapInfo_MapCatalog. Deleting objects from the table does not alter the bounds.

Prerequisite 4 – Making a Remote Table Mappable in MapInfo Professional

MapInfo Professional holds catalog information about mappable tables from the Make Table Mappable command. Creating the entry for a table is a once-per-table task and is required before this specific table can be mapped in MapInfo Professional.

The Make DBMS Table Mappable command makes a remote SQL database table (DBMS table) mappable in MapInfo Professional. Any MapInfo Professional table may be displayed in a Browser, but only a mappable table may have graphical objects attached. Only mappable tables can display in Map windows. Use the Make Table Mappable command only for tables that you cannot upload with EasyLoader.

In the Make DBMS Table Mappable command provide MapInfo Professional with the following information from the remote database table so that the table can be mapped in MapInfo Professional:

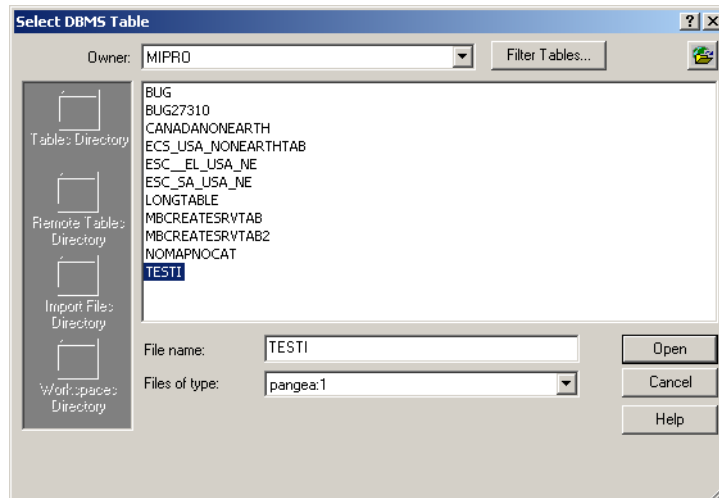
- The column(s) containing the spatial data to map the table (not applicable to relational Oracle SDO)
- The projection used by the remote database table
- The spatial index column from the remote database table (used by MapInfo Professional to speed access of the spatial data and improve performance)
- The symbol to use for objects
- Per row styles, if your table is set up for it, and the MapInfo_MapCatalog has the appropriate column structure
- Object type for Spatial databases
- Table Bounds (control the extent of the bounding rectangle for the Map window)

MapInfo Professional takes this information and stores it in a table called the MapInfo_MapCatalog. Every time you use a DBMS table MapInfo Professional checks the catalog to see if the table is mappable. As a result, you only have to make a DBMS table mappable once. It will always remain mappable. However, one spatial index column entry per table is allowed in the Map Catalog. Therefore, only one spatial column can be mappable at a time. If the table has more than one spatial column and you want to map another spatial column, you must drop the spatial column currently in the Map Catalog and make the table mappable using the new column.

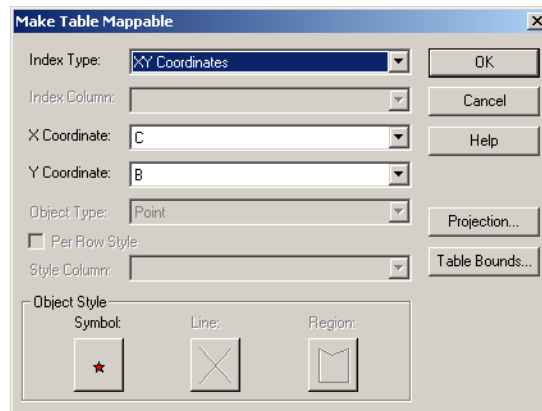
Making a DBMS Table Mappable

To make a DBMS table mappable:

1. On the **TABLE** menu point to **MAINTENANCE** and click **MAKE DBMS TABLE MAPPABLE**. The Select DBMS Table dialog box displays. Here, you select the DBMS table you want to make mappable.

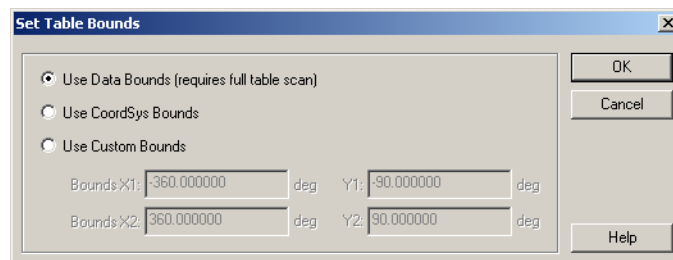


2. Open the appropriate remote connection if you have not done so already. The Open Table dialog box displays.
3. Select the table from the list and click **OK**. The Make Table Mappable dialog box displays.



4. Complete the appropriate selections and entries in this box and click **OK** to make the table mappable.
 - **INDEX TYPE** — Select the spatial index type of the column that has the spatial information in the DBMS table. The spatial index provides a fast way for MapInfo Professional to access the spatial data in the table. The seven index types to choose from are SpatialWare, Oracle Spatial, IUS SW Blade, IUS MM XY Blade, IUS MM SW Blade, MapInfo Professional, and XY Coordinates. (You use the XY Coordinates option when there is no index.)
 - **INDEX COLUMN** — Required for all index types except **XY COORDINATES**. Choose the name of the spatial column, or in the case of a MapInfo Professional index type, choose the name of the MICODE column.
 - X Coordinate, Y Coordinate
 - Required only if you chose the XY Coordinate or MapInfo Professional index type. Choose the X and Y columns that contain the point data you wish to map.
 - **X COORDINATE** and **Y COORDINATE** — Required for XY Coordinate index types. Choose the columns that contain the X and Y coordinates from the appropriate drop down list.

- **OBJECT TYPE** — For spatial databases, select point, linear, or region object types. (Defaults to point object type for **ORACLE SDO**, **MAPINFO PROFESSIONAL**, and **XY COORDINATES** index types.)
 - POINT**: indicates the table only can contain point objects
 - LINEAR**: indicates the table can only contain lines and polylines
 - REGION**: indicates the table can only contain region objects
- **OBJECT STYLE** — Depends on the object types that the mappable table can contain. You can set the default style that the objects will use for display when they are downloaded.
- **SYMBOL** — Displays the Symbol Style dialog box where you can select a default symbol for the point data.
- **LINE** — Displays the Line Style dialog box where you can select a default symbol for the line data.
- **REGION** — Displays the Region Style dialog box where you can select a default symbol for the region data.
- **PER ROW STYLES** — Activates per row styles for the table, which enables you to use different object styles on the remote table. You can modify the styles of individual objects or groups of objects and save them to the DBMS table.
- **PROJECTION** — Activates the Choose Projection dialog box. Specify the projection for the DBMS table. The projection must match the projection used by the corresponding remote database table.
- **TABLE BOUNDS** — Allows you to choose the options that determine how your default view and your entire view table bounds are calculated. The bounds options you specify in this dialog box define both views. Select one of these options and click **OK** to implement those bounds options.



USE DATA BOUNDS — By default MapInfo Professional calculates the bounds as the minimum bounding rectangle of all the data in the layer. This requires scanning the table and calculating this value. This process can take some time so a progress bar displays, showing you the progress of this operation. You can cancel it, if necessary.

USE COORDSYS BOUNDS — You can use the coordinate system bounds, but usually we do not recommend it. The coordinate system bounds are usually much larger than the actual data bounds, which may make finding your displayed data difficult. You are usually zoomed out too far to be able to locate your data easily.

USE CUSTOM BOUNDS — Here, you can set your own custom bounds based on the size and location of your data. Click this option to modify or set the bounds of your data.

Making a DBMS Table Mappable (To Geocode It)

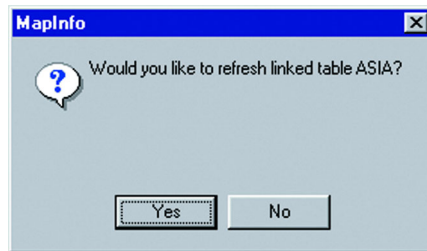
To make a DBMS table mappable for geocoding purposes:

1. Add two numeric columns in the Table on the database server to hold the X coordinates and one for the Y coordinates.
2. In MapInfo Professional, choose **TABLE** menu, point to **MAINTENANCE** and click **MAKE DBMS TABLE MAPPABLE**. Select the table you want to make mappable. The Make Table Mappable dialog box displays.
3. Choose **XY COORDINATES** for the Index Type, X column for the X Coordinate and the Y column for the Y Coordinate.

If your MapCatalog has the capability to support styles, you can set up the table to use per row styles. Simply select the **PER ROW STYLES** check box and choose the column that you want to obtain the style attributes. The only column types available for use with the Per Row Styles option are character or varchar columns.

This option is only available when the MapCatalog has the structure to support styles. It must contain the columns `RENDITIONTYPE`, `RENDITIONCOLUMN`, and `RENDITIONTABLE`.

4. Open the remote table in MapInfo Professional; go to the **FILE** menu and click **OPEN**. You will get a blank Map window. Then on the **TABLE** menu, click **GEOCODE** to geocode your records.
5. Once you have completed geocoding, on the **FILE** menu, click **SAVE TABLE** to save the changes to the remote database.
6. Answer **"YES"** to Refreshing the table in order to see your points.



Using Per Row Styles

Per Row Styles allows the use of different object styles on a remote database. You can modify the styles of individual objects or groups of objects and save them to a DBMS table.

To use Per Row Styles, the DBMS table must be set up correctly, and your MapInfo MapCatalog must have the appropriate structure:

- The MapCatalog must contain columns that support the use of styles. They are: `RENDITIONTYPE`, `RENDITIONCOLUMN`, and `RENDITIONTABLE`. If you have created the MapCatalog with EasyLoader version 6.6 or later, these columns are already in the MapCatalog. If you are using a pre-v. 6.6 version of the MapCatalog, a script is provided that will alter the definition of the MapCatalog to include these columns. Adding these new columns will not cause problems for older versions of MapInfo Professional, MapX, or MapXtreme.
- The map table itself must have a character column wide enough to store the complete style string. Style strings vary in width. We recommend a minimum of 50 characters be provided. If you plan to use custom symbols, which use much longer strings, allow 200 characters.

- The entry for the table in the MapCatalog must be set correctly. This means that the `RENDITIONTYPE` is 1, and the `RENDITIONCOLUMN` contains the name of the column that will contain the style string. This entry is set by EasyLoader 6.6 or later if the MapCatalog contains the new columns, or it may be set using the Make Table Mappable function.

Changing the Symbol Style in a Mappable DBMS Table

The Change DBMS Table Symbol command allows you to change the symbol attributes for the point objects in a mappable DBMS table.

1. On the **TABLE** menu, point to **MAINTENANCE** and click **CHANGE DBMS TABLE SYMBOL**. The Select DBMS Table is displayed. The dialog box only displays mappable DBMS tables.
2. Select a DBMS table to display the Change Table Object Style dialog box. Use the dialog box to specify new style attributes for the objects in the selected table.
3. You must close, reopen, and refresh the linked table for the style change to take effect.

Supporting Oracle Spatial

Oracle Spatial is an implementation of a spatial database from Oracle Corporation. You can install it in addition to the MapInfo Professional ODBC Connectivity component. Although it has some similarities to the previous Oracle SDO relational implementation, it is significantly different. Oracle Spatial maintains the Oracle SDO implementation via a relational schema. However, MapInfo Professional does not support the Oracle SDO relational schema via the Oracle Call Interface (OCI). MapInfo Professional does support simultaneous connections to Oracle Spatial through the OCI and to other databases through ODBC.

Oracle Spatial Requirements

To connect to Oracle Spatial within MapInfo Professional, you must have the Oracle Spatial, or v.8.1.7, or Oracle 9i and 9i release 2 client installed. See your Oracle documentation for detailed information.

Supporting Oracle 8.1.7

MapInfo Professional's implementation of v.8.1.7 of Oracle Spatial does contain any significant changes from the earlier version.

Note: If you are using Oracle 8i and cannot open your three dimensional SDO objects in MapInfo Professional, we recommend that you index your columns with the default /3d index to ensure that your queries do not fail.

MapInfo Professional Support for Oracle Spatial

MapInfo Professional supports Oracle Spatial, v.8.1.7, Oracle 9i and 9i release 2 with the same functionality that it supported for v. 8.1.6. It will read and write spatial tables from the database and execute spatial queries against them.

Supporting SpatialWare

SpatialWare is a MapInfo Corporation product that helps users store, access, manage, and manipulate spatial data as a standard part of their business data. You can query both spatial and non-spatial data within a single SQL Server query using SpatialWare. All of the strengths of SQL Server as a relational database are extended to spatial data using SpatialWare. Spatial data may for example be directly managed and edited by many different users simultaneously.

Bound Objects in SpatialWare Spatial Queries

For both linked and live access tables, spatial objects in SpatialWare and Oracle Spatial queries are now submitted as a bound (binary) object. This change has been made for all implementations of SpatialWare: Oracle, Informix, and Oracle Spatial. Previously, a string was generated for the object. Because of the limitations on the string size, polygon complexity was also limited. Submitting spatial objects as bound objects removes this limitation.

The string describing the spatial object will be stored in the .tab files and reconstructed into a bound object when the table is opened. The SW SPW lib will be used to construct the bound object from the SpatialWare string.

Accessing Remote Databases using ODBC

Open Database Connectivity is a standard for accessing disparate database systems. It is the oil that moves the wheels of inter-database communication. MapInfo is committed to making this important interface work for your organization.

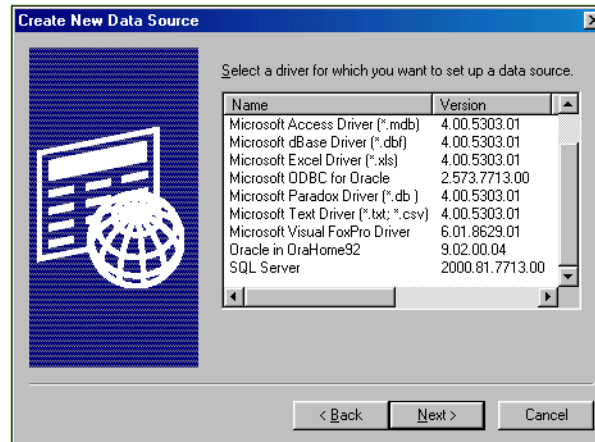
Creating New Data Sources (ODBC)

To access data from the different databases, you must set up a DBMS data source for each database you want to access through ODBC. If you are using Oracle Spatial, no data source is used when connecting using OCI. An ODBC DBMS data source contains the information you need to access that database. For example, an SQL Server data source names the SQL Server database, the server on which it resides, and the network used to access that server. You create a data source for each SQL database whose data you want to download into a MapInfo Professional linked table using the ODBC Administrator.

Then you configure the data source by associating a DBMS driver with it. This association is what enables MapInfo Professional to connect to and find the data defined with a particular data source.

To create a new data source:

1. Run the ODBC Administrator. You can start the Administrator from the Windows Control Panel. When you start the ODBC Administrator, the ODBC Data Source Administrator dialog box displays.
2. Click the **ADD** button. The Create New Data Source dialog box displays. It displays a list of all the installed drivers, including the driver name, version, and manufacturer.



3. Click the driver you want to associate with the database to select it.
4. Click **FINISH**. A driver-specific Setup dialog box for the data source appears. (The source of this dialog box is the ODBC Administrator.)
 Since each driver is different, each data source requires a different configuration. Because of this, each data source has a unique Setup dialog box.
 In general, configuration usually includes the data source name, description, and server name. Optional configurations might include server list, default logon ID and application name. There is a help file for each driver distributed as part of MapInfo Professional and is located in the Windows system directory. The help files are named as follows: MIdrv17.HLP, where *drv* is the name of a driver. For example, MIINF17.HLP is the help for Informix.
5. Type the required information about the data source in the Setup dialog box.
6. Click **OK** when you have finished configuring your data source. The driver writes these values to the ODBC.INI file. These values are now the defaults whenever you connect to the data source.

You can also create a data source on the fly when you are connecting to a data source.

DBMS Tables and Linked Tables

Tables can be downloaded from a relational database management system such as Oracle, or Access. These downloaded tables can be used standalone or remain linked to the original server database. You can use these linked tables to rerun queries on a regular basis. After editing in MapInfo Professional, the data in a linked table can be saved to the relational database management system in a manner that resolves any multi-editing conflicts.

MapInfo Professional stores information about a linked table that is hidden from the user. This information is known as metadata. MapInfo Professional uses metadata to store information about the linked table that is needed to manage transactions between MapInfo Professional and the server database. Two of the most important kinds of information stored in the metadata include the connection string and the query you build from the Expert dialog box.

What is a Linked Table?

A *linked table* is a special kind of MapInfo Professional table that is downloaded from a remote database and retains links to its remote database table.

You can perform most operations on a linked table that you do for a regular MapInfo Professional table. For instance, you can view, edit, copy, save, and rename a linked table just as you could a regular MapInfo Professional table. However, there are some things you can't do to a linked table. For instance, you can't pack a linked table. You also can't modify the table structure of a linked table (but you can modify its MapInfo Professional index structure).

You have live access to remote databases, enabling you to make changes to your remote database directly.

Refreshing a Linked Table

You can refresh a MapInfo Professional linked table with the most recent data residing on the remote database for that linked table.

To refresh a linked table:

1. Do one of the following:
 - Use the **REFRESH DBMS TABLE** button on the DBMS toolbar
 - On the **TABLE** menu, point to **MAINTENANCE** and click **REFRESH DBMS TABLE**.Using either method, the Refresh Table dialog box displays.
2. Choose the name of the table to be refreshed from the refresh table list.
3. Choose **OK**. The specified table is refreshed.

Unlinking a Table from a Remote Database

You can unlink a table from its remote database with the Unlink DBMS Table command. Unlinking a table removes the link to the remote database. This command does not work if edits are pending on the linked table. You must first update any pending edits with the Save Table command. The table linkage is removed. Fields that were marked non-editable are now editable. The end product is a normal MapInfo Professional base table.

To unlink a table:

1. On the **TABLE** menu, point to **MAINTENANCE** and click **UNLINK DBMS TABLE**. The Unlink Table dialog box displays.
2. Choose the name of the table to be unlinked from the Unlink table list.
3. Choose **OK**. The specified table is unlinked.

Opening a DBMS Table

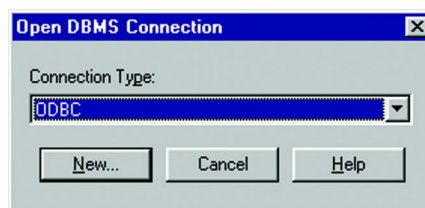
Before you can connect to a remote DBMS table, you must make sure your system is configured for remote access and has the required drivers for that connection. You can establish these drivers during the installation process when you use the **Custom Workstation Installation in Chapter 2 on page 70** directions.

Use the **NEW CONNECTION** button from the Open dialog box or click the **OPEN DBMS TABLE** button from the DBMS toolbar to make a connection to a database. A series of dialog boxes assist you in opening a DBMS table.

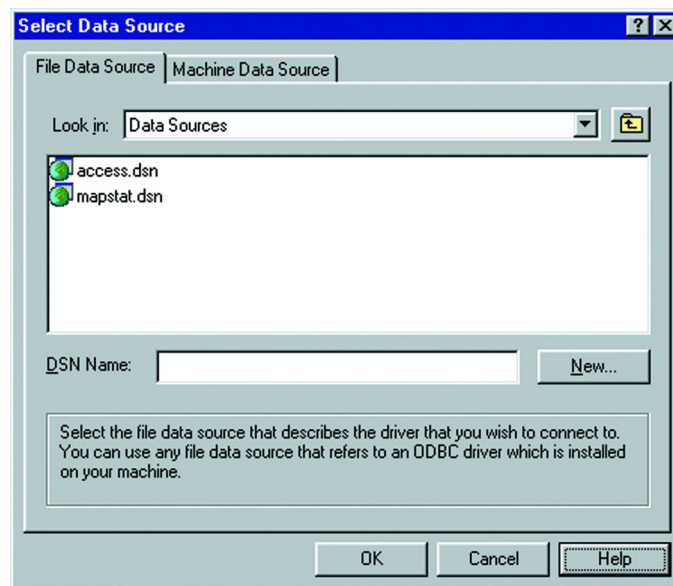
The dialog box sequence that displays depends on what DBMS support components you have installed:

- Choose a Connection Type from the Connection Type list.
- Open a connection to the DBMS source.
- Select the table to open.
- Specify table options such as Column filter, Row filter, etc.

The Open DBMS Connection dialog box displays and prompts you to select a table from the connected data source:

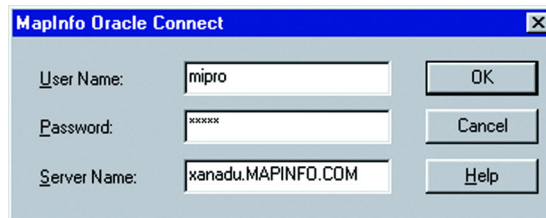


1. Choose a **CONNECTION TYPE** from the Connection Type list. The connection types that appear in the list depend on what types of DBMS Support you have installed: MapInfo ODBC, Oracle, or both.
2. To make a new connection, click the **NEW** button. If your connection type is MapInfo ODBC, the Select Data Source dialog box displays.

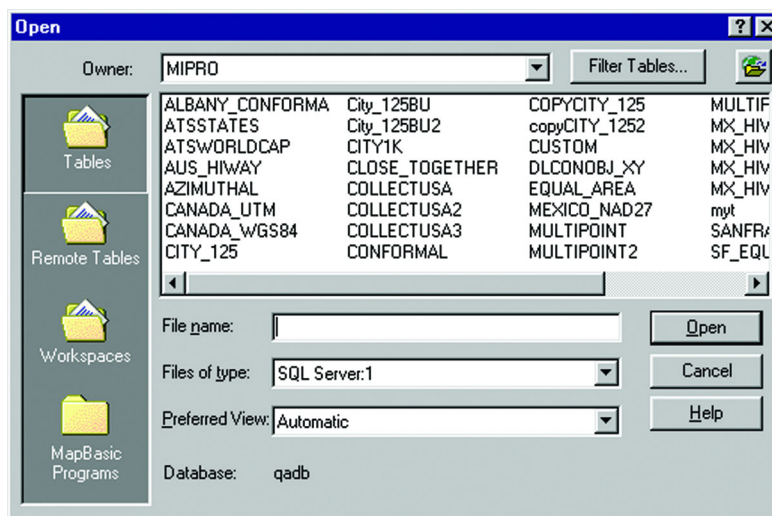


- **FILE DATA SOURCE** — Displays all file DSNs (data source names) and subdirectories contained within the directory displayed in the Look In box. Double-clicking a DSN connects to the data source.
- **LOOK IN** — Displays the current directory in which the subdirectories and file DSNs display. Click the **DOWN ARROW** to the right of the text box to display the entire path.
- **DSN NAME** — Displays the file DSN name selected in the File Data Sources list, or you can enter a new file DSN name.

- **NEW** — Adds a new file data source. If you click this button, the Create New Data Source dialog box appears with a list of drivers. Choose the driver for which you are adding a file DSN. After you click **NEXT**, you may specify the keywords for the file DSN. See **Creating New Data Sources (ODBC) on page 236**, for instructions on creating a new data source.
3. If your connection type is **ORACLE SPATIAL**, the MapInfo Professional Oracle Connect dialog box displays.



4. Enter the server name, user name, and password, and then click **OK**.
When you have chosen or created a connection the Open DBMS dialog box displays. It contains a list of tables for that connection, which displays in the Tables field. The directory path of the database connection or the database name also displays. This field is not present for data sources that do not provide this information.

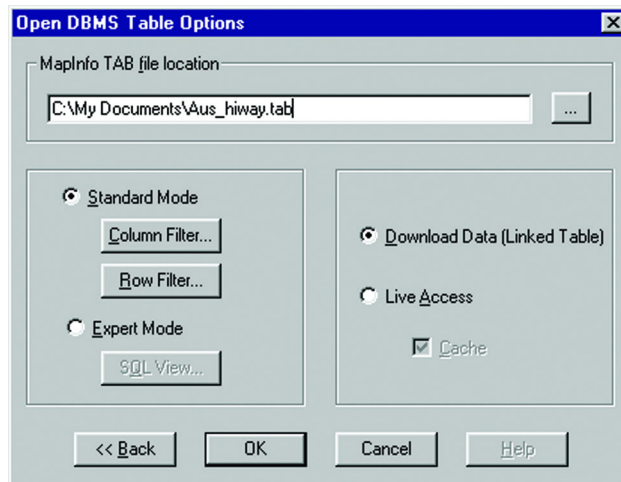


5. Click the name of the table you want to download to highlight it.
6. As an optional step, use the **FILTER** button to select which types of tables to list. The default shows Tables, View, and Synonyms, and hides System tables.
7. Click **OPEN**. The Open DBMS Table Options dialog box displays.

Note: For data sources that make use of owners, such as Oracle, the Owner field is activated. It allows you to list tables owned by different users.

Completing the Open DBMS Table Options Dialog Box

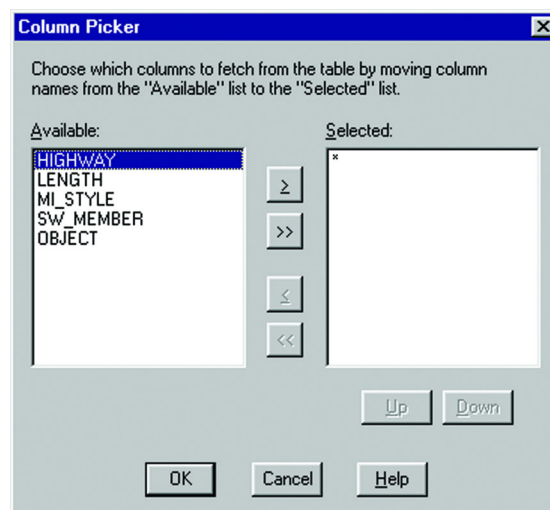
When you selected a table in the first dialog box, in effect, you selected all the rows and columns in that table. In this dialog box you select the columns that contain the data to be downloaded. By default, all columns download.



Note: The default location of the *.tab file is set in Remote Tables preferences.

To use the Open DBMS Table Options:

1. Once the data to be downloaded has been determined, specify the path name for the local table in the MapInfo Professional TAB file location path.
 - **To use the Standard Mode**, click the **COLUMN FILTER** button if you want only certain columns downloaded. The Column Picker dialog box displays.



Move the columns you want from the table from the Available group to the Selected group using the arrow buttons. The single arrow keys move one selected column at a time. The double arrow buttons move all the columns at once from one list to the other.

Change the order of the selected columns in the Selected list using the **Up** and **Down** buttons. Click a column to highlight it, and then move it up or down in the list by clicking the appropriate button.

Click **OK**.

- **To use the Expert Mode**, click the **EXPERT** radio button to create a SQL query that selects data from the table.

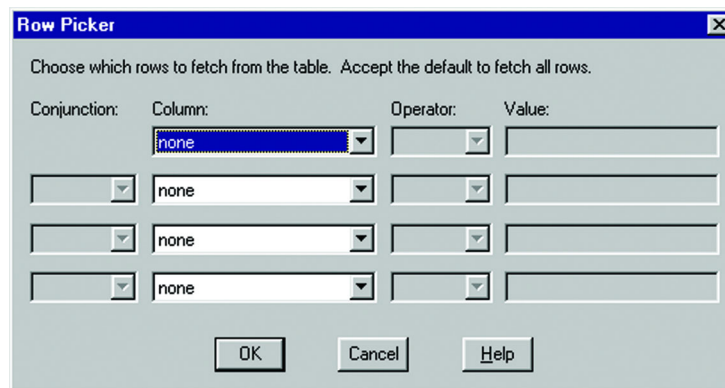
If the table is mappable, the Available list also displays an additional column called "OBJECT," which refers to the spatial column. You can select it to download point objects from the table. If the table is spatialized, it will download lines and polygons depending on what the table contains.

At the initial display of this dialog box, an asterisk (*) appears in the Selected list. If you leave the asterisk, all the columns will be selected from the table.

For additional coaching in using the Expert Mode, see [Entering SQL Queries with the Expert Button on page 244](#).

When you have completed executing your query, continue to [Completing the Open DBMS Table Options Dialog Box on page 243](#).

- Click the **Row** button to restrict the downloading of data from rows that match the criteria you specify. (This is the same as specifying the WHERE clause in a SQL query.) If you select no filtering criteria in this dialog box, all rows will be selected. The Row Picker dialog box displays.



- In the Column list, choose the column(s) from which you want to filter rows. If you are filtering rows for one column, select a column, operator, and value. If filtering rows on more than one column, select a column from the next drop-down list. This will also activate the next row of fields for data entry.
- Choose how you would like to filter the rows using the Operator and Value boxes.

Note: If you clicked the **EXPERT** button, you bypass the wizard and write a SQL query to select the rows from the table. Continue with [Completing the Open DBMS Table Options Dialog Box on page 243](#).
- Click **OK** when you have finished filtering the rows.

The Operator list boxes contain all supported operator symbols for their corresponding selected column. The list of operators will vary depending on the type of the selected column. For example, the operators <, >, and = (among others) will be available for numeric columns, but object columns will have only the operator WITHIN.

The type of the Value control also varies depending on the column type. For object columns, this control will be a list box containing the values CURRENT_MAPPER and SELECTION. For all other column types, this control will be an edit box, allowing the user to enter the proper type of data.

If you select an object column using the 'within' operator, MapInfo Professional returns only the objects from the server that are within the selection. In previous versions, if the selection contained multiple objects MapInfo Professional generated a query using the

MBR of the objects. This would usually return more data than expected. Now multiple objects are automatically combined into a single object before performing the spatial query, which returns the correct results. The object is stored in the .tab file so that it is re-used the next time you open the .tab file to the remote database.

String values are enclosed in single quotes, e.g., 'New York.' Numerical values are entered without any quotes. For example, for a numeric column, the user might select the operator >, and enter a value of 0. This would select only rows in which that column contained a value greater than 0.

There are two wildcard characters that can be used with the LIKE operator: '%' and '_'. The '%' wildcard character matches zero or more characters. The '_' wildcard character matches only one character.

When rows are being filtered from more than one column, Conjunction becomes available. Choose one of these boolean operators: AND, OR, AND NOT, OR NOT.

Completing the Open DBMS Table Options Dialog Box

To complete the Open DBMS Table Options dialog box:

1. Select the Download data (Linked Table) option to download the data and make it into a linked table. Clear the box for live access. (See [Creating Live Remote DBMS Access on page 244.](#))
2. For live access, the **CACHE** check box is displayed. Select the **CACHE** check box to keep attributes and objects that have been read in memory. If you perform an operation such as zooming in they do not need to be fetched from the database (since MapInfo Professional looks in memory for a record you may not see the latest updates).

If cache is on, another user's updates may not appear until the cache is invalidated by a pan or zoom out operation.

If you clear the **CACHE** check box, all data will be fetched from the database whenever it is needed. It will give the most up to date data but it will be less efficient because it must be re-read from a database. (See [Creating Live Remote DBMS Access on page 244.](#))

3. Click **OK** to save the data to the table you specified.

Downloading DBMS Tables

Downloading a DBMS table involves the following steps:

- Connect to a database.
- Select which table to download from the database.
- Select which columns to download from the table.
- Select which rows to download from the table.
- Save the table locally to MapInfo Professional as a linked table.

Entering SQL Queries with the Expert Button

In the Open DBMS Table Options, Expert Mode, the **SQL VIEW** button can be used to display the following dialog box:



This dialog box allows you to enter more complex queries than the wizard allows using the standard DBMS SQL syntax.

To type in multi-line formatted SQL, do the following:

- To get a new line press **ENTER**.
- To tab press **<CTRL TAB>**.
- To cut and paste from the clipboard, use **<CTRL X>** to cut, **<CTRL C>** to copy, and **<CTRL V>** to paste.
- **LOAD** — Loads an SQL statement that has been saved in a file. The Load button activates the Load SQL Query dialog box. This dialog box provides you with access to existing files containing SQL statements (*.SQL files). When you load an SQL file, its format will be preserved.
- **SAVE** — Saves the SQL statement in a file for later use. The **SAVE** button activates the Save SQL Query dialog box. Use this dialog box to save newly constructed SQL statements, or modifications to existing statements. When you save an SQL file, its format will be preserved. Once saved, the SQL statement appears in the list of available *.SQL files in the Load SQL Query dialog box.
- **LAST QUERY** — Loads the last query that was executed in this session of MapInfo Professional.

Creating Live Remote DBMS Access

You can access data live from remote databases. Follow the same procedure for connecting to a data source, and then open a DBMS table for downloading into an MapInfo Professional linked table using the DBMS wizard.

To create live remote DBMS access:

1. When the Open DBMS Table Options displays, select the **LIVE ACCESS** option. The **CACHE** check box is enabled.
2. For live access, the **CACHE** check box is displayed. Select the **CACHE** check box to keep attributes and objects that have been read in memory. If you perform an operation such as zooming in they do not need to be fetched from the database. (Since MapInfo Professional looks in memory for a record you will not see the latest updates.)

- If cache is on, another user's updates may not appear until the cache is invalidated by a pan or zooming out.
- Clear the **CACHE** check box and all data will be fetched from the database. This will give the most up-to-date data, but it is less efficient because the data must be re-read from the database.

3. Click **OK** button and a .tab file is created.

Completion of the dialog box will write the tab file and open it. The next time you want to open the table, open the TAB file.

Before accessing a table live from a remote database, it is highly recommended that you first open a map table (e.g., STATES.tab) for the database table. If you don't open a map table, the entire database table will be downloaded all at once, which could take a long time.

Open a map table and zoom in to an area that corresponds to a subset of rows you wish to see from the database table. For example, if you want to download rows pertaining to Florida, zoom in to Florida on the map. As a result, when you open the database table, only rows within the Map window's MBR (minimum bounding rectangle), in this case Florida, will be downloaded.

Limitations in Creating a Live Table

This is a list of known problems/issues with live access:

- Every table must have a single unique key column.
- FastEdit is not supported.
- With MS Access if the key is character, it will not display rows where the key value is less than the full column width e.g., if the key is char(5) the value 'aaaa' will look like a deleted row.
- Changes made by another user are not visible until the data is refreshed from the server. In addition, if cache is on another user's updates may not appear until the cache is invalidated by a pan or zooming out.
- There will be a problem if a client-side join (through the SQL Select menu item or MapBasic) is performed against two or more SpatialWare tables that are stored in different coordinate systems. This is inefficient (it is better to do the join in the SQL statement that defines the table), but it is a problem in the current release.

Live Access to SpatialWare 4.6 also has some limitations:

- Performance may be slower when downloading using Live Access.
- Deleting records creates problems. Records are deleted; however, the table structure is not packed, causing problems with selecting and labeling.

Limitations of Live Access to Remote DBMS Tables

This method of determining the number of rows is not appropriate for all tables. It works best on large tables, where the number of rows remains stable; that is, new insertions or deletions in the table do not occur on a regular basis.

In this case, a large table is defined as one that approaches a quarter of a million rows or more, or a table that takes a long time to open using the Live Access method.

If the total number of rows stored in the MapCatalog is out of sync with the actual number of rows in the table, problems occur. The map will always include all of the map objects, but other things may not work correctly. For example:

- The row count displayed in the Browser will be incorrect.
- The MapBasic statement to fetch last will not return the correct row.
- Thematic maps, particularly ranged thematic maps, may be wrong.

Saving a DBMS Table

You save changes to an MapInfo Professional linked or live table the same way you save a regular MapInfo Professional table, with the Save Table command.

Saving a linked or live table results saves the records on the remote database. But before MapInfo Professional allows records from a linked table to be updated, it evaluates the records in a process called conflict resolution.

Conflict Resolution for Linked or Live Tables

Because the records in a remote table are from a remote database, it is possible that other users may have changed or deleted them on the remote database since the table was downloaded into MapInfo Professional. As a result, conflicts may exist between the data residing on the remote database and the new data that you want to upload to the remote database.

When saving a remote table, if MapInfo Professional finds conflicts between the data on the remote database and any records in the remote table since it was downloaded, the Resolve Conflicts dialog box automatically displays. Use this dialog box to resolve conflicts as explained in the next table.

This process will be invoked whenever an attempt to save a remote table detects a conflict in an update. The dialog box allows the user to choose which fields from the conflicting records will be used to update the database. Three instances of the record being updated must be considered:

- The original server state of the record (the record as it appeared when initially extracted from the database).
- The current local state of the record (the record as it appears in the session of MapInfo Professional making the update, possibly after editing by the user).
- The current server state of the record (the record as it appears in the database at the time of the update).

A *conflict* exists when the original state of the record does not match the server state. This implies that another user has updated this database since it was extracted by MapInfo Professional.

The Conflict Resolution dialog box displays once for each conflicting record. At any point in this process, you may choose to leave this interactive mode and have the rest of the conflicts resolved automatically. In that case, you can use all local values or all server values to resolve the conflicts in the records.

For each conflict found during a commit, a modal dialog box displays. This box will display enough information for you to decide which data values to use to update the row in question.

Type of conflict	Default resolution
Value changed on server, local value <i>unchanged</i>	Use server value
Value changed on server, local value <i>changed</i>	Use local value

This record was also changed by another user. Select which values should be used to update the data.

Column	Original DBMS	Current MapInfo	Current DBMS	Current MapInfo	Current DBMS
TOTPOPHIS	273,997	410,967	310,967	<input checked="" type="checkbox"/>	<input type="checkbox"/>
*ML_PRINX	1	1	1	<input type="checkbox"/>	<input type="checkbox"/>

* Denotes the column[s] used for the unique key.

Column: TOTPOPHIS

Original DBMS: 273,997

Current MapInfo: 410,967

Current DBMS: 310,967

Buttons: OK, Stop Commit, Automatic..., Help

Click **OK** to save the selected values to update this record.

Column

Shows the name of the column in the record that has data which is in conflict and needs to be resolved. If the column name is too long and does not fit into the list box, a truncated representation will be shown instead. Its full value displays in the Column field.

Original DBMS

Shows the original data as it appeared when extracted from the database.

If the original data is too long and does not fit into the list box, a truncated representation will be shown instead. Its full value can be displayed in the Original field.

Current MapInfo Professional

Shows the data as it appears in the MapInfo Professional linked table you are trying to save. The MapInfo Professional field will be blank if the record has been deleted from the MapInfo Professional database. If the data from the MapInfo Professional linked table is too long and does not fit into the list box, a truncated representation will be shown instead. Its full value can be displayed in the MapInfo Professional field.

Current DBMS

Shows data as it appears in the remote database at the time of the update. (This data might have been changed by another user since it was downloaded into an MapInfo Professional linked table.) The Current field will be blank if the record has been deleted on the remote database, after being downloaded into an MapInfo Professional linked table. If the current data from the remote database is too long and does not fit into the list box, a truncated representation will be shown instead. Its full value can be displayed in the Current field.

Current MapInfo Professional

Check this box to update the remote database with the value from the MapInfo Professional linked table.

If the current record on the database or the MapInfo Professional record was deleted, then this check box is not available. Instead, you must use the **MAPINFO PROFESSIONAL** or **CURRENT** button.

Current DBMS

Select to retain the current value on the remote database. If the current record on the database or the MapInfo Professional record was deleted, then this check box is not available. Instead, you must use the **MAPINFO PROFESSIONAL** or **CURRENT** button.

MI Pro button

This button selects all the MapInfo Professional values. If the record you are trying to resolve was deleted from the MapInfo Professional database, selecting the **MI PRO** button will delete the record from the remote database. If the record you are trying to resolve was deleted from the remote database, selecting the **MI PRO** button will insert the new record into the remote database.

Current button

This button selects all the current DBMS values. If the record you are trying to resolve was deleted from the MapInfo Professional database, selecting the **CURRENT** button will ignore the deletion and retain the current record in the remote database. If the record you are trying to resolve was deleted from the remote database, selecting the **MI PRO** button will insert the new record into the remote database.

Column

Shows the full name of the column highlighted in the list box.

Original DBMS

Shows the full value of the original data highlighted in the list box.

Current MI Pro

Shows the full value of the MapInfo Professional data highlighted in the list box.

Current DBMS

Shows the full value of the current remote database data highlighted in the list box.

Stop Commit

The **STOP COMMIT** button terminates the entire update. A second dialog box confirms that this is what you really want.


Automatic

The **AUTOMATIC** button causes the interactive conflict resolution to end. A dialog box displays to allow you to select the automatic conflict-resolution modes you want to use for the remainder of this update. You can select one two automatic modes from the dialog box. You can accept MapInfo Professional values, or the values currently residing on the remote database.

Disconnecting from a Remote Database

Disconnecting from a remote database server is a simple operation.

To disconnect from a remote database server:

1. From the DBMS Toolbar, do one of the following:
 - Click the **DBMS DISCONNECT**  button.
 - On the **FILE** menu, click **CLOSE DBMS CONNECTION**.Both operations display the Close DBMS Connection dialog box. The Connection list displays all the open connections.
2. Select the connection(s) you want to close and click **OK**. The selected connection(s) close.

Working with DBMS Tables

Getting live access performance is an important issue with large DBMS tables. This section covers this issue as well as some explanation about when DBMS tables are read only and when DBMS spatial objects are read only.

Live Access Performance with Large DBMS Tables

Opening large tables of a quarter million or more rows using the DBMS Live Access method has traditionally been slow. Even when you are displaying a very small number of rows in a Map window it can take several minutes.

Most of this time is used to perform a row count on the table and to order the rows by primary key. MapInfo Professional uses the table's row count internally. To prevent MapInfo Professional from having to count the rows, use the DBMS Count Rows in Table tool to virtually eliminate the initial startup time on the table. The DBMS Count Rows tool updates the number of rows and stores the total in the MapCatalog.

To utilize the tool, you must modify the MapCatalog definition for existing MapCatalogs to include a new integer column, NUMBER_ROWS. Using the SQL tool supported by your database, execute this statement to add the column:

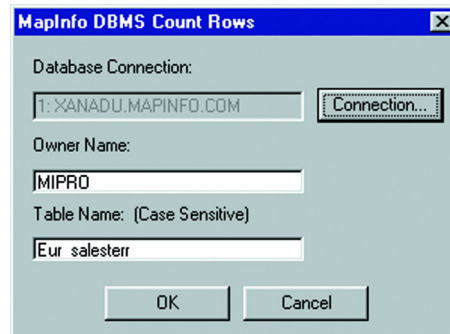
```
ALTER TABLE MAPINFO.MAPINFO_MAPCATALOG
ADD NUMBER_ROWS NUMBER
```

In new installations of MapInfo Professional 6.5 or later, use the EasyLoader tool to add the NUMBER_ROWS column when it creates the MapCatalog.

To load the DBMS Count Rows tool, on the **TOOLS** menu, click **TOOL MANAGER**. Select the **LOADED** check box next to the DBMS Count Rows in Table tool, and click **OK**. The tool is now located as a command in the Tools menu.

To use DBMS Count Rows:

1. On the **TOOLS** menu, click **DBMS MIRowCnt**. The DBMS MIRowCnt dialog box displays.
2. Specify the database connection, the owner name, and the table name.
3. Click **OK**. The rows in the table are counted and the total is placed in the MapCatalog.



When Is a DBMS Table Read-Only?

The DBMS table can be read-only under any of the following circumstances:

- The data downloaded from the server database is not editable.
- There are no editable columns in the data downloaded from the server database.
- The data downloaded from the server database does not contain a primary index.

If the data downloaded from the server database does not contain a primary index, you can create one. Then the table will become editable. The next section explains how to create a primary index on a remote table from MapInfo Professional.

When Is a DBMS Spatial Object Read-Only?

The spatial object itself may not be editable.

A DBMS table's spatial objects may not be editable under the following circumstances:

- Spatial data is not actually stored in a column on the table. This would happen if a function were used on the spatial data that generated spatial data, such as buffering the object on the server.
- Spatial data is three-dimensional.

Drawing and Editing Objects

The drawing and editing capabilities in MapInfo Professional® allow you to create and customize an unlimited variety of objects for your maps. Easy-to-use drawing tools and commands are accessible from the Drawing Toolbar. You can also display nodes, line directions and centroids to give you better control when editing objects.

In this Chapter:

- ◆ **Understanding the Drawing and Editing Tools 253**
- ◆ **Drawing Objects 254**
- ◆ **Drawing Polygons and Polylines 256**
- ◆ **Drawing Symbols 256**
- ◆ **Entering and Working with Text on the Map 261**
- ◆ **Editing Objects 262**

Understanding the Drawing and Editing Tools

MapInfo Professional has a complete set of drawing tools and editing commands. These tools allow you to draw and modify objects on your map. You can also use these tools to customize the colors, fill patterns, line types, symbols, and text on your map.










However, these tools and commands give you more than the ability to modify your map. You can draw a variety of objects that you can use to perform powerful geographic analyses. For example, you can draw circles, polygons, and other bounded objects. You can then search for records within those boundaries.

Note: You can only draw and edit objects on a map when the layer the object is on is editable.

We have covered making a layer editable in depth elsewhere in this User Guide. See [Making the Layers “Editable” on page 127](#).







Using the Drawing Tools

There are nine drawing tools, each located in the Drawing toolbar:

Icon	Tool Button	Use Description
	Arc	To draw a circular arc, hold down the SHIFT key while using the Arc tool.
	Ellipse	The ellipse is drawn from the center outward at the point where you click. To draw a circle, hold down the SHIFT key while dragging the ellipse cursor. To begin an ellipse (or circle) from a “corner,” use the CTRL key in combination with the Ellipse tool.
	Line	Use the Line tool to draw straight lines (streets, pipelines, cables). To draw a horizontal, vertical or 45° line, hold down the SHIFT key when using the Line tool. Note that borders around regions or boundaries are not lines. Therefore, if you use the Line tool to draw a square, MapInfo Professional does not recognize the square as a region. You cannot shade its interior or perform searches within it.
	Polygon	Unlike the Ellipse, Rectangle, and Rounded Rectangle tools (which only create shapes), the Polygon tool creates regions. You can perform many more editing functions with regions, such as merging and reshaping.
	Polyline	Similar to the Polygon tool in that polylines can be reshaped and smoothed (replacing angles with curves). Neither option is available with objects drawn with the Line tool.
	Rectangle	To draw a square, hold down the SHIFT key while using the Rectangle tool. The object is drawn from a corner. To draw a rectangle centered on the point at which you click, use the CTRL key with the Rectangle tool.
	Rounded Rectangle	To draw a rounded square, hold down the SHIFT key. As with the Rectangle tool, use the CTRL key with the Rounded Rectangle tool to draw the object from the center outward.
	Symbol	Use the Symbol tool to create point markers.
	Text	You can customize the font, point size, and rotation angle. You can also create text by using MapInfo Professional's labeling tools and commands.

Using the Drawing and Editing Commands

The Drawing toolbar contains six additional buttons to aid you in drawing and editing.

Icon	Tool Button	Description
	Reshape	Toggle in and out of Reshape mode with this button when you want to add, delete, or move nodes in an editable layer (also available on the Edit menu).
	Add Node	The Add Node button allows you to put additional nodes on an object for more precise editing.
	Line Style	Displays the Line Style dialog box where you can change the color, width, and type of selected line objects or set new defaults for future objects.
	Region Style	Displays the Region Style dialog box where you can change the fill pattern and border of selected region objects or set new defaults for future objects.
	Symbol Style	Displays the Symbol Style dialog box where you can change the symbol type, color, and size of selected symbol objects or set new defaults for future objects.
	Text Style	Displays the Text Style dialog box where you can change the font, size, color, and attributes of selected text or set new defaults for future text and labels.

Drawing Objects

Drawing objects in MapInfo Professional is easy. Once you have made the layer editable, choose the appropriate tool. Using the shape tools, you can draw arcs, ellipses, circles, lines, rectangles, and rounded rectangles on your map. You can either draw the object directly on the Cosmetic Layer (and save it to another or new layer later) or make a map layer editable now and draw the objects there.

Once you have drawn the object, you can move the object, delete it, copy it to the Clipboard, or paste it to another Map window.

Also, you can delete the last node of the object by pressing the **BACKSPACE** key. If there is only one node left in the object, it will not be deleted.

Using the Ruler Window as You Draw

The Ruler window will show the distance of line segments as you draw, as well as the cumulative distance of the drawn object. If necessary, a rubber-banding line displays to show what points are being used to compute the distance. The Ruler window also displays what type of calculation is used to compute the distance: Spherical or Cartesian. The type of calculation depends on the projection of the map. The following drawing tools will display a rubber-banding line:

- Arc
- Ellipse
- Rectangle
- Rounded Rectangle

You can also use the Ruler window with the Marquee Select and Radius Select tools. Just click the Ruler tool to display the Ruler window.

If the Ruler window is not active, the drawing and selection tools noted above do not display distance. The rubber-banding line does not display.

Object Styles

MapInfo Professional draws objects using the default color, fill pattern, line type, symbol, and text settings for the layer you are drawing on. The default style can be set in the Styles Preferences dialog box.

To change the style of an *existing* object:

1. On the **MAP** menu, click **LAYER CONTROL** and make the layer editable.
2. Select the object and choose the appropriate style command from the Options menu.
The style commands are also available on the Drawing Toolbar. These commands also set the styles for any subsequent objects to be drawn on the layer.
3. Save your changes.

For closed shapes such as circles and squares, you can change the fill pattern and color, the style and color of the border, and the line width of the border. For arcs and lines, you can change the type of line, its color, and the width of the line. In addition, you can use interleaved line styles to create the appearance of intersections for overlapping intersections and lines within a single layer. Interleaved line styles are available for use with lines of the same style and color (they can be different widths). Interleaved line styles are not available for solid lines or borders.

Any edits to an object's default settings will be applied during the entire work session until you make new changes. To save the settings, you must save the table where the object resides.

You can also change the display of an object in Layer Control. In the Layer Control dialog box, click the **DISPLAY** button to bring up the Display Options dialog box. Click the **STYLE OVERRIDE** check box to activate the **STYLE OVERRIDE** button. Click the **STYLE** button to bring up the appropriate Style dialog box.

Note: The settings you specify through the Display Options dialog box are temporary unless you save the table to a workspace.

Printing Fill Patterns

When it comes to printing objects, some fill patterns print faster than others. In general, the fill patterns on the top row of the pattern list in the Pattern drop-down list print the fastest. The difference in printing speed varies from printer to printer. The fill patterns on the top row are also the ones most likely to plot correctly on pen plotters, although results depend on which plotter driver you use. For more coaching on printing fill patterns, review the *MapInfo Professional 7.5 Printer Guide* on your MapInfo Professional 7.5 CD. To review the list of fill patterns available in the MapInfo Professional product, see **Fill Patterns Used in MapInfo Professional in Appendix E on page 616**.

Drawing Polygons and Polylines

Drawing polygons is different than drawing other shapes because you are creating a region on which you can perform other editing and analysis.

For instance, you want to create school districts for your map. You have a street map of your town to guide you in defining the school district boundaries.

To create a polygon:

1. Choose the **POLYGON** tool. The tool becomes a cross hair.
2. Click a starting point for the polygon.
3. Continue to click to add segments to the polygon.
4. When you are ready to complete the object, double-click the last end point.
You can delete the last node by pressing the **BACKSPACE** key.

Note: If there is only one node left in the object it will not be deleted.

You can then use the Combine command to combine this region with another, reshape the region, etc.

Polylines are made up of multiple line segments that are treated as one object. Unlike lines created with the Line tool, you can smooth polylines into a continuous curve using the Smooth command. Again, you can delete the last node by pressing the **BACKSPACE** key.

Note: If there is only one node left in the object it will not be deleted.

Converting a Polyline to a Region

To convert a polyline into a region:

1. Make the Map window active.
2. Open **LAYER CONTROL** and make the layer that contains the polyline editable.
3. Select the polylines you want to convert to a region.
4. On the **OBJECTS** menu, click **ENCLOSE**. The Create Region Objects From Enclosed Areas Dialog Box displays.
5. Click **OK** to convert the polyline you selected to a region.

You can also convert regions to polylines. For these instructions, see [Converting Regions to Polylines on page 270](#).

Drawing Symbols

Symbols on your maps make your map more expressive and easier to understand. This section explains how to change a style currently used by MapInfo Professional and create your own custom symbols. We also discuss in detail the rules governing symbols.

To draw symbols, make the layer you want to draw the symbols to editable and choose the **SYMBOL** tool. Place the cursor where you want the symbol to be and click. The symbol displays using the default symbol style settings.

Changing a Symbol Style on a Map

To change a symbol's style on a map:

1. Select the symbol with an appropriate selection tool.
2. Do one of the following:
 - Click the **SYMBOL STYLE** button
 - On the **OPTIONS** menu, click **SYMBOL STYLE**

Using either method, the Symbol Style dialog box displays.

Note: The options in the Symbol Style dialog box may be different depending upon the size and complexity of the image.

Here you can change the symbol, font, color, and size, as well as create background effects and bold face for symbols.

Select the **DISPLAY AT ACTUAL SIZE** check box to see the symbol you selected at the size it was originally created.

Click the **RELOAD** button to refresh the list of custom symbols stored in the Application Data CUSTSYMB directory. Select this button if you added a new custom symbol and do not see the symbol(s) in the list.

Click the **FULL VIEW** button to display the entire view of custom symbol in a separate window. This button displays only when you select the Custom Symbols font type. You use this button when the preview is too large to display completely in the sample area.

3. Make the desired changes, and click **OK**.

The symbol displays with the style changes you specified. These settings also apply to any subsequent symbols you draw until you change the settings.

Supported Fonts for Symbols

You have many options when drawing symbols. We support a number of TrueType fonts that carry their own symbol sets. We have also organized a number of symbol fonts around different industries, such as real estate and transportation, making it easy for you to find the symbols you need. MapInfo Professional supports the following fonts:

- MapInfo Cartographic
- MapInfo Transportation
- MapInfo Real Estate
- MapInfo Miscellaneous
- MapInfo 3.0 Compatible Symbols (vector symbols, available as a True Type font in MapInfo Professional): the 36 shapes from the MapInfo symbol set offered in versions prior to MapInfo Professional.
- MapInfo Oil & Gas
- MapInfo Weather
- MapInfo Arrows

- Installed font symbols: symbols available from the installed fonts that offer a symbol set
- Custom symbols: from here you can access user-created bitmap symbols which you have saved to the CUSTSYMB directory. This directory is created during MapInfo Professional installation. See [Working with Custom Symbols \(page 258\)](#) for more about this process.

The MapInfo Symbols font is the same set of symbols offered in previous versions of MapInfo Professional, but the symbols are now a TrueType font. The MapInfo 3.0 Compatible font contains the same symbols offered in previous versions of MapInfo Professional in the same vector format. When you use these symbols, the Background and Effects options in the Symbol Style dialog box are unavailable.

CAUTION: If you are creating a map that will be used by MapInfo 3.0 users, avoid using TrueType symbols and custom symbols. Limit your point objects to the symbols in the MapInfo 3.0 Compatible symbol set.

If you create a table that contains TrueType symbols or custom symbols, and you display the table using MapInfo 3.0, the symbols will be invisible. If you then edit the table using MapInfo 3.0, the point objects may be lost.

Working with Custom Symbols

You can create and use your own custom bitmaps as symbols in MapInfo Professional. To access these custom symbols, place them in the CUSTSYMB directory and select them from the Custom Symbols option in the Font list of the Symbol Style dialog box (**OPTIONS > SYMBOL STYLE**). All of the custom symbols in MapInfo Professional are stored in the CUSTSYMB directory. If you cannot find this directory, there are a couple of places you could check. The location of this file depends largely on the administration of your computer, the version of MapInfo Professional you use, and the location of your installation directory.

Usually, this directory is located in Program Files\MapInfo\Professional\ (or one of its subdirectories) or in \Documents and Settings\user's login directory\Applications Data\MapInfo\MapInfo\version number\. If you cannot find this directory, click **START** and **SEARCH** and search for \CUSTSYMB on your system.

Note: If you add custom symbols while you are working in MapInfo Professional, open the Symbol Style dialog box and click the **RELOAD** button to ensure that the new symbol(s) you have added display. Otherwise, you have to exit MapInfo Professional and re-enter it to get the new symbols to display in the Custom Symbols list.

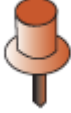



When you change the style of a custom symbol, the Effects options in the Symbol Style dialog box change. You can either show a background or apply a color.

- **SHOW BACKGROUND** displays the custom symbol with the background color with which it was created.
- **APPLY COLOR** replaces all non-white pixels with a color you choose from the color palette.
- **DISPLAY AT ACTUAL SIZE** shows the symbol at its actual size.

When you are creating extended custom symbols we recommend you check the Show Background check box if you do not require transparency. This setting improves performance significantly during exporting and Drag and Drop operations.

MapInfo Professional ships with custom symbols that you can use to enhance your maps. Here is a list of the custom symbols we provide.

Title	Image	File Size	Color Depth
AMBU-64.BMP		13 KB	24-bit
BANK-64.BMP		13 KB	24-bit
BUILDINGS.BMP		13 KB	24-bit
FIRE-64.BMP		13 KB	24-bit
FOOD-64.BMP		13 KB	24-bit
HOUS-64.BMP		13 KB	24-bit
PINB-64.BMP		13 KB	24-bit
PING-64.BMP		13 KB	24-bit
PINGY-64.BMP		13 KB	24-bit

Title	Image	File Size	Color Depth
PINR-64.BMP		13 KB	24-bit
RAIL-64.BMP		13 KB	24-bit
RED-CAR.BMP		13 KB	24-bit
TRUC-64.BMP		13 KB	24-bit

Understanding the Custom Symbol Types

There are two types of custom symbols: custom symbols and extended custom symbols. The difference in these two types depends upon the complexity of the bitmap images. Files that are equal to or larger than 128K and/or have greater than 8 bit color are considered to be extended custom symbols. You need to know the distinction between these two types of custom symbols because the options for the extended custom symbols are slightly different from the custom symbols.

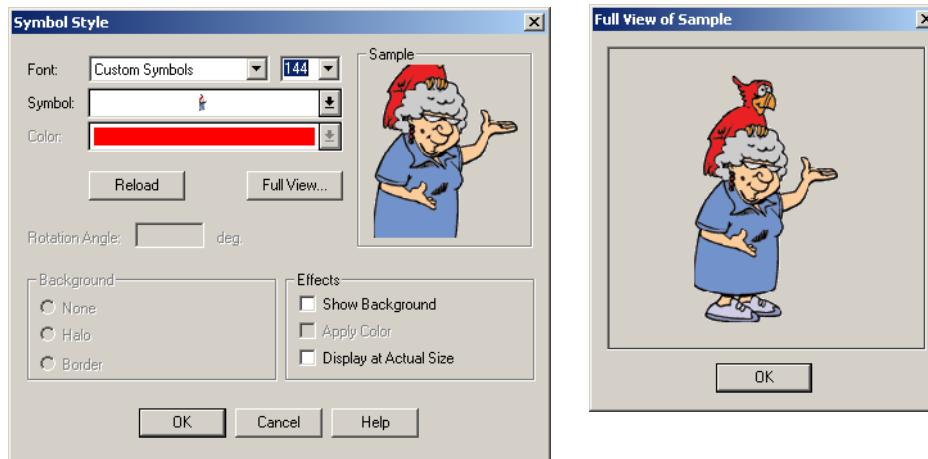
Understanding the Custom Symbol Sizes, Shape, and Color Rules

You can create various sized and shaped bitmaps for use as custom symbols. As a general rule, smaller symbols look better at smaller font sizes because they won't need to be stretched. Larger symbols look better at larger font sizes because they have more pixels and more detail. Here are some rules and tips that govern custom symbols:

- You can select the point size for custom bitmaps from 9 to 240 pt.
- You can display the custom bitmap image at actual size.
- There is no a file size limit for custom bitmaps (other than what is required by your raster engine and the amount of memory you have).
- Extended custom symbols can be either rectangular or square in shape.
- Extended custom symbols usually have their own complex color pattern (which is what makes them extended) so the **APPLY COLOR** option is disabled.
- MapInfo Professional supports up to 24bit color bitmaps.

When you are dealing with very large bitmaps, there are a couple of special rules to keep mind:

- Some users have reported panning problems associated with very large symbols. When you create a symbol that is larger than 36 points, the symbol may not completely redraw as you pan across your map. To alleviate this problem, go to the system registry and add or change your MBRExtraPoints registry entry.
- There are times when the custom symbol you are trying to display is too large for the Sample area.



To display this image, click the **FULL VIEW** button to display the entire image in a new window. There may be times when the custom symbol you have created may be too large for even the new window.

Entering and Working with Text on the Map

Although the labeling feature takes care of most of your text needs, you will still need to create text objects with the Text tool to annotate your map or layout (e.g., map titles and subtitles). Unlike labels, text objects have no connection to data.

To create text, make sure the layer you want to draw the text to is editable and choose the Text tool. The cursor changes to an I-beam. Place the cursor where you want the text to be and type in the text you want.

To change the style of the text:

1. Select the text with the Select tool.
2. Do one of the following:
 - Click the **TEXT STYLE** button
 - On the **OPTIONS** menu, click **TEXT STYLE**.

Using either method, the Text Style dialog box displays where you can change the font, the size, color and create various effects such as haloing or drop shadows.

These settings will remain in effect for any text you subsequently draw on the map until you change them.

3. To save changes, on the **FILE** menu, click **SAVE**. To save objects drawn to the Cosmetic Layer, on the **MAP** menu, click **SAVE COSMETIC OBJECTS**.

Editing Objects

In all likelihood, you will need to change or edit some of the objects you have drawn or mapped. To begin this process, you need to make the layer that you want to change editable (on the **MAP** menu, click **LAYER CONTROL**).

To edit an object:

1. Select the object with the **SELECT** tool.
If the object is a line, edit handles appear at either endpoint.
If the object is a boundary or region, edit handles appear at the outer corners of the object.
2. Drag the object to a new position or change its line style, fill pattern, or symbol.
3. On the **FILE** menu, click **SAVE** to save your changes.

To delete an object:

1. Click the object with the **SELECT** tool.
2. Do one of the following:
 - On the **EDIT** menu, click **CLEAR** or on the **EDIT** menu, click **CUT**.
 - Press the **DELETE** key.Using either method, MapInfo Professional deletes the object.

To view an object's nodes, centroids, and line direction when editing and drawing, set the conditions in the (Layer Control) Display Options dialog box.

Positioning and Sizing your Map Objects

To move an object to a new location, make the object's layer editable and click the object to select it. Hold down the mouse button for at least one second until the cursor turns into a four-headed arrow. Drag the object to its new location and release the button. The object maintains its shape.

To move an object (in an editable layer) one pixel at a time, click it and press and hold the **CTRL** key and press the **ARROW** button corresponding to the direction you want the object to move. To move the object 10 pixels at a time, press and hold the **CTRL** and **SHIFT** keys and press the **ARROW** button corresponding to the direction you want the object to move.

Also, if you click the on the fifth edit handle (rotate handle) and hold down the mouse button, you can rotate the highlighted box to the desired angle. A rubber banding box is drawn representing the bounds of the rotated object. If you press and hold **SHIFT** key while the rubber banding box is being drawn, the rotation will be limited to 45 degree increments.

Moving Objects on the Map

You can move selected objects within its editable map layer easily.

To move an object on the map:

1. Click your map to make it active.
2. Make the layer where the object is located editable (on the **MAP** menu, click **LAYER CONTROL**).
3. Select the object(s) using the Select tool.

If you select more than one object at a time to move, the objects move in the same way. Take care to ensure that you do not move an object off the map or off land by mistake.

Note: When you move the objects, you move them all at once, maintaining their positions relative to one another.

4. Do one or all of the following:
 - To move the selected object(s) using the mouse, hold down the mouse button and drag the object to its new location
 - To move the selected object(s) one screen pixel at a time, press and hold the **CTRL** key and press the **ARROW** key in the direction you want the object(s) to move
 - To move the selected object(s) 10 screen pixels at a time, press and hold the **CTRL** and **SHIFT** keys and press the **ARROW** key in the direction you want the object(s) to move

Note: Since the moves are made in screen pixels, the zoom level affects how far the object is moved.

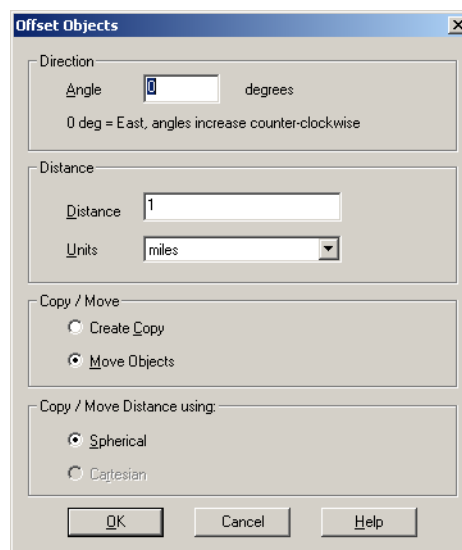
Offsetting Objects on the Map

The Offset feature makes a copy of the object(s) you select from the original source object(s) and saves them in the original data file.

You can both move and offset the objects you select using this process. The difference between these two operations is whether MapInfo Professional makes a copy of the data (as in the case of copy) or simply moves the objects and stores the new value in the original table.

To move/offset selected objects on the map:

1. Click your map to make it active.
2. Make sure a layer is editable (on the **MAP** menu, click **LAYER CONTROL**).
The offset/move functionality is available when any layer is editable, not just when the objects you want to move or offset are in the editable layer. However, you can only move an object within its editable layer. Copy is always permitted as long as a layer is editable.
3. Select the object(s) using the Select tool.
4. On the **OBJECTS** menu, click **OFFSET** to display the Offset Objects dialog box.



5. To move your selected objects, enter or select from the following options and click **OK** to apply the changes.
To copy your selected objects to offset them, enter or select from the following options and click **NEXT**. Then go to **step 6**.
 - **ANGLE** — To offset your selected object at an angle, type the angle (in degrees) in this field. The new object is created based on the original object and is offset in the direction of the angle you specified, measured from the positive X-axis. If you enter a positive angle, the object is offset counterclockwise; if you enter a negative angle, the object is offset clockwise.
 - **DISTANCE/UNITS** — To set the offset distance and units, type the distance and select the units in the Distance box. The list of units is as follows: inches, links, feet, U.S. Survey feet, yards, rods, chains, miles, nautical miles, millimeters, centimeters, meters, and kilometers.

Note: MapInfo Professional takes the default units from the map window in which you've selected the object.

 - **CREATE COPY** — Click this option to create a copy of the selected object(s) in the data. When you complete this process, MapInfo Professional saves the copy to the editable layer.
 - **MOVE OBJECTS** — Click this option to move the object without creating a copy in the data. You can only move an object within its own editable layer. When you move objects, the Data Aggregation dialog box does not display, since you are only moving the data within the layer.
 - **COPY OR MOVE DISTANCE USING** — The option you select in this box depends largely upon the projection of your source map. If your map has a latitude/longitude projection, MapInfo Professional enables the **SPHERICAL** type only. If you are working with a non-Earth projection, MapInfo Professional enables the **CARTESIAN** type only. When you click **SPHERICAL**, MapInfo Professional calculates the copy/move distance by mapping the data into a Latitude/Longitude On Earth projection.
When you click **CARTESIAN**, MapInfo Professional calculates the copy/move distance by considering the data to be projected to a flat surface and distances are measured using Cartesian distance calculations.
6. The Data Aggregation dialog box displays if one of these conditions are true:
 - You clicked the **CREATE COPY** option
 - You selected objects in a different table from the table associated with the editable layer
 - The editable layer is not the cosmetic layer and has no text associated with the geographical objects in it

You may notice that the only controls available to you in this dialog box are **BLANK**, **VALUE**, and **NO DATA**.

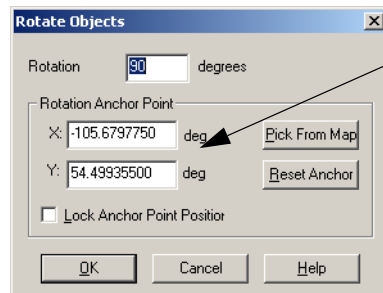
Type a value you will remember in the **VALUE** field of this dialog box. For more information about data aggregation, see [Aggregating and Disaggregating Data in Chapter 10 on page 363](#).
7. Click **OK** to copy the data and offset the objects you selected.

Rotating Objects on the Map

To rotate an object or objects by a specific angle, use the Rotate Objects tool, which is available whenever you have selected an object(s) in an editable layer in a Map or Layout window.

To rotate an object or objects in a Map or Layout window:

1. On your editable layer, select the object(s) you want to rotate.
2. On the **OBJECTS** menu, click **ROTATE** to display the Rotate Objects dialog box.



These entries can be in degrees decimal or degrees/minute/second format and are determined by the Display Coordinates setting in your Map Options dialog box. You cannot use the Military Grid Reference here.

3. In this dialog box, you specify the angle and the anchor point of the rotation. Type the rotation angle in the Rotation field.

Note: The rotation angle can be positive (counter clockwise) or negative (clockwise).

4. Determine the anchor point by doing one of the following:

- Accept the default anchor point of the selected object(s) by leaving the X and Y coordinates that display in these field as they are

Note: The default anchor point varies depending upon how many objects you have selected and the kind of objects they are. See [Understanding an Object's Default Anchor Point on page 265](#) for more about default anchor points.

- Type new entries in the X and Y coordinate fields to select a new anchor point
- Click the **PICK FROM MAP** button and click the anchor point you want on the Map or Layout window. Click the mouse button only once to establish this point.

Note: If the **PICK FROM MAP** button is unavailable, you can select the locations directly from the map, if a map is open.

To return to the default anchor point, click the **RESET ANCHOR** button.

5. Decide whether or not you want to lock the anchor point. Click the **LOCK ANCHOR POINT POSITION** check box to lock the anchor point.

When you lock the anchor point, you ensure that the anchor point will not be recalculated when you return to the Map or Layout window. If you do not lock the anchor point, MapInfo Professional recalculates the anchor point in the based on the rotated selection. Once the objects are rotated, they may have a different anchor point.

Note: You cannot maintain an anchor point lock when you change the selection from the Map window to the Layout window or from the Layout to the Map window.

6. When you have completed these entries or selections, click **OK** to rotate your object(s).

Understanding an Object's Default Anchor Point

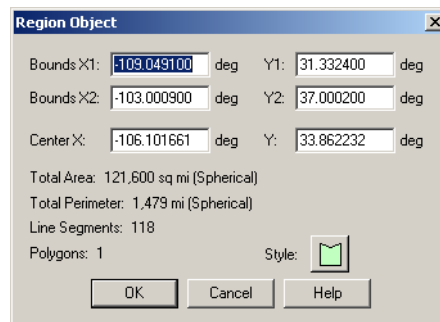
When rotating objects in an editable layer, the default anchor varies depending upon how many objects you are rotating and the kind of objects you select. If you select:

- A single object (not a polyline), the default anchor point is the object's centroid

- A single polyline or several objects, the default anchor point is the center of the polyline's or the selected objects minimum bounding rectangle (MBR)
- Multiple objects, the default anchor point is the center of the MBR of the selected objects

Changing your Map Object Attributes

When you double-click a region, line, point or text object with the Select tool, MapInfo Professional displays an Object Attribute dialog box. This dialog box gives you the object's size, its position, and other information specific to the object. For example, if you double-click a region, MapInfo Professional displays the perimeter, centroid, and area. It also shows the type of distance calculation that was used to obtain these values.



If the layer is Selectable but not editable, you can only view these attributes. If the layer is also editable, then you can change these attributes by typing new values into the text boxes of the dialog box. The illustration above shows the Object Attribute dialog box for a region object in an editable layer. You can also access this dialog box on the **EDIT** menu (click **GET INFO**).

Changing an object's size and position with the Object Attribute dialog box gives you much greater control over its exact size and position than you have through drawing it on the screen. For example, you have a list of ten radio towers and their X and Y coordinates. You could geocode these points using the Create Points command. However, if you bring up the Points Object Attribute dialog box and type the new X and Y coordinates, you can create ten points with the Symbol tool and then individually place them in the correct location.

You can also use the Text Object Attribute dialog box to change the point's actual text. For example, you have typed the title "World Population" on a Map window. You want to fix your typographical error. Bring up the Object Attribute dialog box for the text object. You can correct your error in the box that displays the text.

Reshaping Map Objects

You can reshape regions, polylines, lines, arcs and points. A region is an object created with the Polygon tool. You cannot reshape objects created with the Rectangle tool, the Rounded Rectangle tool, or the Ellipse tool.

To reshape an object:

1. Select an object with the Select tool.
2. Do one of the following:
 - On the **EDIT** menu, click **RESHAPE**

- Use the **RESHAPE** button on the Drawing Toolbar.

You are now in Reshape mode. MapInfo Professional draws nodes at every juncture where two polyline or polygon line segments meet.

3. To reshape the object, move the nodes, add nodes, or delete nodes from the object.

To move a node, click it and, while holding down the mouse button, drag the node to the desired location. The line segments connected to the node are moved to a new position.

To add a node, click the **ADD NODE** tool from the Drawing Toolbar, position the cursor where you want to add the node, and click the mouse button. MapInfo Professional adds a node. You can now move this node or delete it, just as you would any node.

To delete a node, position the cursor over the node, click it, and press the **DELETE** key. To delete the last node when creating a polyline or polygon, click the **BACKSPACE** key.

Note that the maximum number of nodes for regions and polylines is 1,048,572 nodes for a single polygon region or polyline. The limit drops by seven nodes for every two additional polygons. If an object with more than 32K nodes is saved and the table is read in a version of MapInfo Professional prior to version 4.5, the object(s) will not be visible. Objects in the table that do not exceed the 32K limit will be visible.

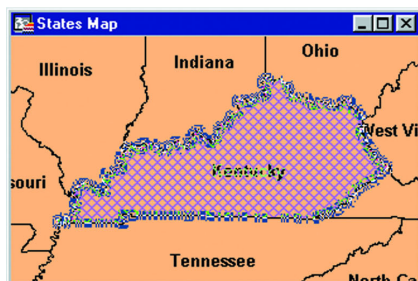
The Reshape command is very useful when you are creating sales territories or other merged boundaries. For example, you are merging postal code boundaries together to create school districts. Some postal code boundaries fall into more than one school district. Use the Reshape command to reshape the school district to incorporate a section of a postal code boundary.

Moving the Endpoints of an Arc

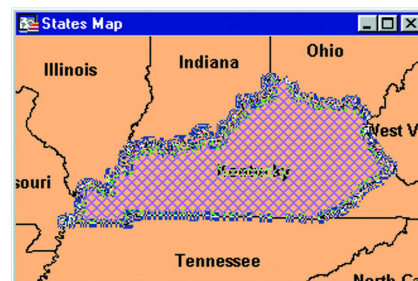
You can also change the endpoints of an arc with the Reshape command. Select the arc with the Select tool and choose Reshape. Grab either end of the arc and move it to the desired location. Reshaping an arc will not change the shape of the ellipse that it is part of, merely its endpoints.

Selecting Multiple Nodes

Reshape mode allows you to easily select nodes of an existing object and copy and paste them, drag them to reshape the object, delete them, etc. To trace an existing object, we recommend that you use the autotrace feature, which is explained in the next section, Snap to Nodes. The following illustrations show how to copy the border between Kentucky and Indiana.



1) Select the object. Click **RESHAPE MODE** to display the nodes.



2) Select the nodes you want to copy.



3) Choose Copy and Paste to display the new objects with edit handles.



4) Click and drag the object to move to another location.

To reshape an object (such as the state of Kentucky):

1. Select Kentucky to enable Reshape mode.
2. Select the first node with the Select tool.
SHIFT-CLICK the last node to be copied. MapInfo selects all nodes in between following the shortest route between nodes.
(To select all nodes *except* those between the shortest distance, use **CTRL-CLICK** with the **SELECT** tool.)
3. On the **EDIT** menu, click **COPY** to copy the nodes to the clipboard.
4. Paste the duplicate nodes onto the map. On the **FILE** menu, click **PASTE**. The object you copied is drawn on top of the original object as a polyline.
5. To move the polyline click it, hold down the mouse button, and drag the polyline to a new location.

Using “Snap To” to Select Nodes and Centroids

Not only can nodes be used to reshape an object, they can also be used to align one object to another object. MapInfo Professional refers to this process as snapping to a node.

Note: You can also use the snap to capability to snap to visible centroids in region objects.

In the Map window, regions, polylines, lines, arcs and rectangles all have nodes that can be attached (or snapped) to each other. When the Snap mode is enabled, MapInfo Professional searches for nodes and centroids as you move around a window. MapInfo Professional automatically snaps the cursor to a node or centroid when the cursor comes within the snap tolerance of the node. The crosshairs display when the node is “snapped to”.

To toggle Snap to Nodes, press the **S** key. The Status Bar displays with the word “SNAP” when Snap mode is activated. When you activate the Snap mode, a circle displays around your cursor showing the size of the tolerance of the Snap mode in pixels.

The **S** key acts like a toggle on/off switch. You can set the snap tolerance in pixels in the Map Window Preferences dialog box. The Snap Tolerance field allows you to specify a tolerance within which snap operates. For example, if you set the snap tolerance to 3 pixels, whenever you move the cursor within 3 pixels of a node, the cursor will snap to the node.

Snap mode works in the Map Window and Layout window (but not raster layers). It works with all MapInfo Professional tools in the Main and Drawing toolbars except Pan, Drag Map, and Text tool. Additionally, snap mode works on object types, including regions, points, multipoints, collection

objects, lines and polylines, rectangles, and arcs. It is not available for text objects, ellipses, and rounded rectangles. You set the Snap in one window at a time and can save it with your workspace.

Snap to Nodes applies to all selectable layers—this is useful if you are drawing an object in one layer and want to attach it to an object in another layer. If you do not want to snap to objects in certain layers, make those layers unselectable.

Move Duplicate Nodes

In most maps, nodes of various objects are usually connected, especially for adjoining streets and boundaries that share a common border. Using the Move Duplicate Nodes Option under Map Window Preferences, you can specify where MapInfo Professional looks for connected nodes in order to move them in unison. Choose the **NONE OF THE LAYERS** button to turn the option off. Choose the **SAME LAYER** button so that connected nodes in the same layer are moved when one of them is moved.

Autotracing Existing Objects

MapInfo Professional makes it much easier to trace an existing polygon/polyline network, e.g., the United States. The new autotrace feature allows you to trace the nodes of another polyline or polygon. Autotrace is available when Snap mode is turned on. Note that you can only use autotrace on existing polylines and polygons. You cannot autotrace rectangles, ellipses, arcs, or other shapes made with the drawing tools.

To autotrace a polyline/polygon, do the following:

1. Turn on Snap mode (click the **S** key), and click a node of the polyline/polygon you want to autotrace.
2. Move the mouse to another node of the same object.
 - For polylines, hold down the **SHIFT** key and click.
 - For polygons, hold down the **CTRL** key and click.
3. Do one of the following:
 - For polylines, hold down the **SHIFT** key and click.
 - For polygons, hold down either the **SHIFT** or **CTRL** key and click.

As soon as you press either the **SHIFT** or **CTRL** key, MapInfo Professional highlights the path to be autotraced. When you click, MapInfo Professional automatically traces all the segments between the two nodes and adds them to the polyline/polygon you are drawing.

Note: The **SHIFT** key autotraces the shorter path between the two nodes (the path with the lessor number of nodes), and the **CTRL** key autotraces the longer path (the path with the greater number of nodes). Autotrace works the same way as when you are selecting multiple nodes in Reshape mode.

You can only autotrace one object at a time. The second node you **SHIFT/CTRL-CLICK** must belong to the same object as the first node. If it belongs to a different object, MapInfo Professional will draw a straight line between the two nodes. If you click a node that's shared by two objects (e.g., a shared border), you can begin autotracing from either polygon.

Smoothing and Unsmoothing Lines

You can use the Smooth command to convert polyline angles into polyline curves.

To smooth a polyline angle into a polyline curve:

- Click a polyline with the Select tool and on the **OBJECTS** menu, click **SMOOTH**. MapInfo Professional smooths the line so that it appears to be one continuous line with curves instead of angles.
- To undo the process choose either the Undo Smooth command or on the **OBJECTS** menu, click **UNSMOOTH**.

Both the Smooth and Unsmooth command can be used only on polylines. A polyline is a line drawn with the Polyline tool. Smooth and Unsmooth do not work with objects drawn with the Line tool. If you attempt to smooth or unsmooth any object besides a polyline, MapInfo Professional displays a warning message.

Converting Regions to Polylines

You may find it necessary, on occasion, to change an object into a polyline or a polyline into a region during an editing session. You can do so simply by selecting the object and on the **OBJECTS** menu, click **CONVERT TO REGION** or **CONVERT TO POLYLINE**.

For instance, you select a group of nodes that you want to copy and paste elsewhere on your map. MapInfo Professional treats the group as a polyline and copies it to the clipboard. After you paste the polyline on your map, you can convert it to a region on the **OBJECTS** menu, click **CONVERT TO REGION**.

If you want to create a buffer zone within one mile of a boundary, meaning you want a zone that extends one mile from the boundary to the outside and to the inside, you must first convert the region to a polyline and then create the buffer. If you first create the buffer on the region, you will include too much territory in the buffer (the entire region in the buffer plus the one mile buffer that extends outside of the region).

Converting objects to polylines and regions allows you to perform node-editing operations on objects that ordinarily do not allow node editing. For example, you cannot add nodes to a rectangle object. If, however, you first convert the rectangle into a polyline or region, you can then add nodes to the object.

Editing Street Maps (StreetPro)

MapInfo Professional sells street maps for every county in the United States. If you have purchased any of these StreetPro maps, you will need to know how to edit them. You can add and delete streets, rename streets, or edit existing streets.

We have included a StreetPro file with your sample data. This map contains streets in San Francisco, California (SF_STRTS.tab).

StreetPro files are read-only files; you can't change them. But, associated with each StreetPro file are two files that you can change: SF_STRT1.tab and SF_STRT2.tab. SF_STRT1 contains the graphic information about the streets and address ranges for each segment (hence, we'll call it the segments file). SF_STRT2 contains the street names (we'll call it the names file).

These two files are associated through a field called MI_REFNUM, which contains a reference number. A segment with a reference number 23 in SF_STRT1 will be associated with the name in SF_STRT2 that has the same reference number.

The other fields in the segments file are:

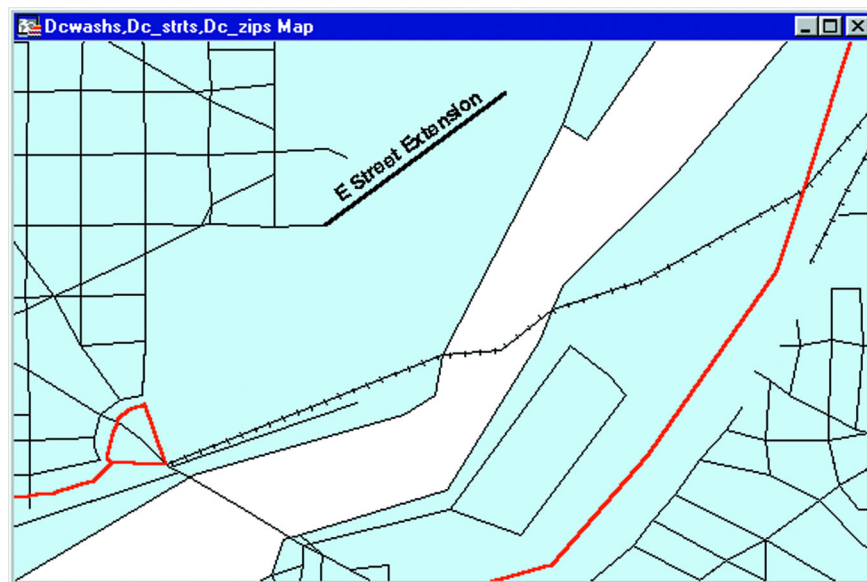
- FromLeftStarting point of address numbers, left side of the street.
- ToLeftEnding point of address numbers, left side of the street.
- FromRightStarting point of address numbers, right side of the street.
- ToRightEnding point of address numbers, right side of street.
- TypeThese numbers indicate the type of street or highway.

Adding a Segment to an Existing Street

Let's assume you want to add a segment to an existing street or want to add a street for which a name already exists.

When you want to add a segment to an existing street, you already know that the street name is in the name file.

Adding a street where the name already exists isn't as odd a situation as you might imagine since StreetPro maps are county-wide. You might want to add Poplar St to one town. If another town already has a Poplar St, then you don't need to add that name to the name file since it contains all the names used in the county. To find out whether a name already exists in the name file, use the **FIND** command from the **QUERY** menu.



In either case the basic idea is that you have to add a new record to the segments file and associate that record to the name file through the reference number. Assume we are working in the Washington D.C. files; the procedure is the same for any StreetPro file.

Note: Some of the files described in this example may refer to MapInfo Professional Tutorial data, which is available on the MapInfo web site, www.mapinfo.com/miprotutorial.

1. On the **FILE** menu, click **OPEN** to open the DCWASHS, DC_STRTS, AND DC_ZIP files.

2. Choose Layer Control from the Map menu. Make the DCWASH layer Editable and the DC_STRTS layer Selectable.
3. Using the **FIND** command or the Info tool, locate the street you want to edit.
4. Click the street with the Info tool. Scroll through the Info window until you locate the MI_REFNUM (MapInfo Professional reference number) field. Make a note of that number.
5. Go to the DCWASHS layer in the Map window and draw the new segment. By setting the Snap to Node mode, MapInfo Professional will guide you to connect the node from the existing street with the node from the new segment.
6. Click the new segment with the Info tool. Type the appropriate textual information, address ranges, street type, and MapInfo Professional reference number.
7. Repeat the process for each additional new segment.

Adding a New Street

Now let's consider the case where you want to add a completely new street. Since the street is new, you have to make changes in both DCWASHS1 and DCWASHS2. The following procedure will work with any StreetPro file.

Note: Some of the files described in this example may refer to MapInfo Professional Tutorial data, which is available on the MapInfo web site, www.mapinfo.com/miprotutorial.

1. Open DC_STRTS and DCWASHS1 in a Map window.
2. Open DCWASHS2 as a Browser and make it the active window.
3. Choose **NEW ROW** from the Edit menu. Scroll down to the bottom of the Browser. MapInfo Professional appends an empty row to the Browser.
4. Type the name of the street into the empty record.
5. The new street name also needs a corresponding MI_REFNUM. The easiest way to select a reference number is to keep these numbers continuous. Simply add 1 to the last MI_REFNUM listed in the Browser. Use that number as the MI_REFNUM for your new street name.
6. Choose **LAYER CONTROL** from the Map menu.
7. Make the DCWASHS1 layer Editable and the DC_STRTS layer Selectable.
8. Draw the new segment on the DCWASHS1 layer.
9. Click the new segment with the Info tool. Type the appropriate textual information, address ranges, street type, and the new MapInfo Professional reference number.
10. Repeat the process for each additional new segment.

Renaming a Street

If you want to rename a street, simply change its name in the name file, which is the S2 file in StreetPro. Note that changing a name in that way affects all segments that reference it.

For instance, if you want to change the name of Broadway in one town, you have to make sure there aren't other towns in the county that also have a Broadway. If there are, then you have to add the new street name to the names file and give it a reference number. You would then go into the segments file and give the new reference number to those segments you want to change.

If you want to rename only a part of the street, you have to add a new record to the names file, give that record a new reference number, and then assign that new reference number to the appropriate segments in the segments file.

How do you find those segments? One way would be to call up a Map window of the town and select the segments using the Select tool. Those segment records will then be highlighted in the Browser, where you can change their reference number.

Editing Street Colors

You can change the street colors and line types in StreetPro maps. For example you might want to do this to indicate streets under repair or all streets that make up a sanitation pickup route.

1. Open the street file in a Map window.
2. Choose **LAYER CONTROL** from the Map menu and make the street layer editable.
3. Select all the streets you want to change.
4. On the **OPTIONS** menu, click **LINE STYLE**.
5. Select a line width, line style, and color.
6. To save your changes, choose the **SAVE** command from the File menu.

You can use any method to select the streets, depending on the nature of the situation. You can use the Select tool to click the segments, one-by-one. You could also use the Radius Select, Marquee Select or Boundary Select tools, or the SQL Select or Select commands.

Selecting and Querying Data

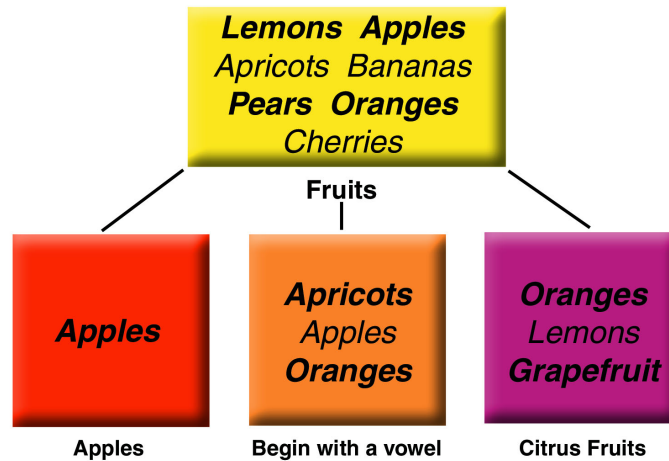
This chapter presents the ins and outs of selecting records from tables. As you use MapInfo Professional® you will find yourself selecting records quite often. This chapter covers an overview of selecting and querying methods using tools from the Main toolbar.

In this Chapter:

- ◆ **Selecting your Data in MapInfo Professional. 275**
- ◆ **Querying Your Data in MapInfo Professional. 282**

Selecting your Data in MapInfo Professional

While MapInfo Professional allows you to attach data to objects on a map, its true analytical power is its ability to group and organize data. Once your data is broken down into logical groups, you can analyze it based on one or more variables.



For example, you have a basket of fruit. You want to organize the fruit into different categories, based on one or more variables:

- Put all the apples into one group
- Put all the citrus fruit into one group (oranges, lemons, grapefruit)
- Put all the fruit that begins with a vowel into one group (oranges, apples, apricots)

There are many different ways that you could group the fruit. Some fruit would fall into more than one category (oranges are citrus fruit and also begin with a vowel). You could also use more than one variable to group your fruit — put all the citrus fruit that begins with a vowel into one group.

MapInfo Professional can retrieve information or even individual records from within your data. We refer to the record or records that are retrieved this way as *selections*. A selection is a subset of data that has been collected based on one or more variables.

For example, you have a table of customer records. You could create a subset of all customers who live within a 50 mile radius of Prague. Or, you could create a subset of all customers who purchased over \$1000 of merchandise. Or, you could create a subset of all customers whose last name begins with the letter “B”.

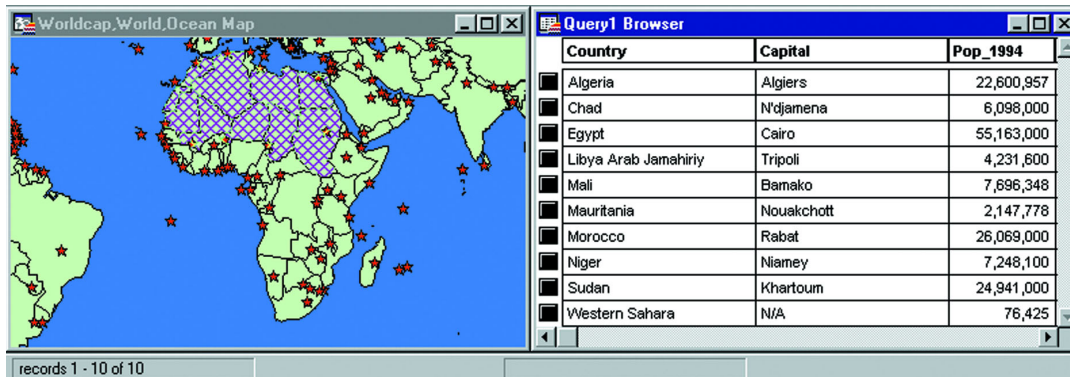
The statements above used to create these subsets are known as *queries*. A query is just another word for a question — which of my customers spent more than \$1,000? Which of my customers lives within 50 miles of Prague?

As with the fruit example, there are many different ways to group your data. Some data records will obviously fall into more than one category. You could also use more than one variable to group your data. Which of my customers lives within 50 miles of Prague and purchased over \$1000 of merchandise?

This section gives you some examples and some practical applications of “selecting” in MapInfo Professional.

Characteristics of Selections

Selections are temporary tables. When you make a selection, MapInfo Professional creates this temporary table (called a selection) to store the records you’ve selected.



You can perform many of the tasks with a selection table that you can perform with a permanent (base) table such as:

- View it in a Browser, a Map window (if it has graphic objects), a Graph or a Layout window.
- Cut and copy it into the clipboard and paste it into another table, or even into another application.
- Use it to edit a table. If you want to edit only certain records in a table, you can get those records into a selection and then edit that selection.
- Make a further selection from it.

To convert selections into permanent tables, on the **FILE** menu, click **SAVE COPY AS**. Once you’ve saved the temporary selection table as a permanent table, you can treat the new table like any other table.

Selection tables are totally dependent on the table from which they were created. If you close a base table, all associated selection tables are deleted.

Selection Commands and Tool Descriptions

MapInfo Professional gives you a number of commands and tools for making selections. They fall into two categories:

- **Selecting from the screen:** Select tool, Radius Select tool, Boundary Select tool, Polygon Select tool, Marquee Select tool, Invert Selection tool, Select All command. To select records with the tools, click or encircle the associated graphic objects. To select records from a layer at the same time, on the **QUERY** menu, click **SELECT ALL**.
- **Selecting with queries:** Select, SQL Select. When you select records with either of these methods, you create a logical expression that MapInfo Professional uses to select the records. For example, the expression `SALES > 20000` means that MapInfo Professional will select only those records with sales higher than \$20,000. We discuss Select and SQL Select in more detail in [Using Select to Create Queries on page 285](#) and [Using SQL Select to Query Data on page 288](#)).

Selecting from the Screen

To select objects from the screen, the layer that contains the objects must be Selectable. To make a layer Selectable, on the **MAP** menu, click **LAYER CONTROL** and select the Selectable check box for that layer.

When you select map objects in a Selectable layer, MapInfo Professional highlights the objects using the settings defined in the Highlight Control section of the Preferences dialog box (Options menu). When you select map objects in an Editable layer, MapInfo Professional places edit handles (small squares) around the extents of the object you selected.

If you have more than one Selectable layer in a Map window, MapInfo Professional selects objects from the topmost Selectable layer.

For example, you have a Selectable layer of county boundaries and a Selectable layer of state boundaries. If the county boundaries are in the topmost layer in the Map window, MapInfo Professional selects objects from the county layer. If the state boundaries are in the topmost layer in the Map window, MapInfo Professional selects objects from the states layer. When you use the Select tool, MapInfo Professional also displays InfoTips for the topmost Selectable layer. As you move your cursor over the objects, InfoTips display the object's label expression. You can turn off the InfoTips in the Map window Preferences (on the **OPTIONS** menu, point to **PREFERENCES** and click **MAP WINDOW**).

Likewise, if you perform a boundary search, the boundary object that you want to search should be in the topmost layer.

For example, you have a layer of postal code boundaries and a layer of state boundaries. If you want to select all objects that fall within a postal code boundary, the postal code layer should be the topmost boundary layer. If you want to select all objects that fall within a given state, the state layer should be the topmost boundary layer. You can reorder the layers by selecting the **MAP** menu, and clicking **LAYER CONTROL**.

You can select objects from tables other than the topmost table, by holding down the **CTRL** key when you are selecting an object.

For example, say you have three selectable layers, such as STATES, COUNTIES, and CITIES. If you want to select objects in the STATES table, but it is the bottommost layer in the Map window, do the following:

1. Hold down the **CTRL** key and click the map with the Select tool. You are now in the second layer.
2. Hold down the **CTRL** key and click the map again with the Select tool. You are now selecting objects from the third layer, the STATES layer.

Selecting Tools

MapInfo Professional includes several tools on the Main toolbar to allow you to choose records for further viewing and analysis, including:

- Select tool
- Radius Select tool
- Marquee Select tool

- Polygon Select tool
- Boundary Select tool
- Invert Selection tool

Each tool is discussed in the next section.

Using the Select Tool

Use the Select tool to select objects one at a time or to select all objects that are generally in the same area of the Map window. You select an object by clicking it using the mouse.

To select an object using the Select tool:

1. Make the layer that you want to select objects from Selectable (on the **MAP** menu, click **LAYER CONTROL**).
2. Choose the **SELECT** button from the Main toolbar.
3. Click an object in the Map window. If that object's layer is Selectable, MapInfo Professional highlights the object. If the layer is Editable, MapInfo Professional puts edit handles around the extents of the object. If the layer is neither Editable nor Selectable, MapInfo Professional does not allow you to select the object.
4. On the **WINDOW MENU**, click **NEW BROWSER WINDOW** to display selected records in a Browser. Choose Selection from the list of tables. MapInfo Professional creates a Browser of the new temporary table. To select records from the Browser, simply click each record with the Select tool.

To select multiple objects individually:

1. Click the first object to select it.
2. Hold down the **SHIFT** key and click another object. MapInfo Professional selects that object, too.
If you select a second object without holding down the **SHIFT** key, MapInfo Professional unselects the first object and selects the second object.

When selecting a point object, you generally want to position the Select tool in the center of the symbol. However, some symbols have a hot spot that you must hit in order to select it. For example, the hot spot on the golf flag symbol is the base of the pole.

Moving Selected Objects

You can also move the selected object(s).

1. Do one of the following:
 - Hold down the mouse button and drag the object to its new location
 - Press the **UP**, **DOWN**, **LEFT** and **RIGHT** Arrow keys to move the selected objects 1 screen pixel in the corresponding direction.

If you press the **SHIFT** key when the arrow key is selected, the object will move 10 pixels. Since the moves are made in screen pixels, the zoom level affects how far the object is moved.

Rotating Selected Objects

Finally, you can also rotate selected objects.

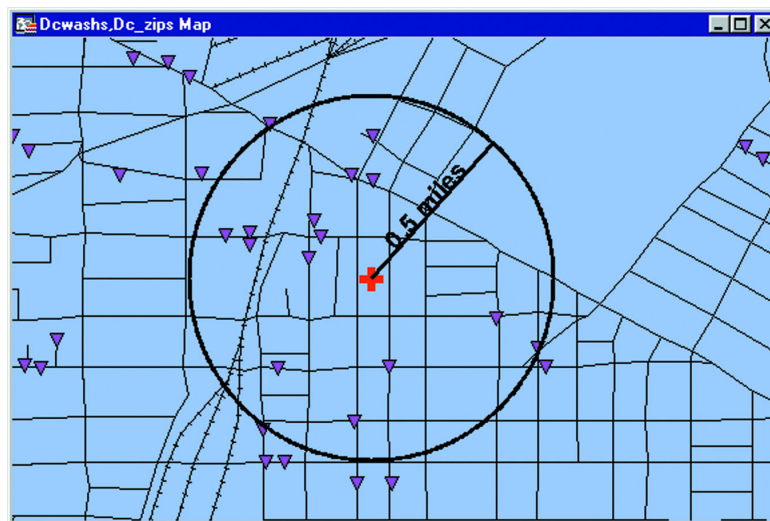
1. Select the object. The object is highlighted and bounded by four edit handles and a fifth handle below the lower right corner.
2. Click the fifth handle (rotate handle) and hold down the mouse button. Rotate the highlighted box to the desired angle. A rubber banding box is drawn representing the rotated object.
Press the **SHIFT** key while the rubber banding box is being drawn to limit the rotation to 45 degree increments.

Note: You can rotate Lines, Polylines, Polygons, MultiPoints, Collections, Arcs, Ellipses, Rectangles, Round Rectangles. You cannot rotate points.

Radius Select Tool

The Radius Select tool is used to select all objects that fall within a given radius. For example, you have a table of blood donors and a table of blood donation sites. Using the Radius Select tool, you could create a temporary list of blood donors that live within a one-half-mile radius of each blood donation site.

Note that the Radius Select tool selects all objects whose centroid falls within the circle. The object doesn't have to be completely bounded by the circle.



To select objects within a radius:

1. Make the layer you want to select objects from selectable (on the **MAP** menu, click **LAYER CONTROL**).
2. Choose the Radius Select tool from the Main toolbar. The cursor becomes a hand when moved over the Map window.
3. Click a place on the map that you would like to use as the center point of your radius search. For example, if you want to select all the fire hydrants that fall within two miles of a fire station, click the fire station and use that as the center point.
4. Hold down the mouse button and drag the mouse away from the center point. MapInfo Professional draws a circle around the point and reports the radius of the circle in the Status Bar (lower left corner of the screen).

5. When you have the desired radius release the mouse button. MapInfo Professional highlights all map objects that fall within that circle.
6. To see a list of all the records that fall within that circle, choose New Browser Window from the Window menu. Choose Selection from the list of tables. MapInfo Professional creates a Browser of the new selection table.

Marquee Select Tool

The Marquee Select tool is used to select objects within a rectangle. By clicking and dragging using the Marquee tool, you create a dotted rectangle, or marquee box around objects you want to select. All Selectable objects in the topmost Selectable layer will be included in the marquee box. To select objects from a layer below the topmost Selectable layer, in Layer Control, make sure it is Selectable and turn off Selectable for the layer(s) above.

To select objects within a rectangle:

1. Make the layer that you want to select objects from Selectable (on the **MAP** menu, click **LAYER CONTROL**).
2. Choose the **MARQUEE SELECT** tool from the Main toolbar. The cursor becomes a hand when moved over the Map window.
3. Click a place on the map outside of the area you want to include in the marquee box.
4. Hold down the mouse button and drag the mouse to form a dotted rectangle around the points you want to select.
5. When you have reached the desired rectangle size release the mouse button. MapInfo Professional highlights all map objects that fall within that rectangle.
6. To see a list of all the selected records, on the **WINDOW** menu, click **NEW BROWSER WINDOW**. Choose **SELECTION** from the list of tables. MapInfo Professional creates a Browser of the new selection table.

Polygon Select Tool

The Polygon Select tool selects map objects within a polygon that you draw on a map.

To select objects with the Polygon Select tool:

1. Make the layer that you want to select from Selectable (on the **MAP** menu, click **LAYER CONTROL**).
2. Choose the **POLYGON SELECT** tool from the Main toolbar. The cursor becomes a pointing hand when moved over the Map window.
3. Click the map location at which you want to place the first end point of the polygon. Move the cursor over your map in any direction. MapInfo Professional draws a line from the point where you clicked to the cursor.
4. Click to create another endpoint. Continue to move the cursor and click until you have the desired number of sides to your polygon.
5. To close the polygon, make your last click as close as possible to the first click. MapInfo Professional closes the polygon and selects the objects that are within it.

Boundary Select Tool

If you want to select objects that fall within a given region or boundary, use the Boundary Select tool. When you use this tool, MapInfo Professional selects all objects within any boundary on the map, such as state or county boundaries, police precincts, or sales territories.

For example, you have a layer of states and a layer of retailers. Using the Boundary Select tool, you could click a state and create a temporary list of all the retailers in that state.

To select objects within a region:

1. Make the layer that you want to select objects from Selectable (on the **MAP** menu, click **LAYER CONTROL**).
2. Choose the **BOUNDARY SELECT** tool from the Main toolbar. The cursor becomes a cross hair when moved over the Map window.
3. Click within a boundary object. MapInfo Professional selects all objects that fall within that boundary.
4. To see a list of all the records that fall within that boundary, on the **WINDOW** menu, click **NEW BROWSER WINDOW**. Choose Selection from the list of tables. MapInfo Professional creates a Browser of the new selection table.

Invert Selection Tool

The Invert Selection tool is a convenient way to select many objects at once. You simply select the few objects that you don't want, and then invert the selection to select all the objects you do want.

1. Make the map layer that you want to select from Selectable (on the **MAP** menu, click **LAYER CONTROL**).
2. Make the **SELECT** tool active, and click one or two map objects.
3. Click the **INVERT SELECTION** tool. MapInfo Professional selects all the objects that are not part of the current selection, and cancels the current selection.

You can also find Invert Selection in the Query menu.

Other Search Methods

You can draw your own polygons and search for objects within them. For example, you have a table of city streets and a table of retail businesses. Since streets are made of lines and not boundaries, you cannot search within a city block. However, you could create boundaries by tracing the street map with the Polygon tool. You could then search for objects within that boundary.

You can also create search polygons with the Buffer command. The Buffer command is used to create boundaries around points, lines, or other boundaries. For example, you want to search for all customers who live within five miles of Interstate 90. Using the Buffer command, you could create a polygon that would encompass any area within five miles of Interstate 90.

You could even use the Buffer command to create a boundary around another boundary. For example, you want to search for all radio stations that are located within twenty miles of a given county. Using the Buffer command, you could create a polygon that would encompass any area within twenty miles of the county boundary.

To find a point in a polygon (perform a polygon search), two layers must be Selectable: the layer containing the objects you are selecting, and the layer containing the boundary you want to use in selecting those objects.

Unselecting Objects or Records

You may choose to:

- Unselect one object or record from a group of selected objects or records.
- Unselect a group of selected objects or records.
- Unselect all selected objects.

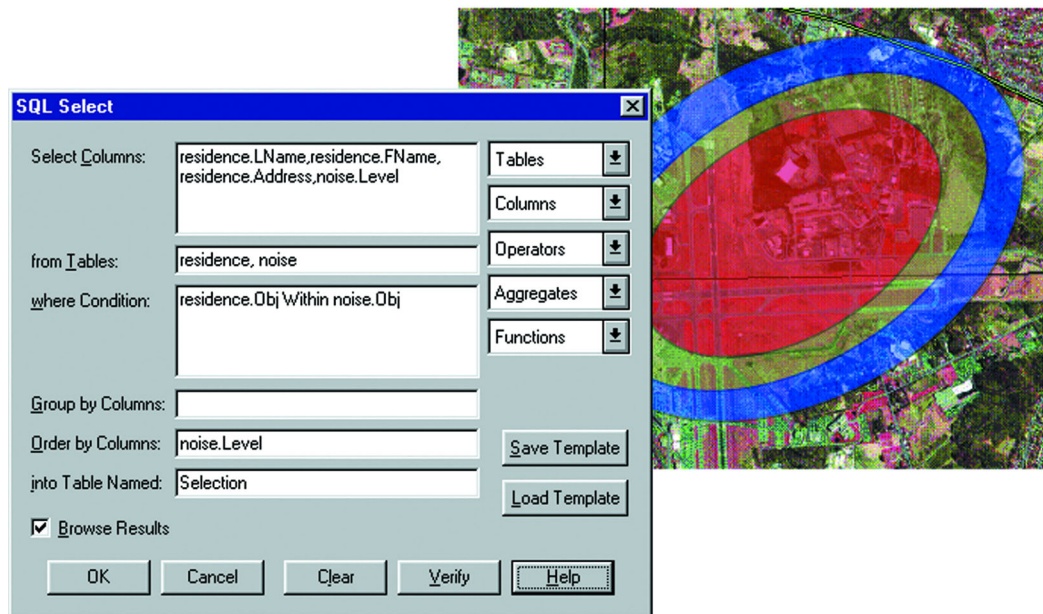
To cancel the selection of one object or record from a group of selected objects or records, hold down the **SHIFT** key and click the object or record with the Select tool. When you click it, the selection is cancelled.

To cancel the selection of all selected objects, you can either click the Map window where there are no objects or choose the **UNSELECT ALL** command from the Query menu.

Querying Your Data in MapInfo Professional

A *query* is a mathematical question that you pose to your database to collect information. In MapInfo Professional, there are two query builders available under the Query menu, Select and SQL Select.

SQL Query to Determine Homes Affected by Airport Noise Pollution



In the case of *Select*, you can pose a question of a single table. For example,

- Which of my customers spent more than \$20,000?

- Which of my customers live in Vermont?

In the case of *SQL Select*, you can ask your question from one or several table(s) of information and perform these tasks:

- Derive new columns – columns that calculate new values based on the contents of your existing columns.
- Aggregate your data so that you see only a listing of subtotals instead of seeing your entire table.
- Combine two or more tables into one results table.
- Show only the columns and rows that interest you.

Selecting and Using Queries

Select allows you to query a table. It allows you to select records and objects from a table according to their attributes. You can use it to highlight objects in a Map or Browser window that meet certain criteria. You can also create a results table that you can browse, map, or graph like any other table.

For instance, by formulating queries with *Select*, you can ask MapInfo Professional to:

- Show only postal code regions where the average household income is above \$65,000.
- Show only postal code regions where the median age is 42.
- Show only the postal code regions where the household income is above \$65,000 and the median age is 42.
- Show only records for all orders received in July or September.
- Show cities of over 100,000 people in Texas, California and Florida.

When you are working in a Browser, MapInfo Professional highlights the records meeting the criteria of the query. When you are working in a Map window, the graphic objects of the chosen records are highlighted. When you are working in both windows, the objects in both are highlighted. In all cases, MapInfo Professional automatically creates a working table called Selection that contains the results of the query. You can browse, map, or graph this table like any other table. The table can also be saved as a separate table with **SAVE COPY AS**.

Creating Expressions

To perform a Select query, you must create an expression. An expression is a logical statement that is used to ask your question. For example, you have a table of apartments for rent. If you want to create a temporary table of all apartments that cost less than \$800 a month, you could use the expression:

- RENT < 800

where RENT is the name of a numeric column that contains the per month rent rate.

MapInfo Professional searches the apartment table for all records that satisfy this condition and puts those records in a temporary table that you can map, browse, graph or carry out additional queries.

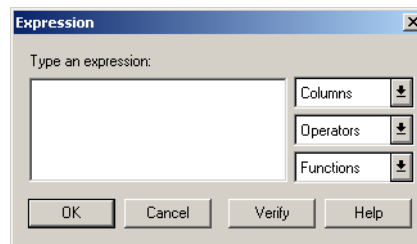
You can also perform mathematical operations on your data. For example, you want to create a temporary table of all apartments that have a total cost of less than \$800. Total cost is equal to the sum of the rent and the monthly utilities.

You could use the expression:

- $RENT + UTILITIES < 800$

You are telling MapInfo Professional to add the number in the RENT column and the number in the UTILITIES column and then compare that number to 800.

There are two ways of creating an expression. The first method is to type in the expression directly. When you are creating very simple expressions, this method is usually faster. The second method is to press the **ASSIST** button in the Select dialog box and build your expression using the pop ups in the Expression dialog box. This method is particularly useful when you are just learning how to build expressions or when you are building very complex expressions.



The Expression dialog box gives you three drop-down lists that you can use to build your expression: columns, operators, and functions.

Columns

This pop up lists every column in the table from which you are selecting. If the table contains derived columns from previous queries, those columns will also be listed.

Operators

This pop up contains mathematical and logical operation symbols. The mathematical operators in this pop up include addition, subtraction, multiplication, division, greater than, less than, and equal signs. You can use these symbols to create mathematical formulas.

For example, from your table of sales representatives you want to select those sales representatives who, on the average, gross more than \$2000 per month. Gross sales is computed by adding together sales and commission.

You have two columns in your table: TOTAL_SALES, which is total sales for the year for each representative and COMMISSION, which is total commission for the year for each representative. You could build the following expression:

- $(TOTAL_SALES + COMMISSION) / 12 < 2000$

This expression tells MapInfo Professional to add the number in the TOTAL_SALES column with the number in the COMMISSION column. However, this gives you gross sales for the year. We want average gross sales for the month. Therefore, we divide the sum by 12, which will give us a monthly average. We then compare that figure with 2000.

The Operators pop up also includes logical operators conjunctions AND, NOT, OR and LIKE. The LIKE operator can be used with two wildcard characters: '%' and '_'. The '%' character matches zero or more characters. The '_' character matches only one character.

Functions

This pop up contains mathematical functions that take one or more parameters and return a value. You use functions to perform basic mathematical functions on the data in that column. For example:

- `abs(<number>)`

takes the absolute value of the numbers in the specified column.

For example, a meteorologist wants to select all days where the temperature in her city was more than 10 degrees warmer or cooler than the national average. She has a column in her table, AVG_DIFF, that contains the difference between the national average and city average. She could create the following expression:

- `AVG_DIFF < -10 Or AVG_DIFF > 10`

This expression tells MapInfo Professional to select all records that have an average difference less than -10 or greater than +10. However, she could also create the following expression:

- `abs(AVG_DIFF) > 10`

This expression tells MapInfo Professional to select all records where the absolute value of the average difference is greater than ten.

The Functions pop up contains many other functions, including area, perimeter, sin, cos, and date-related functions. For a complete list of functions, see [Creating Expressions in Chapter 15 on page 525](#).

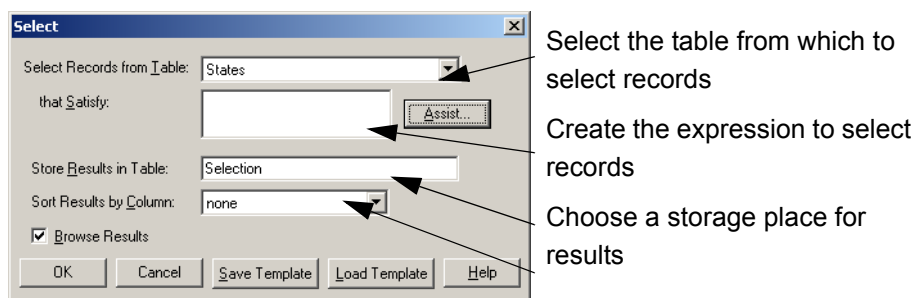
Verify

This button reviews the expression you have created and verifies that it is valid. This is particularly helpful if you are new to writing expressions.

Using Select to Create Queries

In general the process for selecting objects using Select is:

1. On the **QUERY** menu, click **SELECT** to display the Select dialog box.



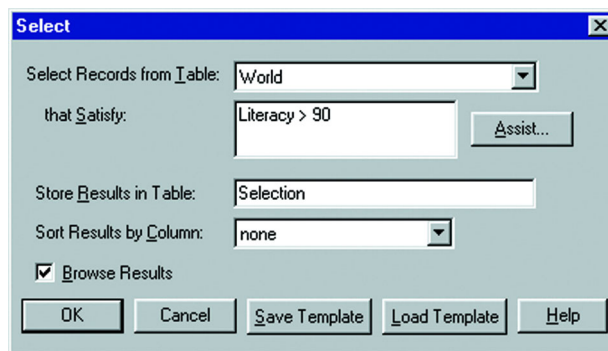
2. To see a list of the records you have selected, select the Browse Results check box.
3. MapInfo Professional creates a Browser of the new selection table.

MapInfo Professional names the table Query1. It will name the next temporary selection table Query2. You can override MapInfo Professional's default name and give the selection a descriptive name. Type the new name into the Store Results in Table box. The table can also be saved as a separate table with Save Copy As.

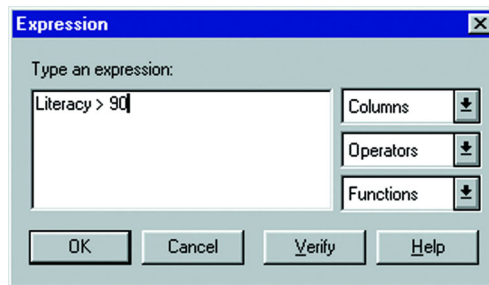
Example: Selecting

MapInfo Professional makes finding information and locations easy. You can use the Select feature to create subset databases of your information. As an example, we will use the sample WORLD table to select particular countries with a literacy rate greater than 90%.

1. Open the WORLD.tab table.
2. On the **QUERY** menu, click **SELECT** to display the Select dialog box.



3. Complete the Select dialog box:
 - **SELECT RECORDS FROM TABLE** — From the **SELECT RECORDS FROM TABLE** drop-down list, choose **WORLD**.
 - **ASSIST** — Click the **ASSIST** button to display the Expression dialog box.



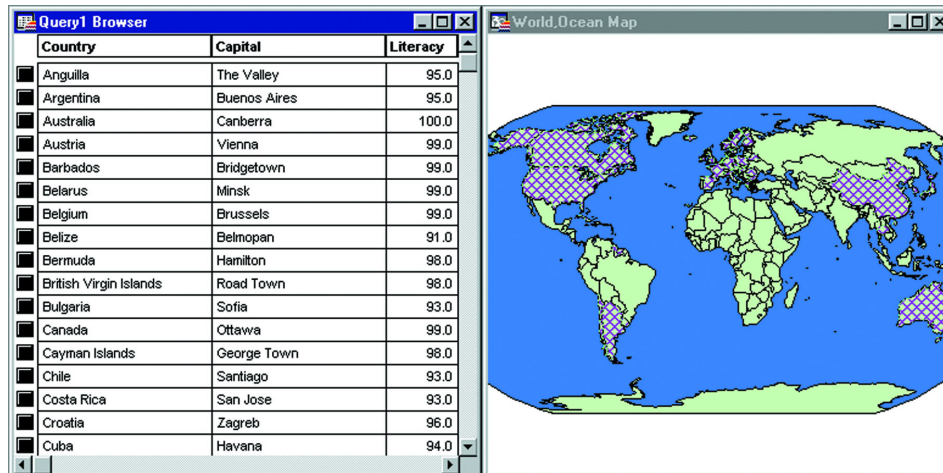
4. Complete the Expression dialog box as shown in the following figure:

From the Columns drop-down list, choose **LITERACY**.

From the Operators drop-down list, choose **>** (the greater than sign).

Type **90**.

Click **VERIFY** to confirm the syntax of your expression. Click **OK** to close the Verify dialog box.
5. Click **OK** to close the Expression dialog box. The Select dialog box redisplay.
6. Select the Browse Results check box.
7. Click **OK**. MapInfo Professional creates a Browser that contains the selections. Notice that the selections display in both the World map and Browser.



Making a New Table Using a Subset of a File

Many of the data sets that are used with MapInfo Professional include more objects and information than necessary for some projects. In many cases it is easier to work with a subset of the complete data product. For example, if you were tracking crime statistics for a certain county by census tract, you would not need the census tracts for the entire state. You could extract just the census tracts for the county.

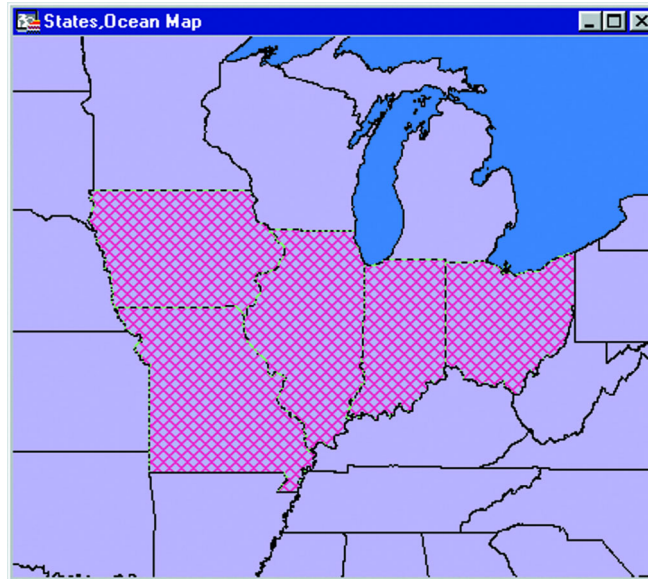
There are two ways to create a new table that will contain a subset of the records from an existing file. You can interactively select the objects representing the records you would like to put in the new table using one of the select tools. Or, you can use the SQL Select command to choose a subset of objects based on an SQL function. For an example using the SQL Select command, see [Example 1 — Computing Population Density Using Area on page 289](#)

Saving the resulting table is the same procedure, whether you choose the objects interactively or use an SQL select statement.

Note: Many of the queries on the following pages can be done either by using the **SQL SELECT** command or through the simpler Select command. Because SQL Select is more versatile and more commonly used, the SQL Select dialog box is used in the following examples.

Interactively Selecting Objects

1. On the **FILE** menu, click **OPEN** and open the table in a Map window.
2. Select the objects that will make up the subset with the Select tool, Radius Search Selector tool, or Polygon Search Selector tool. **SHIFT-CLICK** to select multiple objects.



3. On the **FILE** menu, click **SAVE COPY AS** and save the Selection table. The table can be saved with any filename.

Using SQL Select to Query Data

A *selection* is a subset of data rows in a table, chosen based on the contents of one or more columns from the table. You create selections by formulating questions, or queries, about your data. How many customers live in the state of Idaho? Which police precinct has the highest rate of violent crime? MapInfo Professional stores the results of these questions in temporary tables called *query tables*.

In the first part of this chapter, we discussed selections and query tables as a result of using Query Select command. We now turn our attention to an extremely powerful and useful feature in MapInfo Professional, querying by SQL Select.

While MapInfo Professional's Select command lets you formulate sophisticated queries, SQL Select goes even further. The records in the query table generated by the Select command don't have any information in them that isn't contained in the records of the base table. They are, in fact, the same records. They have been arranged so that they can be viewed together.

With SQL Select you can create query tables containing information that was only implicit in the base table(s).

The SQL Select dialog box is one of the most elaborate ones in MapInfo Professional. But don't be intimidated. Once you learn what each box is used for, it is fairly simple to create powerful selection statements. You can type directly into the boxes or you can use the pop up menus on the right to enter items into the boxes.

The easiest way to describe the dialog box is to walk you through an example, step-by-step. This example uses data from the WORLD table included in MapInfo Professional, so you can try out this SQL Select exercise yourself. We have included a brief description of the parts of the dialog box with each step. A complete description of each box is given after the example.

Example 1 — Computing Population Density Using Area

In this example, we'll use the world map to create a table of all the countries that have a population density of over 500 people per square mile.

The following formula computes population density:

- $POPULATION / AREA$

While the WORLD table has a population column (pop_1994), it does not include a column for country area. However, since the WORLD table has graphic objects associated with the records, MapInfo Professional can compute the total area for each country.

Open the WORLD.tab table, and maximize its display by clicking the window's maximize button. On the **QUERY** menu, click **SQL SELECT** to display the SQL Select dialog box.

To complete the SQL Select dialog box, do the following:

1. In the From Tables box, choose **WORLD** from the Tables drop-down list.
You can specify more than one table in an SQL statement. This example uses only one table, WORLD.
2. You should fill in the From Table box before you fill in the Select Columns box. MapInfo Professional uses the tables in the From Tables box to generate the list of columns in the Columns drop-down list.
3. Place your cursor in the Select Columns box and delete the asterisk (*). In this example, we will specify a list of columns to be included in the resulting query table, instead of including all columns.

Note: An asterisk (*) in the Select Columns box means by default that all columns would be queried.

Remember, the query table is the temporary table that MapInfo Professional creates to store the results of the query.

4. Select **COUNTRY** from the Columns drop-down list.
5. Select **POP_1994** from the Columns drop-down list.

Now, we need to compute population density. Remember, population density is computed by dividing population by area. There is no Area column in the table. However, there is a function, Area, which will compute the area of any mappable object. Since the WORLD table is mappable, MapInfo Professional can compute the area of each country and, therefore, the population density of each country.

6. Select the division sign (/) from the Operators list.
7. Select **AREA** from the Functions popup.

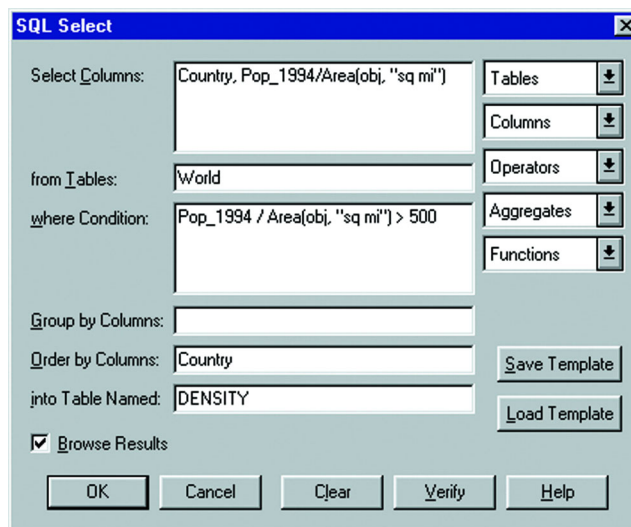
This creates a *derived* column. A derived column is a column that contains the results of calculations performed on another column or columns. When MapInfo Professional creates the query table, it will include two columns: the **COUNTRY** column and the **POP_1994/AREA(OBJ, "SQ MI") COLUMN**, which is our population density column. MapInfo Professional includes a units statement with all geographic functions. If you wanted MapInfo Professional to return the area in square kilometers, you would change "sq mi" to "sq km."

Now, we need to build an expression that selects only those countries whose population density is over 500 people per square mile.

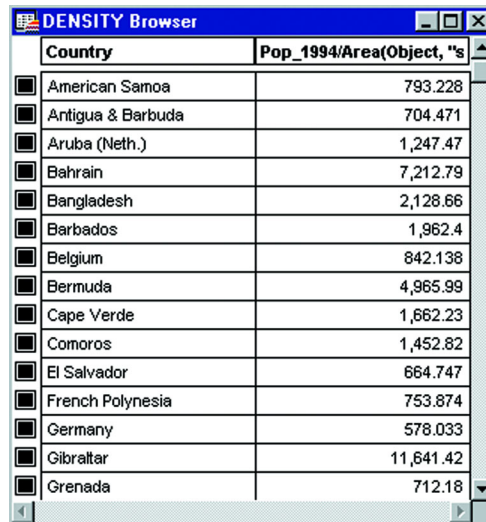
8. Tab to the Where Condition box and select **POP_1994** from the Columns drop-down list.
9. Select the division sign (/) from the Operators drop-down list.
10. Select **AREA** from the Functions pop up.
11. Select the greater than sign (>) from the Operators drop-down list.
12. Type the number **500**.

We have now built the expression “Select all countries whose population density (pop_1994/Area(obj, “sq mi”)) is more than (>) 500 people per square mile.”

13. Leave the Group by Columns box blank.
14. Tab to the Order by Columns box and select **COUNTRY** from the Columns list.
The Order by Columns box allows you to specify the order the records in the query table will display. By selecting Country, MapInfo Professional will list the records in alphabetical order, according to country name.
15. Tab to the Into Table Named box and type **DENSITY**.
By default, MapInfo Professional names the query table Query1. Subsequent query tables will be named Query2, Query3, and so on. You can change the name of the query table by typing in a new table name in the Into Table Named box. MapInfo Professional will name the query table DENSITY.
16. Click **VERIFY**. MapInfo Professional checks the syntax of your SQL statement. If there are any errors in your statement, MapInfo Professional gives you an error message telling you what the error is and which box contains the error.
17. Select the Browse Results check box to create a Browser of the query table. If you do not select Browse Results, MapInfo Professional still creates the temporary query table but doesn't display it. If you wanted to display the table after the fact, choose the Browse option in the Window menu and select **DENSITY** from the drop-down list.



18. Click **OK** to create the following table.
The first column contains the country name. The second column contains the population density. Note that the countries are listed in alphabetical order (Order By: Country) and the population density for each country listed is over 500 people per square mile (pop_1994/Area(obj, “sq mi”) > 500).

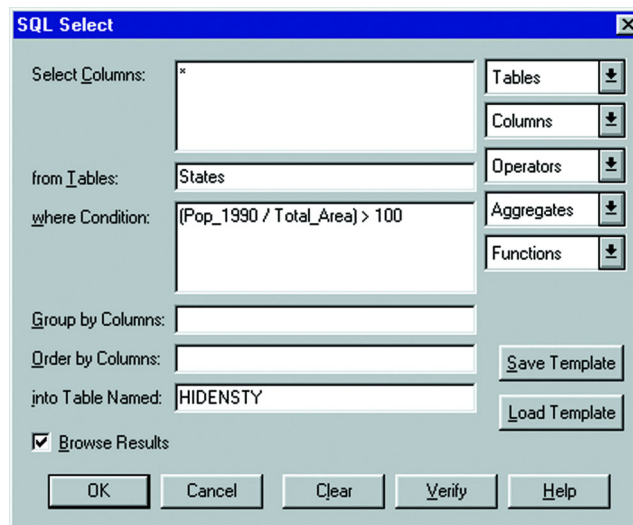


Country	Pop_1994/Area(Object, 's)
American Samoa	793.228
Antigua & Barbuda	704.471
Aruba (Neth.)	1,247.47
Bahrain	7,212.79
Bangladesh	2,128.66
Barbados	1,962.4
Belgium	842.138
Bermuda	4,965.99
Cape Verde	1,662.23
Comoros	1,452.82
El Salvador	664.747
French Polynesia	753.874
Germany	578.033
Gibraltar	11,641.42
Grenada	712.18

Example 2 — Computing Population Density with SQL

To set up an SQL Select statement that selects only those states with a high population density, do the following:

1. On the **FILE** menu, click **OPEN TABLE** and open the STATES table in a Map window.
2. On the **QUERY** menu, click **SQL SELECT** and fill in the SQL Select dialog box.



SQL Select dialog box configuration:

- Select Columns: *
- from Tables: States
- where Condition: (Pop_1990 / Total_Area) > 100
- Group by Columns: (empty)
- Order by Columns: (empty)
- into Table Named: HIDENSTY
- Browse Results

This creates a new table, HIDENSTY, that contains only those states with a relatively high population density (population divided by total area). The asterisk (*) in the Select Columns box transfers all of the columns in the STATES table to the HIDENSTY table.

3. On the **FILE** menu, click **SAVE COPY AS** and save the Selection table. The table can be saved with any filename.

Saving Queries

Any query created using the Select or SQL Select commands can be saved as an MapInfo Professional query table. Query tables consist of a .tab file and a .QRY file. After you have executed a Select or SQL Select statement, on the **FILE** menu, click **SAVE QUERY** to save the query as a table. When you open this table, the tables on which the query is based are re-opened and the query is re-executed.

Note: Queries made against other queries cannot be saved as a table or in a workspace.

Saving Queries to Workspaces

You can also save queries in workspaces. When you open a workspace that contains a query, the query will execute and any windows created by the query will redisplay. Unlike saving a query as a table, a separate .tab file is not created when you save a query to a workspace.

Note: To save queries to a workspace, the Save Queries in Workspaces check box must be selected in the Startup preferences. MapInfo Professional selects this check box by default.

Using Templates for Queries

Query templates enable you to save Select or SQL Select statements as templates and reload them. This saves you the trouble of having to rebuild a query each time you want to use it. Both the Select and SQL Select dialog boxes have Load Template and Save Template options to enable you to do this easily. Query templates are useful for re-creating a query with an updated version of the table used in the original query, or for executing a query on a table that has the same fields as the table on which the query statement was created.

Saving a Template

After you have finished writing your Select or SQL Select query, you can save the query as a template.

To save a query as a template:

1. In the Select or SQL Select dialog boxes, click the **SAVE TEMPLATE** button to save the query to a template, or query file. The Save Dialog to Query File displays.
2. Give the query file a name, select a folder, and click **SAVE**. Query files are saved with a .QRY extension and are saved in the directory specified in the Directories preferences.

Note: The query does not need to be complete or syntactically correct to save it to a template.

Loading a Template

You can load any saved query template.

To load a query template:

1. In the Select or SQL Select dialog boxes, click the **LOAD TEMPLATE** button. The Load Dialog From Query File dialog box displays. It lists the .QRY files.
2. Select the .QRY file you want to use, and click **OPEN**. The Select or SQL Select dialog box displays with the values from the template already filled in. Simply execute your query to create the query browser.

Deriving Columns

A derived column is a column in a query table whose contents are created by applying an expression to the values of columns already existing in some base table. In the example above, population density was a derived column.

By default, the Select Columns box contains an asterisk (*), indicating that all of the columns in the base table are to be included in the query table. If you don't want all of those columns, you should delete the asterisk and list only those columns that you want to use.

You aren't limited to creating one derived column. You can create as many derived columns as you want. Note that the more derived columns you create, the longer it will take MapInfo Professional to execute the query.

You can also create derived columns based on the aggregate functions *count*, *sum*, *avg*, *wtavg*, *max*, and *min*. For example:

- `sum(Population)`.

would give you the population for the entire world.

- `sum(Area(obj), "sq mi")`.

would give you the area for the entire world.

Creating Column Aliases

When MapInfo Professional creates a derived column, it uses the expression itself as the name for that derived column. That can be awkward. You can, however, specify an *alias* for the column.

For example, the population density column in our DENSITY Browser was titled:

- `Population / Area(obj, "sq mi")`

We can rename that column so that it is more descriptive. To rename the column, add the new name to the Select Columns box when you are listing the columns. The alias must follow the expression. It must also be separated from the expression by a blank space and enclosed in quotes. For example:

- `Country, Population / Area(obj, "sq mi") "POP_DENSITY"`

When MapInfo Professional creates the temporary query table, the population density column will now be named POP_DENSITY.

You can use aliases to rename any column in a table, not just derived columns. For example, if each country in your table is a separate sales territory for your corporation, you might want to rename the Country column "TERRITORY". The procedure is identical:

- `Country "TERRITORY", Population / Area(obj, "sq mi") "POP_DENSITY"`

Example 3 — Computing Total World Population Density

In this example, we demonstrate several SQL Select features:

- *Create derived columns* based on an aggregate function.
- *Rename columns* by typing column aliases.
- *Create a new results table* based on the WORLD table.

- *Perform SQL Select* on the new table.

In this example, you have a table of world population statistics (WORLD). You would like to create a table that shows the population density of the entire world. Use the following formula:

- TOTAL POPULATION / TOTAL AREA

While the WORLD table does not have total population or total area columns, we can derive them by applying the sum() aggregate function to the Population column and the Area function. We will do this in our first query.

1. Open the WORLD table, and maximize its display.
2. On the **QUERY** menu, click **SQL SELECT**. The SQL Select dialog box displays.
3. From the SQL Select dialog box, do the following:
 - In the From Tables Box, choose **WORLD** from the Tables drop-down list and delete the * from the Select Columns box
 - Select **SUM** from the Aggregates drop-down list
 - Select **POPULATION** from the Columns drop-down list. After you select Population, the cursor will be on the inside of the end parenthesis [)]. Move it to the outside with the **RIGHT ARROW** key.

Note: Sum (Population) will create a derived column that will compute the total world population.

- Press the **SPACEBAR** once and type the column alias **TOTAL_POP**. Remember, an alias has to be separated from its expression by a blank space.

Note: The Sum(Population) column will appear in the results table as Total_Pop.

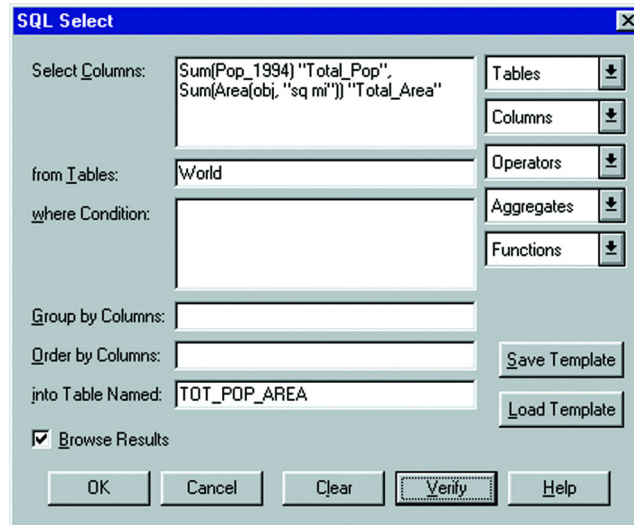
- Select **SUM** from the Aggregates drop-down list.
- Select **AREA** from the Functions drop-down list. After you select Area, the cursor will be on the inside of the end parenthesis [)]. Move it to the outside with the **RIGHT Arrow** key.

Note: Sum(Area) will create a derived column that will compute the total area.

- Press the **SPACEBAR** once and type a column alias "Total_Area".

Note: The Sum(Area(obj, "sq mi")) column will appear in the results table as Total_Area.

- Leave Where Condition, Group By Columns, and Order By Columns blank.
 - In the Into Table Named box, type **TOT_POP_AREA** as the name for this table.
4. Click **VERIFY**. Click **OK**.
 5. Select the Browse Results check box.



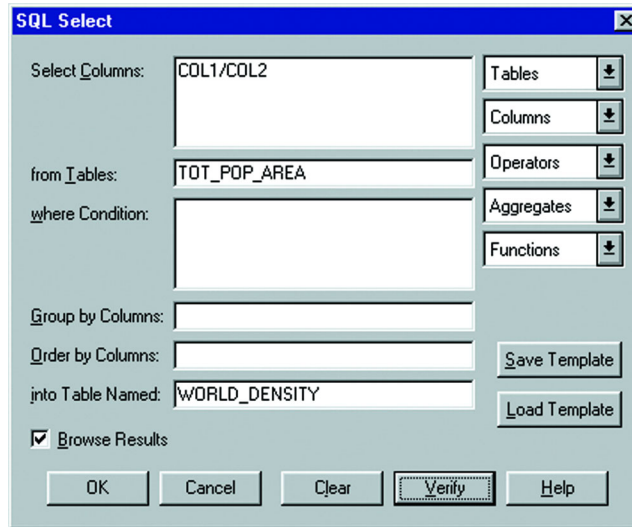
6. Click **OK**.

MapInfo Professional produces a query table named TOT_POP_AREA containing two columns. The first column shows a value for the total population and the second column shows a return value for the total area.

Total_Pop	Total_Area
5,157,461,605	6,093,155,249

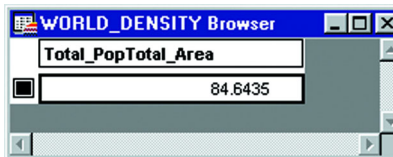
Now that we have the total population and total area, we can compute the world's population density by performing an SQL Select on the TOT_POP_AREA table we just created. In this SQL Select, we will divide the total population by the total area.

1. On the **QUERY** menu, click **SQL SELECT** to display the SQL Select dialog box.
2. Fill in the dialog box as follows:
 - In the From Tables Box, choose **TOTAL_POP_AREA** from the Tables drop-down list.
 - Tab to the Select Columns box and delete the information from our last query.
 - Select **TOTAL_POP** from the Columns drop-down list. Remember, Total_Pop is the column we created from our last query.
Notice that when you select Total_Pop, COL1 appears in the Select Columns field. This is the column number of that field. When choosing derived columns from a previous query, MapInfo Professional uses the column number instead of the name. Columns can be referred to by name or number, where the number designates the order the column has in the Select Columns box. COL1 and COL2 refer to the first and second columns, respectively.
3. Select the division sign (/) from the Operators drop-down list.
4. Select **TOTAL_AREA** from the Columns drop-down list. COL2 displays in the Select Columns field.
5. Leave Where Condition, Group By Columns, and Order By Columns blank.
6. Tab to the Into Table Named box and type **WORLD_DENSITY** as the name of this table.
7. Click **VERIFY**. Click **OK**.
8. Select the Browse Results check box.



9. Click **OK**.

MapInfo Professional produces a query table named `WORLD_DENSITY` that will return a value for the population density in people per square mile for the entire world.



Aggregating Data

When you aggregate data, you perform a mathematical operation on all of a column's values in all of the records in your table. Unlike the Select command, which only allows you to perform mathematical functions on individual records, SQL allows you to aggregate (or summarize) data across records.

MapInfo Professional looks for each *unique* set of data values in the specified column or columns and creates one row for each such unique set. When you aggregate data, you need to specify:

- How the records will be grouped.
- How the data will be aggregated (summarized).

For example, you have a table of sales representatives and their sales figures for the past three months:

SALES_REP	MONTH	SALES
John	May	1200
Cathy	May	900
Julie	May	1100
John	June	900

SALES_REP	MONTH	SALES
Cathy	June	1400
Julie	June	600
John	July	1200
Cathy	July	700
Julie	July	1000

MapInfo Professional could also compute the total sales for each representative by specifying in the SQL Select dialog box:

- Select Columns: SALES_REP, sum(SALES)
- Group by Columns: SALES_REP

SALES_REP	sum(SALES)
John	3300
Cathy	3000
Julie	2700

or MapInfo Professional could compute the average sales for each representative:

- Select Columns: SALES_REP, avg(SALES)
- Group by Columns: SALES_REP

SALES_REP	avg(SALES)
John	1100
Cathy	1000
Julie	900

or MapInfo Professional could compute the total sales for each month:

- Select Columns: MONTH, sum(SALES)
- Group by Columns: MONTH

MONTH	sum(SALES)
May	3200
June	2900
July	2900

MapInfo Professional has six aggregate functions:

- **Count(*)**: counts the number of records in a group. It takes * as its argument because it applies to the record as a whole, and not to any particular field in the record.

- **Sum** (*expression*): calculates the sum of the values in <expression> for all the records in a group.
- **Average** (*expression*): calculates the average of the values in <expression> for all the records in a group.
- **WtAvg** (*expression*): calculates the weighted average of the values in <expression> for all the records in a group.
- **Max** (*expression*): finds the highest value in <expression> for all records in a group.
- **Min** (*expression*): finds the lowest value in <expression> for all records in a group.

Grouping and Ordering Your Data

You can group your SQL query by a particular column so that all rows that contain the same value are grouped together. Specify this column in the Group by column box in the SQL Select dialog box. When used in conjunction with aggregate functions, rows with the same value in all grouping columns are treated as a group. Duplicate rows are suppressed and aggregate values are reported for derived columns based on the aggregate functions. Specify the column(s) by name or by position number as listed in the Select Columns box. When using derived columns, you must specify the column number.

Along the same lines, you can tell MapInfo Professional to order the results of your query in a certain way. By default, MapInfo Professional orders records by their ascending value (which is alphabetical for character fields). When you list more than one column, MapInfo Professional orders the records by the first column. Records with identical values in the first Order by column are ordered by their values in the second Order By column. Like the Group By clause above, use column names or position number. For derived columns use the number. Do not use "col" with the position number.

Joining Tables Using SQL Select

When performing an SQL Select operation with multiple tables, MapInfo Professional needs to join information from the records in the various tables. You may have a map table containing only graphic objects and their names and a table of statistical data for some geographic region. You want to display the statistical data on the map table. You could use SQL Select to create a query table in which your statistical data and map data are joined in one table.

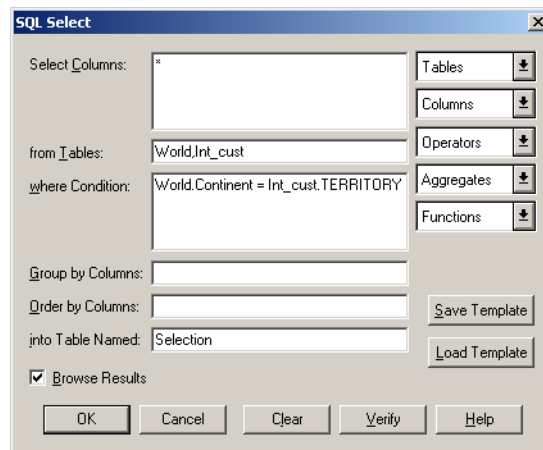
Whenever you are working with multiple tables, you must put a statement in the Where Condition telling MapInfo Professional how to match up the rows in the different tables.

For example, you have the WORLD table that contains countries and a table of economic statistics (Eco_Stats), also broken down by country. You want to create a query table that contains both sets of data:

- Select Columns: * (an asterisk indicates include all columns in the query table)
- From Tables: World, Eco_Stats
- Where Condition: World.Country = Eco_Stats.Country

The two columns that you want to match do not have to have the same name. For example, you have a table of international customers (Int_Cust) that contains a sales territory column (TERRITORY). This column contains continent names, since your company breaks up its sales territories according to continent. If you wanted to temporarily join the two tables:

- Select Columns: *
- From Tables: World, Int_Cust
- Where Condition: World.Continent = Int_Cust.TERRITORY



Example: Total Population and Area by Continent

Given that MapInfo Professional can aggregate data, we can compute total population and total area for every continent in the world. We want to create a table with the following information:

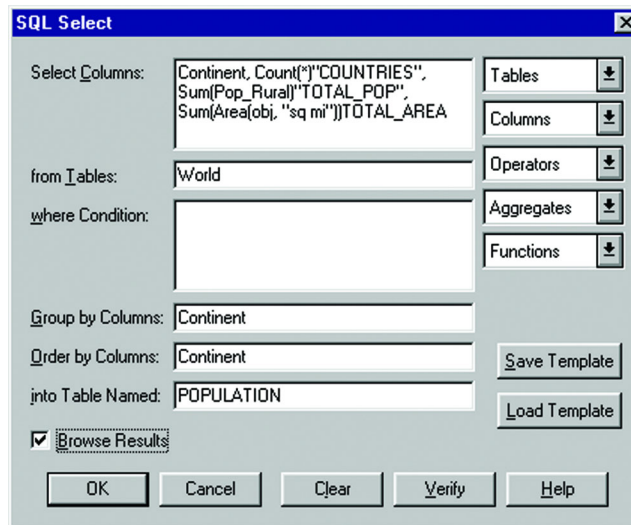
- Number of countries per continent (in alphabetical order)
- Total population per continent
- Total area of each continent

To create a table that captures this data:

1. Open the **WORLD.TAB** table, and maximize its display by clicking the **MAXIMIZE** button.
2. On the **QUERY** menu, click **SQL SELECT** to display the SQL Select dialog box:
3. In the From Tables Box, choose **WORLD** from the Tables drop-down list.
4. In the Select Columns box, choose **CONTINENT** from the Columns drop-down list, and choose **COUNT(*)** from the Aggregates drop-down list.
5. Press the **SPACEBAR** once and type the column alias “COUNTRIES” as the column alias. Remember, an alias has to be separated from its expression by a blank space.
Note: The Continent Count(*) column will appear in the results table as COUNTRIES.
6. Select **SUM** from the Aggregates drop-down list.
7. Select **POPULATION** from the Columns drop-down list. After you select Population, the cursor will be on the inside of the end parenthesis [)]. Move it to the outside with the **RIGHT** Arrow key.
Note: Sum (Population) will create a derived column that will compute the total world population.
8. Press the **SPACEBAR** once and type the column alias “Total_Pop”. The Sum(Population) column will appear in the results table as Total_Pop.
9. Select **SUM** from the Aggregates drop-down list.
10. Select **AREA** from the Functions drop-down list. After you select Area, the cursor will be on the inside of the end parenthesis [)]. Move it to the outside with the **RIGHT** Arrow key. Sum(Area) will create a derived column that will compute the total area.

11. Press the **SPACEBAR** once and type a column alias "Total_Area".

Note: The Sum(Area(obj, "sq mi")) column will appear in the results table as Total_Area.
12. In the Group by Columns box, choose **CONTINENT** from the Columns drop-down list.
13. In the Order by Columns box, choose **CONTINENT** from the Columns drop-down list.
14. In the Into Table Named box, type **POPULATION** as the name for this table.
15. The Count(*) counts all the records in the table. However, since we are grouping the countries according to continent, MapInfo Professional reports the number of countries in each continent and puts it in a column called COUNTRIES (the alias).



The resulting query table is shown in the following figure.

Continent	COUNTR	TOTAL_POP	TOTAL_AREA
	3	0	1,199.85
Africa	55	240,274,626	11,597,279.85
Antarctica	2	0	3,603,100.75
Asia	47	1,831,656,166	18,378,514.7
Australia	2	0	3,073,709.99
Europe	50	88,651,713	3,394,523.69
North America	32	19,737,135	8,663,486.77
Oceania	23	64,983	18,671.71
South America	15	62,892,852	6,832,364.18

Using the Where Condition

The order of fields used in the Join does not matter. Either of the following syntaxes is acceptable:

```
Select * from A,B where A.field1 = B.field1
Select * from A,B where B.field1 = A.field1
```

However, keep in mind that when you switch the order of geographic operands, the geographic operator must also change. The following statements will produce identical results:

```
Select * from states, cities where states.obj contains cities.obj
Select * from states, cities where cities.obj within states.obj
```

Order of Clauses

The order in which Join clauses are performed does not matter. For example, each of the following are valid clauses:

```
Select * from Us_custg,States,City_125
where States.state = City_125.state and States.state = Us_custg.state and
Us_custg.order_amt > 10000
Select * from Us_custg,States,City_125
where States.state = City_125.state and States.state = City_125.state and
Us_custg.order_amt > 10000
Select * from Us_custg,States,City_125
where Us_custg.state = States.state and Us_custg.order_amt > 10000 and
States.state = City_125.state
```

Note: Some of the data used in this example is from the MapInfo Professional Tutorial, which is only available from the MapInfo web site, www.mapinfo.com/miprotutorial.

Error Handling

If an invalid Where condition that uses an OR as a logical operator is detected, MapInfo Professional will indicate an error has occurred. Usually this error will display whenever MapInfo Professional cannot find a join between two tables. For example, if you have specified the following incorrect condition:

```
Select * from A,B where A.field1 = B.field1 or A.field1 = B.field2
```

This error message displays:

```
No join specified between A and B. Invalid join condition in Where clause
```

Performing Outer Joins

An SQL outer join refers to the process of joining data from a larger table and a smaller table where you would like the result to be all the records in the larger table joined to whatever records matched from the smaller table. A problem arises if this is done as a standard join. A standard join in SQL Select will yield a table of only those records that matched. You would like to have empty fields where there is no match.

For example, suppose you have a table containing a listing of all of the apartments in a building. There is also a table containing records for each of the tenants. The tables each have a field with the apartment number in it. Your task is to generate a table of all of the apartments and the tenants occupying the apartments. Some of the apartments will be vacant and have no match in the tenant field.

The first step is to create a subset of the data where you can successfully match the apartment to the tenant.

1. On the **QUERY** menu, click **SQL SELECT**. Set up the following SQL query:

SQL Select

Select Columns: APARTMNT.Address, APARTMNT.AptNumber, TENANTS.Name

from Tables: APARTMNT, TENANTS

where Condition: APARTMNT.AptNumber = TENANTS.AptNumber

Group by Columns:

Order by Columns:

into Table Named: Selection

Browse Results

OK Cancel Clear Verify Help

2. Click **OK**. Your selection appears as a query browser. Save this query to a base table.
3. On the **FILE** menu, click **SAVE COPY AS**. The Save Copy As dialog box displays. Choose the appropriate directory for your file and name it RESULT.tab. Click **SAVE**.
4. On the **FILE** menu, click **OPEN TABLE** and open the RESULT table. This table includes all of the records from both tables where there was a match.
5. Select the records from the APARTMNTS table that had no match in the tenants table. On the **QUERY** menu, click **SQL SELECT** and set up the following SQL query:

SQL Select

Select Columns: *

from Tables: APARTMNT

where Condition: APARTMNT.AptNumber = Not In (Select AptNumber From TENANTS)

Group by Columns:

Order by Columns:

into Table Named:

Browse Results

OK Cancel Clear Verify Help

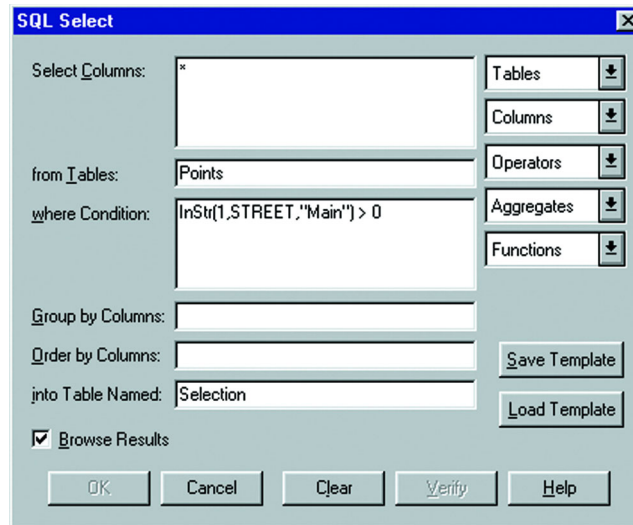
The resulting query table is a list of all of the apartments that are not in the RESULT table. To include these records in your RESULT table, you must append them.

6. On the **TABLE** menu, click **APPEND ROWS TO TABLE**. Append the last query table to the RESULT table. This will append the list of vacant apartments to the list of occupied apartments.

Using the Instr Function to Find Data

The Instr function is used to locate a substring within a larger string. This function is useful for searching a character field to find the position of a specific character or group of characters. It can also be used to find any occurrence of the substring.

For example, to select all of the streets in the POINTS table that contain the word “Main” in the STREET column, set up your SQL Select statement as follows:



In the above example, if the Instr function finds the word “Main” anywhere in the STREET column of the Points table, it will return a value greater than zero (the position of the first letter of “Main” in the string being searched). The syntax of the INSTR function is as follows:

INSTR (position, string, substring)

where:

position is the starting position of the search

string is the text string or field containing the string to be searched

substring is the text string that you are searching for

For example, to find the position of the word “test” in a given text string, the Instr function will look something like this:

```
INSTR(1,"This is a test of the Instr function ","test")
```

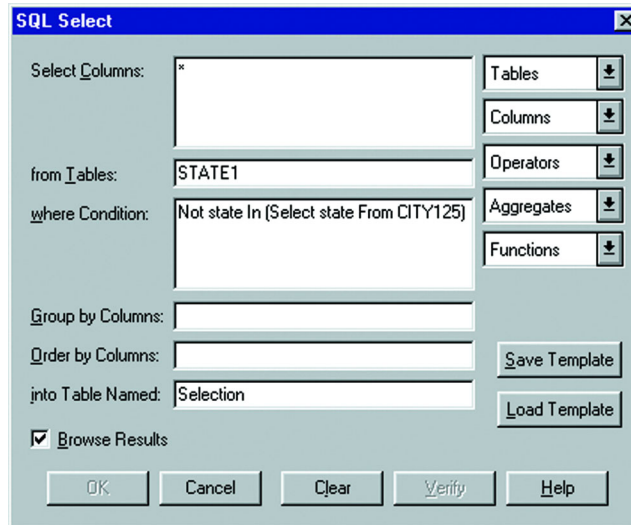
When this statement is executed, the value 11 will be returned.

Note: If the string that you are searching for does not exist in the larger string, the value 0 will be returned.

Selecting Records from One Table that are Not in Another

The following SQL statement allows you to select records from one table that are not in another table based on a field common to both tables. For example, if you have a table, STATE1 and want to select all of the records from STATE1 that are not in CITY125.

1. On the **QUERY** menu, click **SQL SELECT**.



Note: The statement syntax is as follows: NOT *columnname* IN (SELECT *columnname* FROM *secondtable*)

- This SQL statement produces a query of all records in the table STATE1.tab that do not exist in CITY125.tab.

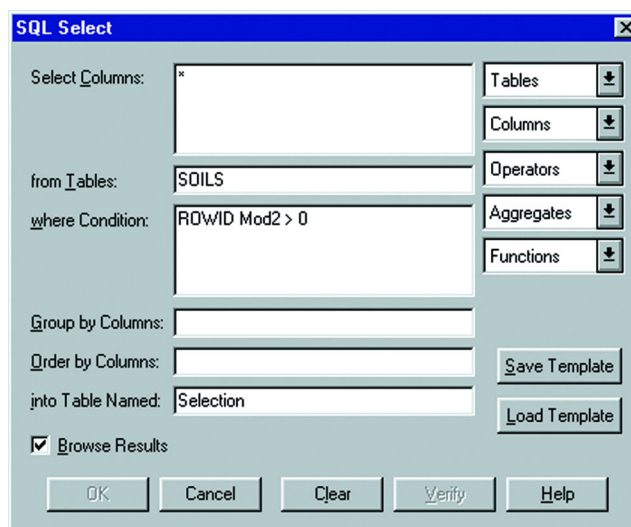
Note: Some of the files described in this example may refer to MapInfo Professional Tutorial data, which is available on the MapInfo web site, www.mapinfo.com/miprotutorial.

Selecting Even or Odd Records from a Table

Every record in a table has a sequential record number or a RowID. Suppose you want to select every other record from your table. The easiest way is to check the table through RowID.

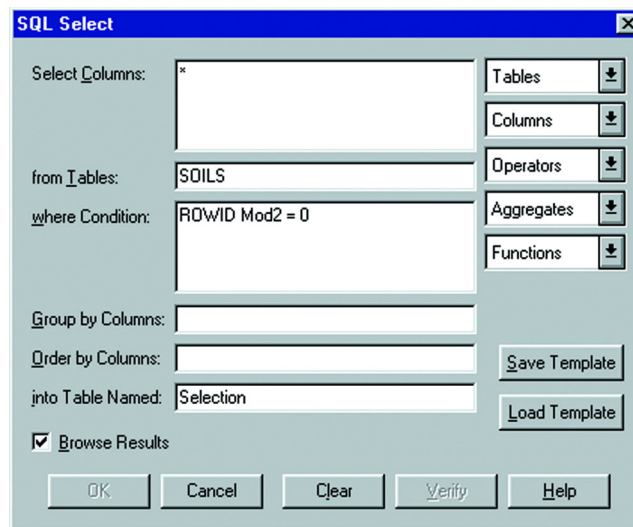
To select records that have an odd record number, do the following:

- On the **QUERY** menu, click **SQL SELECT**.
- Fill in the SQL Select dialog box:



Note: RowID is a function, not a column name in the Soils table.

- To select records that have an even record number, on the **QUERY** menu, click **SQL SELECT**.
- Fill in the SQL Select dialog box:



Note: RowID is a function, not a column name in the Soils table.

- Click **OK**.

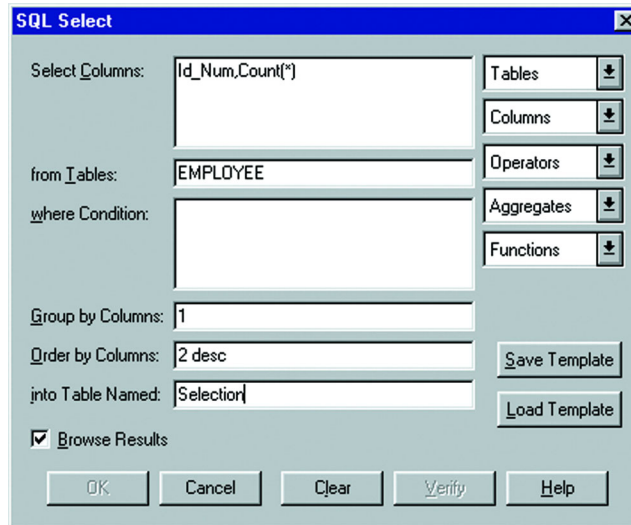
Finding Duplicate Values in a Column

Often data is entered into tables by many different users. Sometimes data is repeated, or there is common information in several different records. This section explains how to find all rows in a table that, for a given column, share a value with another row. This is accomplished by performing two SQL Select statements.

The first SQL Select statement produces a query table with two columns. The first column is a list of all unique values in the data column and the second column lists the number of times that each unique value occurs. The second SQL statement compares each data column value with all rows in the Query table where the count is greater than one.

In the next example, there is a table EMPLOYEE that has two columns Id_Num and Name. To find the duplicate values, perform the two SQL Selects, modifying them where indicated.

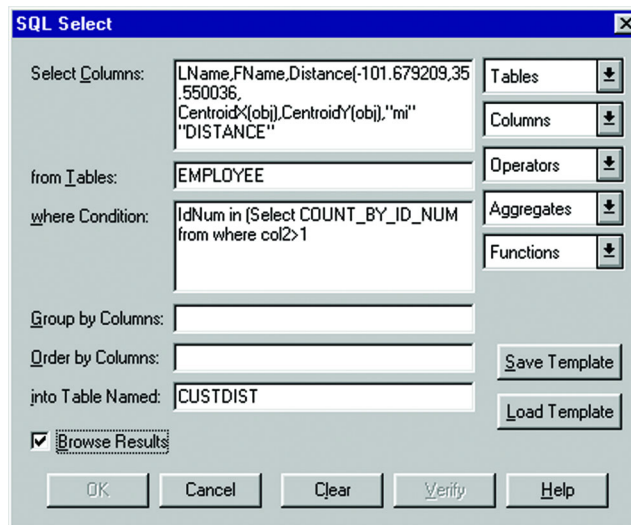
- On the **QUERY** menu, click **SQL SELECT** and fill in the SQL Select dialog box.



Substitute the name of your data column for *ID_Num* and the name of your table for *EMPLOYEE*. The number 1 in the Group By Columns box will group the row by *ID_Num* (the first column). The 2 Desc in the Order by Columns box will arrange the records in descending order based on the values in the count(*) field (the second column).

This SQL Select statement returns a query table with two columns. The first column contains every identification number possessed by at least one employee. The second column contains the number of employees that have that identification number. The rows are sorted by the number of employees that have each id number (i.e., the count).

2. On the **QUERY** menu, click **SQL SELECT** and fill in the dialog box.



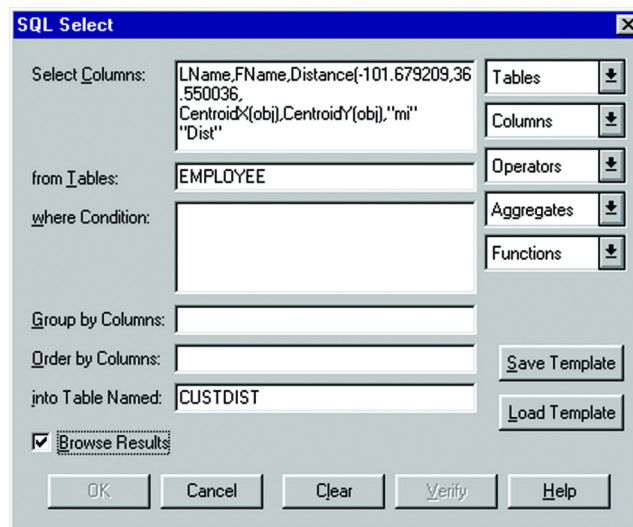
Also, change *EMPLOYEE* to the name of your table and *ID_Num* to the name of your data column.

In the example, the SQL statement returns a query table containing all of the rows from *EMPLOYEE* with duplicated data column values. The where condition selects all rows from *EMPLOYEE* that have an identification number that is the same as one of the ID numbers in the *Count_By_ID* query table. This sub-select finds all identification numbers that occur more than once.

Calculating the Distance to a Fixed Point

In MapInfo Professional it is possible to calculate the distance from one point to another. This example shows how to calculate the distance from a fixed point to every point in a geocoded table and store the result in another table.

1. Determine the location of the fixed point. To find the position of a symbol on the map, double-click the symbol with the Select tool. In this example, the X value is -101.697209 and the Y value is 36.050036.
2. On the **QUERY** menu, click **SQL SELECT** and fill in the SQL Select dialog box, substituting your X and Y values for the values mentioned above. As in the previous SQL query, replace *EMPLOYEE* with the name of your table, and *ID_Num* with the name of the relevant column from your table.

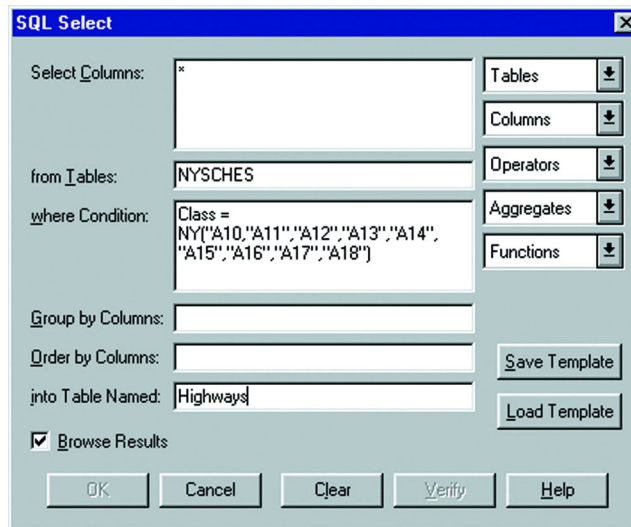


3. Click **OK**. The resulting query table contains last names and first names plus a new column called **DISTANCE** which records the distance between the fixed location (-101.697209, 36.050036) and the point associated with each row of the table.
4. To save the results in a permanent table, on the **FILE** menu, click **SAVE COPY AS**, and save the **CUSTDIST** table.

Selecting Data from a StreetPro Table

If you are using MapInfo Professional StreetPro products, you may want to create a separate layer of just the highway data. The following selection demonstrates a typical selection of highways.

1. On the **FILE** menu, click **OPEN**. Select your StreetPro file. In this example, the table name is **NYSHCHES.tab**.
2. On the **QUERY** menu, click **SQL SELECT**. Fill in the SQL Select dialog box.



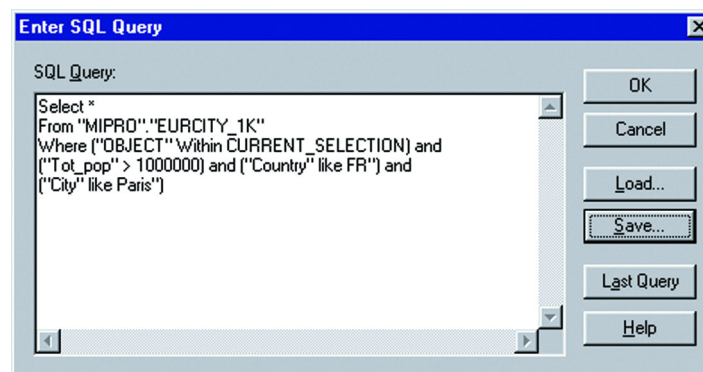
This will create a new table called HIGHWAYS that contains all the primary roads contained in the StreetPro NYSCHES table.

3. On the **FILE** menu, click **SAVE COPY AS** and save the HIGHWAYS table. The HIGHWAYS table can now be added to your map as a separate layer.

Note: The above SQL Select statement selects all of the primary roads as defined by the CFCC codes. To determine the class of the streets that you want to select, use the Info tool on a few of the streets that you want to select, or refer to your StreetPro documentation for explanations of the classes.

Entering SQL Queries using the Expert Button

In the Open DBMS Table Options, Expert Mode, the SQL view button can be used to invoke the following dialog box:



This dialog box allows the user to enter queries much more complex than the wizard allows using the standard DBMS SQL syntax.

Use the features in this dialog box, review these notes:

- To get a new line press **ENTER**.
- To tab press **<CTRL TAB>**.
- To cut and paste from the clipboard, use **<CTRL X>** to cut, **<CTRL C>** to copy, and **<CTRL V>** to paste.

- Click **OK** to move to the final dialog box of the wizard
- Click **CANCEL** to cancel the query. MapInfo Professional returns you to the step in the wizard where you originally clicked the Expert button
- Click **LOAD** to load a SQL statement that has been saved in a file. This button activates the Load SQL Query dialog box, which provides you with access to existing files containing SQL statements (*.SQL files). When you load an SQL file, its format will be preserved.
- Click **SAVE** to save the SQL statement in a file for later use. This button activates the Save SQL Query dialog box, which saves the newly constructed SQL statements, or modifications to existing statements. When you save an SQL file, its format will be preserved. Once saved, the SQL statement appears in the list of available *.SQL files in the Load SQL Query dialog box.
- Click **LAST QUERY** to load the last query that was executed in this MapInfo Professional session.

Creating Thematic Maps, Legends, and Other Maps

Thematic mapping is a powerful way to analyze and visualize your data. You give graphic form to your data so that you can see it on a map. Patterns and trends that are almost impossible to detect in lists of data reveal themselves clearly when you use thematic shading to display the data on a map.

You can create thematic maps with MapInfo Professional® using the following methods: ranges of values, graduated symbols, dot density, individual values, bar and pie charts and continuous grid. There are also several variations on and options within these methods, such as bivariate thematic mapping and inflection point, that give you even more ways to analyze your data.

In this Chapter:

- ◆ **MapInfo in Action** 311
- ◆ **Using Thematic Mapping to Analyze Information** 313
- ◆ **Types of Thematic Maps** 317
- ◆ **Working with Your Thematic Maps and Legends** 326
- ◆ **Updating Column Information using Thematic Mapping** 328
- ◆ **Bivariate Thematic Mapping** 331
- ◆ **Working with Legends** 335
- ◆ **Working with Grid Surface Maps** 336
- ◆ **Working with 3D and Prism Maps** 345

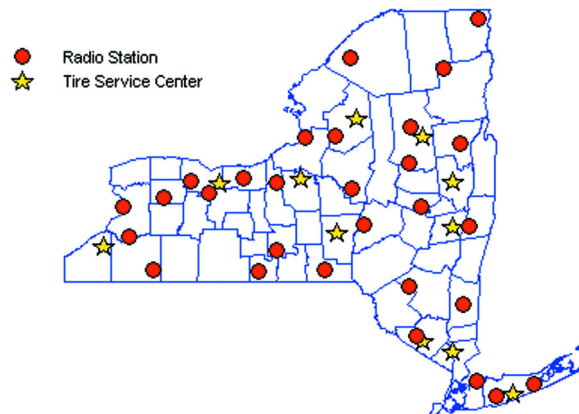
MapInfo in Action

Since you have all the tools you need to make effective and useful maps, it is time to talk about what makes a map effective and useful. Whatever you need your map to say, whether it is to convey information, calculate distances between health care providers and their patients, or get a count of the number of customers that live within a given radius of an outlet location, MapInfo Professional can help you do that. By making selections from your table, you can extract information from sets and subsets of your data or see patterns and distributions, getting answers to such questions as: Which of my customers bought more than \$5000 of equipment? Which of my customers is located within a 200 mile radius of my warehouse? Which of my customers bought more than \$5000 of equipment and is located within a 200 mile radius of my warehouse? For more on selecting, see [Selecting your Data in MapInfo Professional in Chapter 8 on page 275](#), and [Querying Your Data in MapInfo Professional in Chapter 8 on page 282](#).

MapInfo Professional refers to this grouping of like information as thematic mapping.

Can You Give Me an Example?

Imagine that your job is to purchase advertising time from radio stations to market your product, a statewide tire service. You have demographic information for your state by county, and radio stations have supplied you with their own demographics and transmission ranges. You also have a list of your tire service center locations.



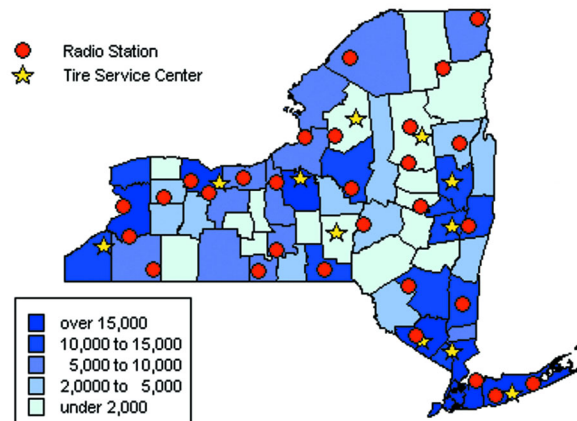
Using MapInfo Professional, you can quickly and easily bring this information into focus and make informed decisions about which radio stations to use to advertise your tire service.

In this example, you need to display the service centers on a map in relation to the radio stations, looking for the stations that reach the areas where your centers are located.

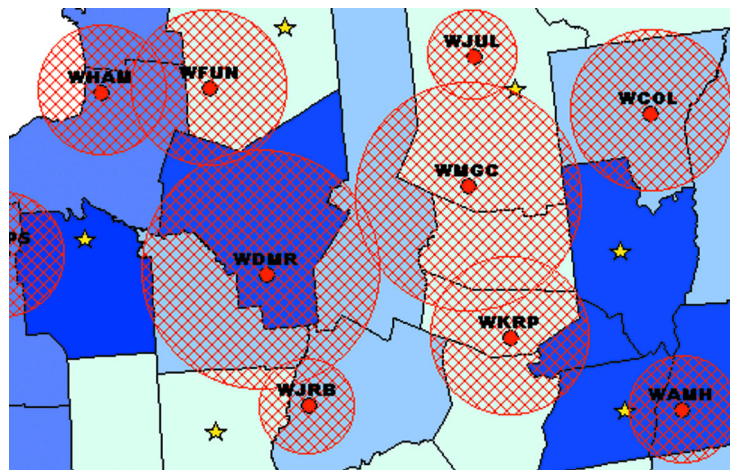
To begin building your map, you would open the MapInfo Professional tables you will need to give your map context: the state, county, and street maps. On this background you create the service center table and geocode it by matching the street addresses of the service centers to the street locations in your StreetPro map. A few more keystrokes add the tire centers to the map, and your

data suddenly leaps into view. Blue stars tell you at a glance the distribution of your tire centers across the state. You use the same method to put the red circles representing the radio stations on the map.

Using your file of county demographics, you ask MapInfo Professional to shade the counties where most of your target market (males 35 and older) lives.



Consulting your list of radio transmission ranges, select the Buffer command and create a buffer circle around each radio station, the circle representing each station's broadcast area. Just by looking you can tell which broadcast areas include the highest concentration of tire service centers or you can ask MapInfo Professional to give you an exact count of the number of tire centers within each area. Tell MapInfo Professional to shade the buffer circles in order according to the number of service centers that fall within each circle. Shade the circles with the most service centers red.



With the radius of each station's transmission range marked, you can see which stations broadcast in areas where your target market is (the shaded counties). But how well do these stations penetrate that market? Which stations will reach the people who are most likely to use your service centers?

Join the demographic information supplied by each station to the broadcast area shown on your map. Now you can click any point within that area and see all the demographic information: the age and income distributions of the station's listeners, and the times of day when particular age and income groups are tuned in, for example.

Even better, ask MapInfo Professional to cross-check the radio stations that reach your best customers with the areas where that population is highest. Fill the broadcast areas of those stations with crosshatching.

Look at the map and choose the stations that reach your best customers in the areas where you have the most locations. Your best bets are green-shaded circles in crosshatched areas. Now you know *where* your target customers are. Click the Info tool on these areas to see the time of day your target market is listening. Now you know *when* to purchase air time.

You can save this map and use it for future planning. For example, it can help you spot a good location for a new tire center or coordinate radio advertising with direct marketing. Do you want to increase advertising in key areas of the state?

Use the MapInfo Professional Layout window to prepare a visually exciting and informative presentation that features this map along with graphs and tables.

As you become better acquainted with MapInfo Professional, you will find that its applications are limited only by your imagination.

Using Thematic Mapping to Analyze Information

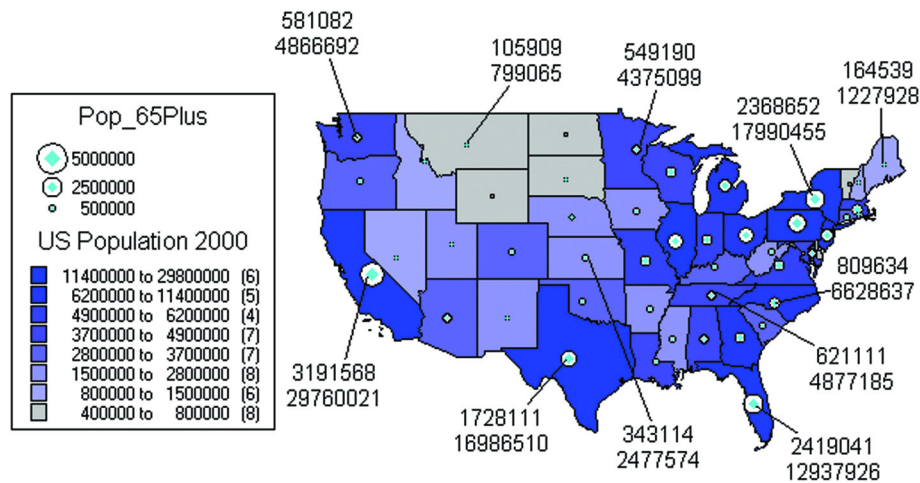
Thematic mapping is the process of enhancing your map according to a particular theme. At the cornerstone of the theme is the data in your table. Themes represent your data with shades of color, fill patterns, symbols, bar and pie charts, and grids.

With MapInfo Professional, you create different thematic maps by assigning these colors, patterns, or symbols to map objects according to specific *values* in your table. MapInfo Professional's bar and pie charts allow you to make data comparisons for each record. Grids allow you to see continuous change of your data across an area.

The Thematic Map feature uses a wizard made up of a series of three dialog boxes to help you choose the type of thematic map you want, the table(s) and fields that will be used to construct the map, and a variety of options to customize your map.

MapInfo Professional's thematic templates make it easy to start constructing a theme. Just choose a template that represents the type of thematic map you want. The templates are fully customizable and can be saved as new templates for future thematic mapping needs. More than 40 templates ship with MapInfo Professional.

Comparison of Senior Population to Total U.S. Population



Planning Your Thematic Map

Before you create a thematic map, it is important to know about the elements that make up a thematic map and how to put them together. This section will discuss thematic variables, where you can obtain your data, using data from the same table or another table, and the arrangement and display of thematic layers.

What is a Thematic Variable

The data that you display on your thematic map is called the thematic variable. Depending on the type of thematic analysis you are performing, your map can show one or more thematic variables. Ranges of values, grid shading, graduated symbols, dot density, and individual values maps all examine one variable. With bar or pie charts, you can display more than one thematic variable at a time.

A thematic variable can also be an expression. Choose Expression from the field list in place of a data field to construct a statement that derives information from the data in your table(s). Although an expression can be made up of more than one variable (e.g., POP_1990 – POP_1980), for purposes of thematic mapping, a complete expression is equivalent to one thematic variable. See [Querying Your Data in MapInfo Professional in Chapter 8 on page 282](#), and [Creating Expressions in Chapter 15 on page 525](#), for more detailed information.

You can also create bivariate thematic maps, where one map object, such as a symbol, represents two different pieces of data. The symbol color, for example, can represent one thematic variable, and the symbol size can represent another.

Where to Obtain the Data

Before you begin your thematic map, you need to decide what information you want to display and locate where that information resides. It can either be in the table on which you are basing the map, or it can be in another table.

If the data is in the same table on which you are basing the map, choose the desired field directly in the Field list box in the Thematic – Step 2 of 3 dialog box.

If the data is in another table, you must first bring the data into the table on which you're basing the thematic map. This requires creating a temporary column using Update Column.

Each situation is described in the next few sections.

Using Data from the Same Table

If you are using data from the same table, choose the table and field on which you want to base your thematic map in the Thematic – Step 2 of 3 dialog box.

For example, you have a table of parking meters that contains the location of the parking meter and the last time the parking meter was emptied. Using Individual Values you want to shade the parking meter symbols according to the last time each meter was emptied. MapInfo Professional will assign a color to each time. In Step 2 of 3, choose the parking meter table as your table, and choose the field that contains the time each meter was emptied.

Using Data from a Different Table

The Join feature within the Thematic – Step 2 of 3 dialog box enables you to use data from other open tables to create a thematic map. Choose Join in the Field list box to display the Update Column dialog box where you can create a temporary column in the base table.

The temporary column can contain data taken directly from the other table, or you can aggregate the data to create derived information for the temporary column.

For example, you have two tables: a table of county boundaries and a table of police stations. You want to shade the table of county boundaries according to the number of police stations in each county.

To do this, all the information you want to use must be in the county table. Therefore, you must add police station data to this table.

Using Update Column, you create a temporary column in the county boundaries table that will store the police station information. To create this column, the two tables must have a link so that MapInfo Professional can access the data that goes into the temporary column. The link can either be a matching field (like county name), or you can make the link geographically (police stations contained within counties).

An example later in this chapter explains more about Update Column.

Methods of Thematic Mapping

When you create a thematic map in MapInfo Professional, the thematic shading is added to your map as a separate layer. It is drawn on top of the base map layer.

Separating Thematic Layers

Separating thematic layers from the base map layer provides you with several important options:

- Graduated symbol thematic maps do not require that your base map contain point objects. Instead, graduated symbol objects are built regardless of the map object type. Therefore,

even if your base map contains region or line objects, you will still be able to create a graduated symbols map.

- You can have multiple thematic layers per base map layer. In some cases, you do not have to add another base layer to the map to create another thematic layer. You can display more than one thematic layer at a time, as well as perform bivariate thematic mapping.
- You can use Layer Control to turn the display on or off for a given thematic layer. The layer it is based on can continue to display. You can also set individual zoom layers on thematic maps.

Ordering of Thematic Layers

To display thematic layers properly, they must be in a specific order. This is especially important when you want to display more than one thematic layer at a time. For example, you would want pie or bar charts for an area map to display on top of regions that are shaded in order to see them.

The following lists the order of map layers from top to bottom (note that map layers are drawn from the bottom up):

1. Pies, Bars, or Graduated Symbol thematic layer.
2. Dot Density thematic layer.
3. Ranged thematic layer – where Color or Size Attributes are applied.
4. Ranged (or Individual Value) thematic layer – where All Attributes are applied.
5. Major layer or base layer.
6. Grid thematic layer.

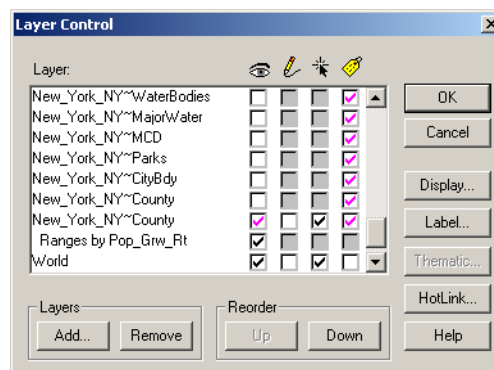
When you create a new thematic layer, MapInfo Professional automatically inserts it into its proper place.

Displaying Thematic Layers

You can turn the display on and off for thematic layers the same way you can for other map layers. All the display settings in Layer Control are also applicable to thematic layers, enabling you to set a zoom level for each thematic layer. You can also access the Modify Thematic Layer dialog box through Layer Control by clicking the **THEMATIC** button.

Thematic layers are always drawn after their base layer. Therefore, they appear above their base layer in the Layer Control list, and are indented to distinguish them from other map layers.

Layer Control (Showing Thematic Layer above Base Map)



Thematic layers are displayed in the list with this naming convention:

```
<Thematic type> with/by <variable-list>
```

The type of thematic map is noted first, followed by the list of variables used to create the map. For example, a pie thematic layer that uses commuting data is listed this way:

```
Pies with ComAlone, ComCarpool...
```

The variable list is truncated if there is not enough room to display each variable used in your thematic analysis.

Types of Thematic Maps

With MapInfo Professional you can create seven types of thematic maps, as listed under Type in the Step 1 of 3 dialog box.

- Ranges
- Bar Charts
- Pie Charts
- Graduated
- Dot Density
- Individual
- Grid

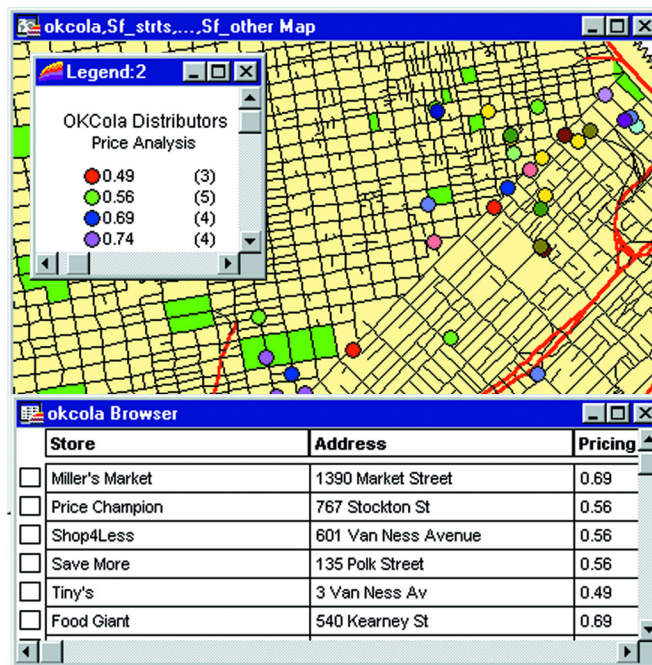
Each has its own purpose and unique attributes. For example, using Ranges of Values, you could thematically shade a map of the world according to population density. You could shade the countries with graduated shades of red, the darkest red representing the most densely populated countries, and the palest red representing the least densely populated countries. At a glance you can see the distribution of the world's population.

You are not limited to representing numeric values with thematic mapping. Nominal values also may be shaded thematically. For example, you have a table of underground cables. Those cables that haven't been serviced in the past six months are labeled priority status. Using Individual Values, you can shade the cables according to their repair status. All records with the same value will be shaded the same.

See the individual sections later in this chapter for more information on each type of thematic map.

The following sections offer general information on the methods available for creating thematic maps. For more information on any of these methods and options, see Thematic Mapping in the *Online Help*.

Individual Map Values



Individual Values maps show points, lines, or boundaries that are shaded by individual values contained in a particular field. You can use both numerical and nominal values in individual values maps. MapInfo Professional gives each unique value its own color or symbol. When an individual values map uses symbol types, the symbols are taken from the base table.

For example, a soft drink distributor maintains a table of the supermarkets that buy soft drinks from him. Each supermarket sells the distributor's brand of soft drink for a different price. If the distributor shades the supermarket points by price, using individual values, all stores that sell the soft drink for 49 cents are shaded one color, all stores that sell the soft drink for 51 cents are shaded another color, and so on. Each unique value is assigned its own color. The distributor is able to see the price distribution among the supermarkets and can determine where he should increase his sales volume, based on the price.

If you are shading your points, lines or boundaries using nominal data, you can shade *only* by individual values. Nominal data is either non-numerical data (name, type of cuisine served, or brand of automobile sold) or numeric data where the numbers represent non-numeric data like an ID number. Dates are considered numeric data and can be used in both ranged and individual values maps.

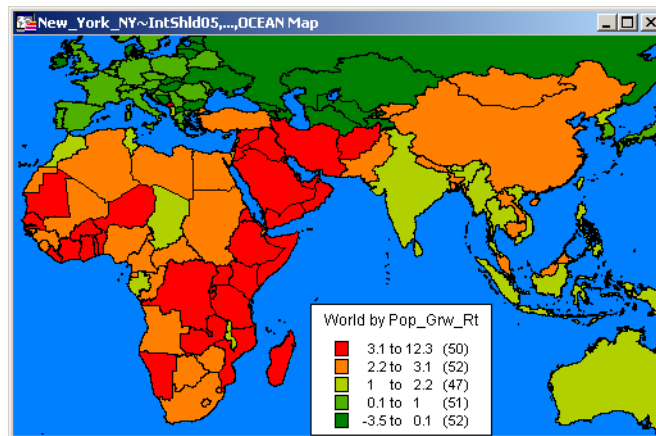
For example, you have the results from a consumer survey. One question on the survey reads "What is your favorite Sunday afternoon activity?" The possible responses are:

1. Sleeping
2. Watching TV
3. Taking a drive
4. Reading
5. Playing or watching sports
6. Visiting museums or art galleries

7. Going to the movies

You want to shade each consumer point with the response for the favorite Sunday activity. The SUNDAY column of your table contains the number that corresponds to the consumer's favorite activity. However, the numbers in this column do not represent quantitative values. Going to the movies is not greater than Playing or watching sports even though $7 > 5$. When numbers are used as names instead of values, you must shade your objects by individual values. The numbers are only used to reference the pastimes so color can be assigned to them.

Ranged Maps



When you create a ranged thematic map, MapInfo Professional groups all records into ranges and assigns each record's object the color, symbol, or line for its corresponding range. For example, you have a table of weather stations for your television viewing area, and you want to shade the locations according to their reported snowfall amounts.

With the Ranged map feature, MapInfo Professional groups the snowfall amounts into ranges. For instance, all weather stations that received between zero and five inches of snowfall in the past month are grouped into one range. Stations receiving between five and 10 inches are in a separate range. Sites that received between 10 and 15 inches are in a third range, while those stations reporting greater than 15 inch snowfall amounts are in a fourth range.

All records are assigned to a range and then assigned a color based on that range. For instance, the weather stations reporting the 15 plus inches of snow are shaded red. The other ranges are shaded in lighter shades of red with the last range in gray (default colors). When you display the map, the colors make it readily apparent which locations received the most and least snow accumulation.

Ranges are also useful when the size of the region is not directly related to the magnitude of the data values. In our population density example in this section, we see that countries that are small in size can be very densely populated, and countries that are large in size may not be densely populated. Differences like these are more readily apparent when the regions are shaded in this manner.

Types of Ranged Values

MapInfo Professional can create ranges automatically using five methods: Equal Count, Equal Ranges, Natural Break (Standard Deviation), Quantile, and Custom. To set ranges manually, use Custom.

Equal Count has the same number of records in each range. If you want MapInfo Professional to group 100 records into 4 ranges using Equal Count, MapInfo Professional computes the ranges so that approximately 25 records fall into each range, depending on the rounding factor you set.

When using Equal Count (or any other range method), it's important to watch out for any extreme data values that might affect your thematic map (in statistics, these values are referred to as *outliers*). For example, if you tell MapInfo Professional to shade according to Equal Count with this database:

John	5000	Andrea	7000
Penny	6000	Kyle	5500
Miguel	4500	Angela	7500
Linda	5000	Elroy	6000
Ben	100	Mark	7000

Ben and Miguel are grouped in the same range (since they have the two lowest values). This may not produce the results you want since the value for Ben is so much lower than any of the other values.

Equal Ranges divides records across ranges of equal size. For example, you have a field in your table with data values ranging from 1 to 100. You want to create a thematic map with four equal size ranges. MapInfo Professional produces ranges 1–25, 25–50, 50–75, and 75–100. (Since ranges use “=>” and “<=”, they need to overlap.)

Keep in mind that MapInfo Professional may create ranges with no data records, depending on the distribution of your data. For example, if you tell MapInfo Professional to shade the following database according to Equal Ranges:

John	100	Andrea	90
Penny	6	Kyle	1
Miguel	4	Angela	92
Linda	95	Elroy	89
Ben	10	Mark	10

MapInfo Professional creates four ranges (1–25, 25–50, 50–75, and 75–100). Notice, however, that only two of those ranges (1–25 and 75–100) actually contain records.

Natural Break and Quantile are two ways to show data that is not evenly distributed.

Natural Break creates ranges according to an algorithm that uses the average of each range to distribute the data more evenly across the ranges. It distributes the values so that the average of each range is as close as possible to each of the range values in that range. This ensures that the ranges are well-represented by their averages, and that data values within each of the ranges are fairly close together.

Quantiling enables you to build ranges that determine the distribution of a thematic variable across a segment of your data. For example, you can quantile state population by urban population to illustrate how urban population is distributed across the United States. Your legend will not indicate that you have used Quantile to build your ranges. You can customize the legend so that it shows which field you used to quantile the table.

When you create ranges using **Standard Deviation**, the middle range breaks at the mean of your values, and the ranges above and below the middle range are one standard deviation above or below the mean.

You can also define your own ranges using Custom.

Customizing Range Styles and Inflection Point

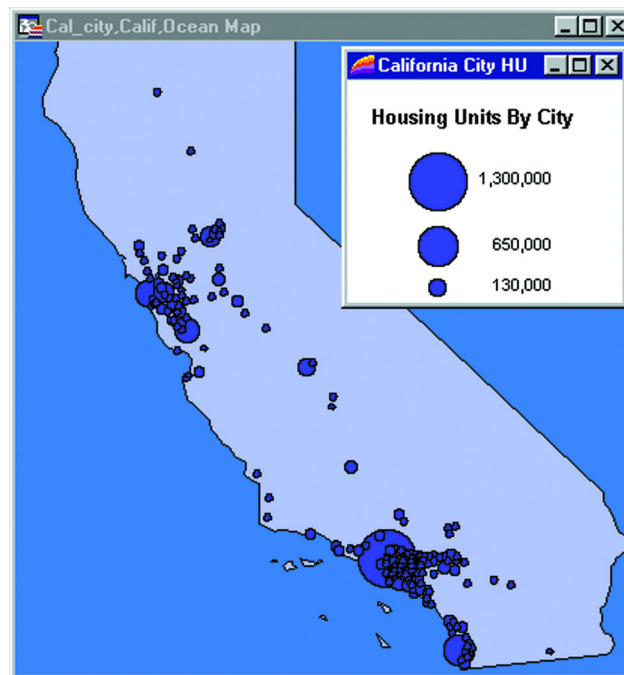
When you customize range styles, you can choose which attributes to display on your map: color, size, or all attributes. The size attribute becomes available when you are working with point and line data. You can change the size of each symbol, or use graduated symbols to represent your ranges.

Another effective way to customize the display of ranges of data is by inserting an inflection point between ranges. An inflection point is a color style that provides you with a second interpolation of your data. This option is useful for showing two sets of contrasting information, like data that contains positive and negative values such as profit and loss figures, or population growth.

The colors of the top and bottom ranges spread to, but never reach, the inflection point color. They only approach the inflection point. For example, if the inflection point is white, and the top and bottom range colors are blue and red respectively, the color spreads from blue to white, and from white to red. The ranges closest to the inflection point are either very pale blue or red, but they never actually become white.

See [Using an Inflection Point to Show Distinction in Chapter 9 on page 333](#) for more on using an inflection point.

Graduated Symbol Maps



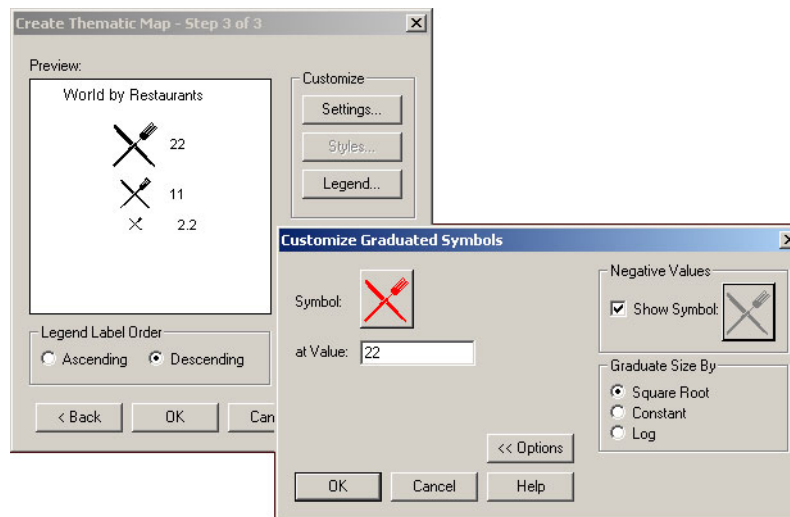
Graduated symbol maps use symbols to represent different values. You can use graduated symbols regardless of the type of map object with which you are working.

For instance, use graduated symbols to show the number of housing units by city. When you select the graduated symbols option, MapInfo Professional varies the size of each symbol according to the value in the sales order field. You can also represent how much interest each customer has expressed in a given product by assigning a symbol whose size is proportional to the customer's interest.

Graduated symbols maps work best when you use numeric data. If you are working with a layer of restaurants, it makes no sense to create graduated symbols based on the type of cuisine each restaurant serves. However, graduated symbols are appropriate when you want to show the number of hamburgers sold at 20 different fast food restaurants.

There are three attributes you can customize on a graduated symbols map: the color, type, and size of the symbol. To change the symbol's attributes in Thematic Step 3 of 3, choose **CUSTOMIZE SETTINGS** and click the symbol icon in the Customize Graduated Symbols dialog box to access the Symbol Style dialog box. The default symbol is a red circle.

Customize Graduated Symbols



In the Customize Graduated Symbols dialog box, the size of the symbol in the Symbol box is the size for the value listed in the at Value box. All values between the high value and zero have interpolated point sizes. If you want the symbols at the low end to be larger, increase the point size.

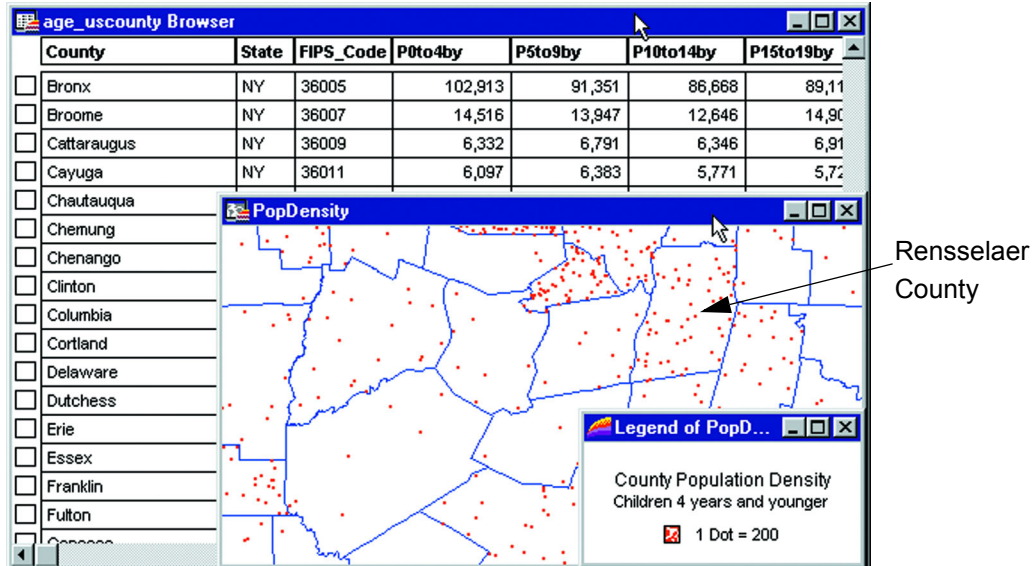
You can also display symbols for negative data values. To change it, click Options in the Customize Graduated Symbols dialog box. There is a separate symbol picker so that you can make this symbol as distinct from the symbol for positive values as you want. When you click the icon a different Symbol Style dialog box displays, enabling you to choose a different symbol type, change the color or the size, or change any combination of the three attributes. The default symbol for negative values is a blue circle, and all values between zero and the low value (a negative number) also have interpolated point sizes.

Dot Density Maps

Dot density maps use dots to represent the data value associated with a boundary or region. The total number of dots in a region represents that region's data value. If you have 10,000 senior citizens in a county, and each dot represents 100 senior citizens, there would be 100 dots in the county boundary.

Dot density is particularly useful for showing raw data where one dot represents a large number of something: population, number of fast food restaurants, number of distributors who carry a brand of soda, etc.

For example, if you have a table of age demographics broken down into postal codes, you could use the dot density option to show the concentration of small children in each postal code boundary.



There are three customizing options for dot density maps. You can specify the value of one dot. For example, you have a table of population statistics, broken down by county. There are 10,000 pre-school students in Rensselaer County, New York. If you display Rensselaer County according to the number of pre-school students using the dot density method, each dot could represent 200 students. In that case, there would be 50 dots in Rensselaer County. You can specify the number of units each dot represents using the Customize Dot Density Settings dialog box.

When you increase the value each dot represents, you decrease the number of dots that display on the map. You could modify your dot density map so that one dot represents 400 students. In that case, there would only be 25 dots in Rensselaer County.

A second option is to change the size of the dots according to your needs, either large or small. If you are working with large populations, or large counts of something, make the dot size smaller so that the distribution of dots is easier to see. Conversely, if you are working with a small data set, making the dot size larger might illustrate your analysis more clearly.

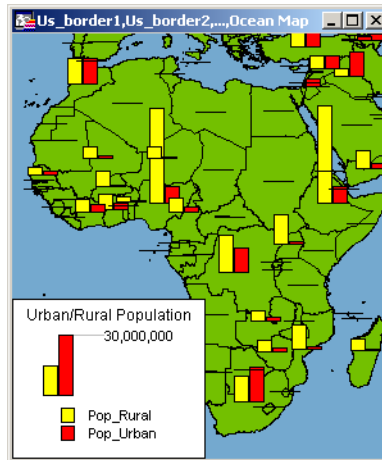
Note: Distribution of dots is random within the region. If you shade states according to population, the dots for New York are spread out throughout the state; they are not concentrated in New York City, where the majority of the state's population lives.

Thirdly, in the Customize Dot Density Settings dialog box, change the color of the dot to either red or black to add more variety to the final map. You can create multiple dot density maps on the same layer by varying these options.

Bar Chart Maps

Unlike thematic maps for single variables such as ranges of values or graduated symbols, a thematic bar chart map allows you to examine more than one variable per record at a time. A bar chart is built for every map object at the centroid of the object, enabling you to analyze the thematic variables in a particular chart by comparing the height of the bars. You can also examine the same variable across all the charts in your map.

For example, you have a table of country boundaries of Africa containing the urban and rural populations, you can create a thematic map that displays a two-bar chart for each country: one bar representing the rural population, and the other representing urban population. You can compare the relative population, or you can examine several countries and compare one country's population growth over another's. For best results, use no more than four to six bars per bar chart in your analysis.

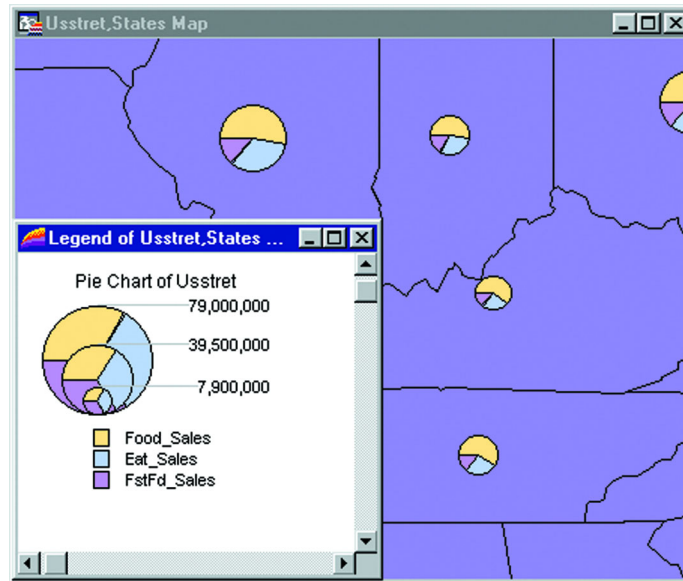


You can customize the color of each bar, create a frame around each chart, and fill the empty space inside the frame with a pattern or color. In addition, you can change the bar chart's orientation, such as displaying horizontal bars instead of vertical (the default). You can also control where to display the chart: over the object's centroid (the default) or any of eight other locations.

You can also change the type of bar chart. In our example, you can create a multi-bar chart, where each thematic variable has its own bar, or a stacked bar chart with each thematic variable on top of one another, or a graduated bar chart, where the bars are graduated in size based on some value. You can also scale the bars in a multi-bar chart independently from one another. To show negative values in a bar chart map, the bars extend in the opposite direction to the chart's orientation. Note that negative values do not display in stacked bar charts.

Pie Chart Maps

Thematic mapping using pie charts also enables you to examine more than one variable per record at a time. Like comparing the height of the bars in bar charts, in pie charts you compare the wedges in a single pie, or examine a particular pie wedge across all of the pies. Pie charts also enable you to compare parts of a whole.



Both pie and bar charts are particularly useful for analyzing demographic data. For example, you have a table of demographic information for the United States. Your table shows the populations of several major demographic groups. Using pie charts, you can show the population of each demographic group, and see what fraction of the pie it makes up in each pie. This enables you to see the distribution of demographic groups on a per state basis, or across the entire United States. You can also look at one demographic group and see how the population of the group varies in different states. For best results, use no more than four to six pie wedges per pie chart in your analysis.

You can customize the color of each pie wedge as well as the borders of the wedges and the whole pie. You can also specify the angle at which you want to place the first pie wedge, and whether the variables go in a clockwise or counterclockwise direction. Like bar charts, you can also change the pie's orientation. The default is to place the pie over the centroid of the object.

You can choose from graduated pies or half pies. Graduated pies will graduate the size of the pies according to the sum of their components. With half pies your data will be distributed across half a pie instead of a whole pie.

Working with Your Thematic Maps and Legends

This section covers changing and saving thematic map information and thematic legends.

Modifying a Thematic Map

Once you create your theme, it is likely that you will want to change something about it. MapInfo Professional provides two ways to reach the Modify Thematic dialog box where you can customize a variety of settings, styles, and legend components.

To modify a thematic map, do one of the following:

- On the **MAP** menu, click **MODIFY THEMATIC MAP**
- Double-click the theme's legend frame within the legend window to display the dialog box.

When you are modifying a map, a quick way to change a number of settings at once is to change the template of the current theme.

To merge a template into your current map:

1. On the **MAP** menu, click **MODIFY THEMATIC MAP** to display the Modify Thematic Map dialog box.
2. In the Modify Thematic Map dialog box, click the **MERGE** button in the Templates group. The Merge a Template into the Current Theme dialog box displays with a list of the same type templates as your theme (all range of values templates, for example.)
3. Choose the new template and click **OK** to return to the Modify Thematic Map dialog box.
4. Click **OK** again to display the map with the new thematic template. The settings in this template will now be applied to your theme.

The Merge feature is only available once you have created the thematic map.

Saving Your Thematic Settings

MapInfo Professional provides a way to save your themes and the templates from which you created them.

Saving Thematic Map Layers

To save your thematic maps, on the **FILE** menu, click **SAVE WORKSPACE**. A workspace is a listing of all the tables and settings used in a map. When you open the workspace, MapInfo Professional opens the tables and re-creates the thematic map. If you close a table or Map window without saving your session to a workspace, MapInfo Professional displays the Save Map Objects dialog box and prompts you to do so. The dialog box indicates what types of objects will be lost (e.g., thematic layers, label layers) if you do not save your session to a workspace. You can turn off the warning prompt in Map Window preferences.

Saving Thematic Templates

Every thematic map begins with a template from which you can then customize for your particular needs. These settings can be saved for future use. In the Create Thematic Map – Step 3 of 3, choose the **SAVE AS** button in the Template group box. The Save Theme to a Template dialog box displays. To save your new settings to the existing template, click **OK**. To retain both the new and the original template, type a different name into the Name field. To recover any template that ships with MapInfo Professional, copy it from the \THMTMPLT directory on the product CD. Templates have the extension .THM. In MapInfo Professional 7.5 files are stored on a per-user basis.

For individual value themes you can also save the actual categories in a theme template. For example, if you choose to build an individual value theme on a table to show land usage, you can assign a different region style to each type of land usage (commercial, forest, residential, farm land etc.). You may then want to take those same assignments and apply them to another table. You can do this by storing the category in a template, it will be associated appropriately when the template is applied to the second table.

To save individual categories in a theme template when creating a new thematic map or for an existing thematic map, from the Modify Thematic Map dialog box press the **SAVE AS** button and specify a template Name. Check the **SAVE INDIVIDUAL VALUE CATEGORIES** box and click **OK**. A template is saved that can be used to apply the stored individual categories to a second table. When you choose **MAP** menu and click **CREATE THEMATIC MAP** the template's name will appear in the Template Name field of the Create Thematic Map - Step 1 of 3 dialog box.

Updating Column Information using Thematic Mapping

As explained earlier in this chapter, you can use data from another table to construct your thematic map using Update Column.

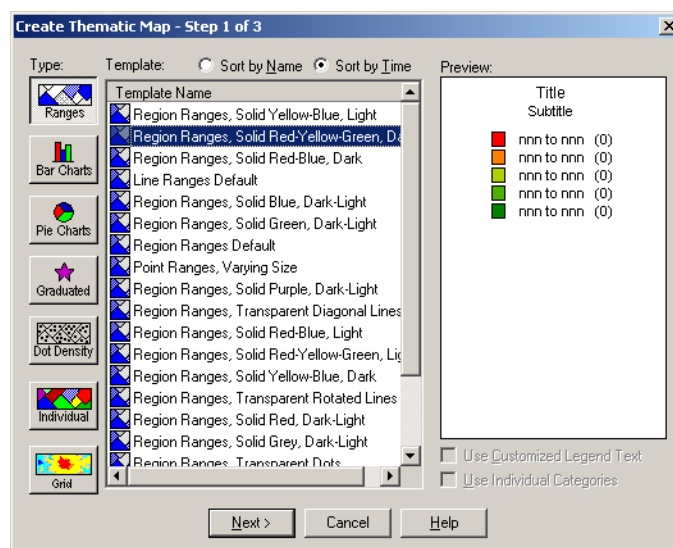
Update Column creates a temporary column in your base table and automatically inserts data into it for your map. This data can be a field taken directly from another table, or aggregated from other data.

For example, you have a table of U.S. state boundaries and a table of U.S. city point locations. Using ranges of values you want to shade the STATES table according to the percentage of each state's population living in urban areas. For MapInfo Professional to calculate this percentage, the population for the cities must be in the STATES table.

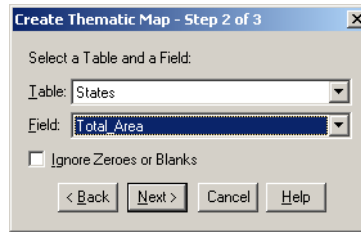
Note: Some of the files used in this example may be from the MapInfo Professional Tutorial data and is only available from the MapInfo web site, www.mapinfo.com/miprotutorial.

To create a temporary column using Update Column:

1. Open the base table (STATES.tab) and the city table (CITY_125.tab).
2. On the **MAP** menu, click **CREATE THEMATIC MAP**. The Create Thematic Map Step 1 of 3 displays.



- Choose **RANGES** and select a template name from the list. This will be the style of the thematic map you are creating. Click **NEXT** to continue. The Create Thematic Map Step 2 of 3 dialog box displays.



- Choose **STATES**, since this is the table you want to shade and in the Field drop-down list, choose **JOIN**. The Update Column for Thematic dialog box displays.

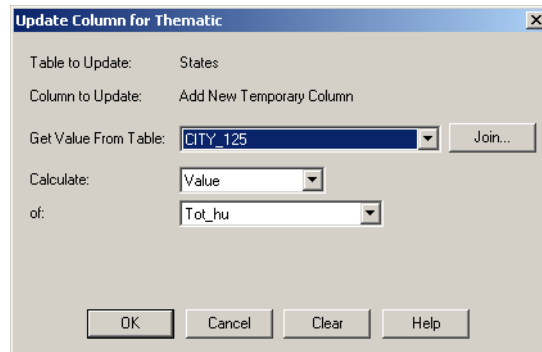


Table to Update is already set to STATES and Column to Update is automatically set to Add New Temporary Column.

- Select the **CITY_125** in the Get Value From Table box. If that is the only other table open, MapInfo Professional automatically displays its title in the list box.

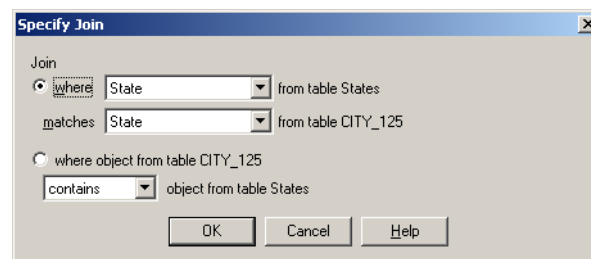
Note: When you create a temporary column for a thematic map, the field must be a numeric field. This is true for all thematic maps except individual values.

Since in our example, we are looking for the percentage of the population living in urban areas in the United States, we need to calculate the total of the CITY_125 population; that is, we must calculate the total of the population of each city in a each state. We need to put that sum into the temporary column.

- In the Calculate box choose **SUM**. In the of box, choose **TOT_POP**.

To put the data from the CITY_125 table into the temporary column of the STATES table, there must be a link between the two tables that MapInfo Professional can use to access the data. MapInfo Professional can often make this link automatically. In this example, both our tables have a State field.

- Click **JOIN** to display the Specify Join dialog box.

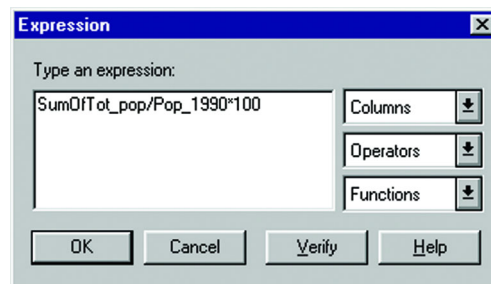


When you choose Join in the Update Column for Thematic dialog box, you can see that MapInfo Professional has already set up the Specify Join dialog box with the STATE fields from both tables. If the join were not calculated automatically it would be necessary to specify the matching fields or geographic join.

8. Choose **OK**. MapInfo Professional calculates the sum and returns you to the Thematic – Step 2 of 3 dialog box. The Field list box displays the temporary column you created: SumOfTot_pop.

However, before we create the map, we still need to calculate the percentage of the total population of each state that is urban. That information does not exist as a field in the table, so you must build an expression to generate it.

9. In the field drop-down list, select **EXPRESSION**. The Expression dialog box displays.

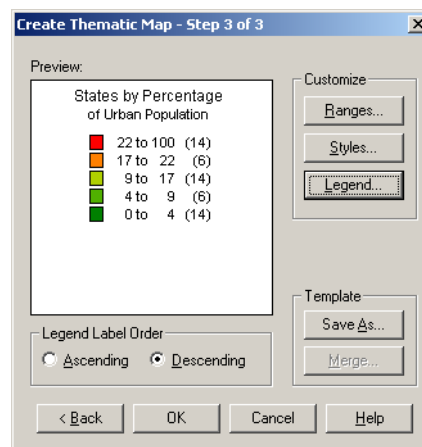


The expression $\text{SumOfTot_pop}/\text{Pop_1990} * 100$ will give you the answer as a percent.

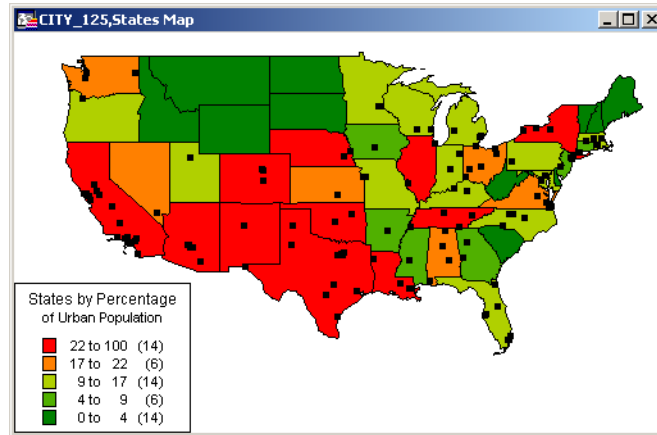
10. In the Type an expression box, type:

$\text{SumOfTot_pop}/\text{Pop_1990} * 100$

11. Choose **VERIFY** to ensure that your syntax is correct, and then choose **OK**. The Create Thematic – Step 2 of 3 dialog box redisplay showing the expression you created. Choose **NEXT** to go on to the Create Thematic Map Step 3 of 3 dialog box.



12. Click the **RANGES** button and choose either **EQUAL COUNT** or **EQUAL RANGES** to customize the ranges, whichever gives you the best representation of your data. Use Round By to round to a decimal place or whole number. Customize the styles to best illustrate your analysis by clicking the **STYLES** button. Customize your legend by clicking the **LEGEND** button.
13. Click **OK** to display your map in a Map window.



Bivariate Thematic Mapping

Bivariate thematic mapping uses point or line objects to represent two thematic variables. For example, a star can represent one variable, such as the number of teenagers, while a blue fill for the star represents their annual purchase amounts.

To create a bivariate map in MapInfo Professional, you create two thematic maps, and layer one over the other so that the objects display two variables.

Types of Maps and Variables

The only types of thematic maps suitable for bivariate mapping are ranged and individual values maps. You can choose between two combinations for a bivariate map, depending on your data:

- two ranged maps
- one ranged map and one individual values map

Prism maps can also be used for bivariate theme mapping. See [Bivariate Prism Maps on page 350](#) for more information.

If you have a non-numeric variable, one of your maps must be an individual values map. You cannot create a bivariate map with two non-numeric variables.

Displaying Attributes of a Symbol

To display two variables within one symbol, it is important to choose a different symbol attribute for each variable. For example, you cannot choose color for both variables because one color will overwrite the other. Choose from the following combinations:

- Color and symbol type
- Color and size
- Size and symbol type

Symbol type should only be used for nominal or non-numeric data, as there is no inherent association between a symbol type and a quantity.

Example of Bivariate Thematic Mapping

To illustrate this process, suppose as a sales manager you want to know which businesses have generated the most sales in your territory. You have a table of customers with their total sales and sales representative.

First, you must decide what combination of thematic maps to use. Because you are working with sales representatives (non-numeric data) and total sales (numeric data), you must create both an individual values map and a ranged map.

Second, decide how you want to display the data. You can use a combination of color and size attributes to display your thematic variables. You want to assign a color to each sales representative and use a different size symbol to represent each range of sales figures. Note that this is different than a graduated symbols map, where the symbol is scaled to one value. Here, the size of the symbol represents a range of values.

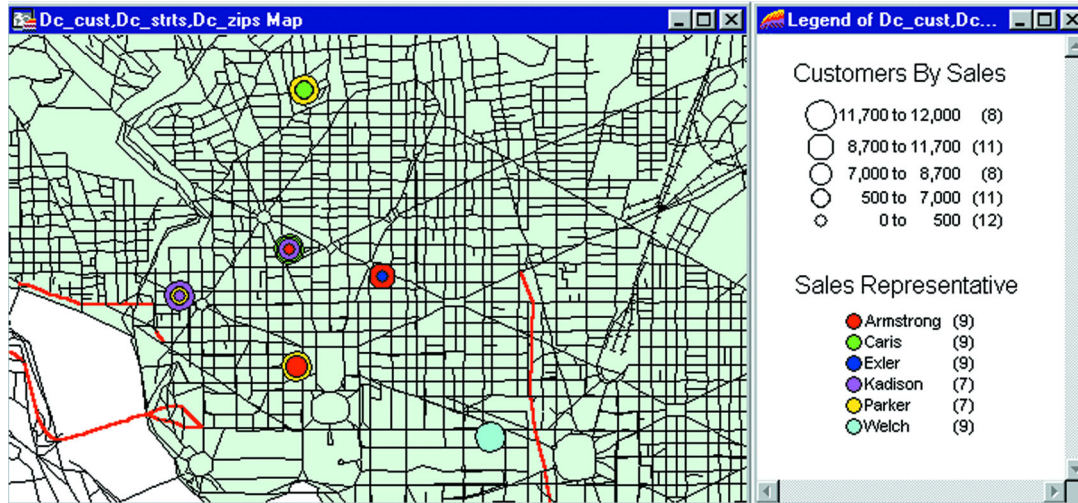
Third, you must create a separate thematic map for each variable. For the Individual Values map, use the table of customers as the table and choose Sales_rep as the field to which to assign values. MapInfo Professional assigns each sales representative a different color.

Next, create a ranged thematic map that shows the customers' total sales. Choose the Customer table as the table, and choose Sales as the field. Divide the total sales into six ranges with approximately the same number of customers in each range. In the Thematic- Step 3 of 3 dialog box choose the **RANGES** button, change the number of ranges to six, and verify that the type of range is set to Equal Count.

To show the ranges as sized symbols, choose Styles in the Thematic- Step 3 of 3 dialog box. In the Autospread Group choose **SIZE**. The symbols in the Styles group change to graduated size. However, the only variable you want to display is size, as the symbols' color is coming from the individual values map. Choose **OPTIONS** to display the Apply group and choose the **SIZE** button again.

Note that the selection in the Apply group overrides any selection you make in the Autospread group. To specify or change which symbol attributes display, you must choose **OPTIONS**, and choose the **COLOR** or **SIZE** button in the Apply group.

The symbols become hollow circles that are graduated in size. Choose **OK**, and your ranged map draws over the individual values map. The symbol color from the individual values map indicates the sales representative, and the size of the symbol represents a range of total sales figures. The map legend lists the bivariate map as two separate thematic maps, in effect displaying two legends. The legend does not combine the two variables.



Note: If you do not see both variables displayed on the map, make sure your variables did not overwrite each other. Also check Layer Control to see that the Display box is checked on both maps.

Using an Inflection Point to Show Distinction

In thematic mapping, an inflection point is a color style you insert between ranges. It provides a second way to interpret your data.

The inflection point is placed where there is a distinct marker between the ranges of values above it and the ranges of values below it, or where a numeric shift in your data occurs. Most often, the inflection point is inserted as close to the zero value as possible, since zero marks the shift between positive and negative values, or at the mean of your data values.

The inflection point enables you to see this shift on your map. You see two different color spreads in your ranges. Instead of spreading toward each other, the top and bottom range colors both approach the color of the inflection point.

Another type of inflection point map is a grid surface thematic map. Here every color that displays in the legend is an inflection point. Values that fall between these inflection points display with a blend of the two colors. This allows you to see a continuous gradation of color across the map. See [Working with Grid Surface Maps on page 336](#) for a discussion on this type of thematic map.

Example of an Inflection Point Map

To show positive and negative population growth in the United States, you can insert an inflection point close to where the zero value is in your ranges. The top and bottom range points will spread, or graduate, toward the inflection point: one for increased population, and one for decreased population.

For a detailed description of the figures involved in this process, see [Updating Column Information using Thematic Mapping on page 328](#). Since here we are focussing on the Inflection Point options, the process will cover that aspect of this map in more detail.

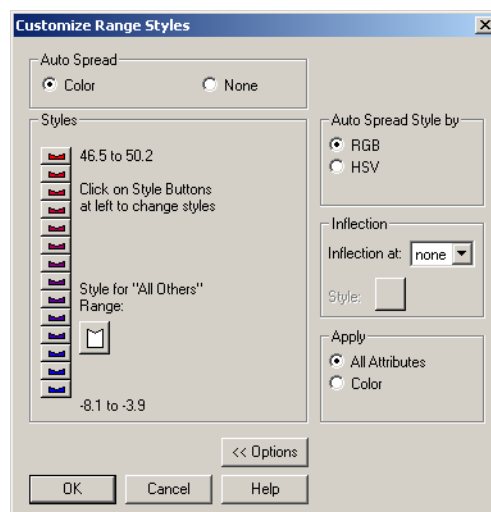
To enhance a map using an inflection point:

1. From the Create Thematic Map Step 1 of 3 dialog box select Ranges and a template type. Click **NEXT** to display the Create Thematic Map Step 2 of 3 dialog box.
2. Create an expression to show population growth. For this example, we are using the expression $(POP_1990 - POP_1980)/POP_1980 * 100$. Choose **NEXT** to display the Create Thematic Map Step 3 of 3 dialog box.
3. Click **RANGES** to customize the ranges. For our example, choose **EQUAL RANGES**, and set the number of ranges to **14**.

When you use an inflection point, it is important that your data distribute well across the ranges. You may want to increase the number of ranges, or compare the distribution of the data between Equal Count, Equal Ranges and Natural Break to see which gives the best representation of your data.

You may also want to use **CUSTOM** to adjust the range values so that zero is the minimum value in one range, and the maximum value of the range below it. This is optional.

4. After you complete these changes click **OK**. The Create Thematic Map Step 3 of 3 dialog box redisplay.
5. Click **STYLE** to choose the style for the ranges. Choose **OPTIONS** to display the Inflection options.



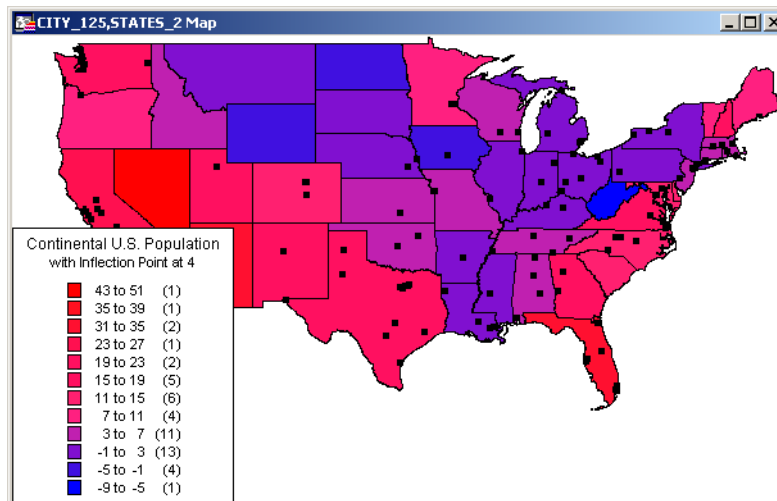
6. Determine where among the ranges the inflection point should lie and specify the range position for the inflection point. Examine the preview before you create the inflection point to locate where you want to place it. When you choose an inflection point, you must choose a number that identifies the position of a range in the legend. Count the ranges in the preview legend until you get to the range with a zero at one of its ends. If your Legend Label Order is Descending, count the ranges up from the bottom. If it is Ascending, count down from the top. You can keep the default color spread between the ranges (red to blue), or you can choose a different color spread. For this example, keep the top range at red, and change the bottom range to blue. In the Inflection at box, choose 2 for the second range, as you determined above. The default is None, meaning no inflection point.

- Set the style for the inflection point and click **OK** to return to the Create Thematic Map Step 3 of 3 dialog box.

To choose the style for the inflection point, click inside the **STYLE** box in the Inflection group. The Fill Style dialog box displays. Select the color for the inflection point and click **OK**. The default style is a white fill with no pattern.

Preview your legend in the Thematic – Step 3 of 3 dialog box. Your legend does not show explicitly where the inflection point is, as your range colors only approach the inflection point. You can, however, add the inflection point to the legend title or subtitle.

- Click **OK** to create the map with the inflection point you created.



Working with Legends

Legends are an important part of making your map understandable to your audience. In MapInfo Professional, you can create two kinds of legends: cartographic and theme legends. Theme legends are those associated with thematic maps. Cartographic legends enable you to create a legend for any map layer(s) in your Map window. The combination of the two types makes it possible to provide cartographic data for all of your map layers.

What are Cartographic Legends?

Cartographic legends display cartographic data for a map layer. A legend is created for each layer in your Map window that you choose to include in the legend. Cartographic legends can be displayed in a layout, expanding MapInfo Professional's presentation capabilities. You can create a legend for an individual layer, giving it particular emphasis, or you can place legends for several layers in one legend window. You can also customize many elements of the cartographic legend and the legend window, including the window title, legend frame borders, and the legend title and subtitle.

Here is a brief description of how to create a cartographic legend:

1. On the **MAP** menu, click **CREATE LEGEND**. The Create Legend – Step 1 of 3 dialog box displays.
2. Select the layers you want to use in the legend and click **NEXT**. The Create Legend – Step 2 of 3 dialog box displays.
3. Specify the legend properties and legend frame defaults and click **FINISH** or click **NEXT** to select and set attributes for each legend frame.
 - If you click **FINISH**, your legend displays.
 - If you click **NEXT**, the Create Legend – Step 3 of 3 dialog box displays.
4. Specify the legend frames and give titles to them in the fields provided and click **FINISH** to display your legend.

For more details on the options available in the cartographic legend feature, see [Creating a Cartographic Legend in Chapter 12 on page 434](#).

What are Thematic Legends?

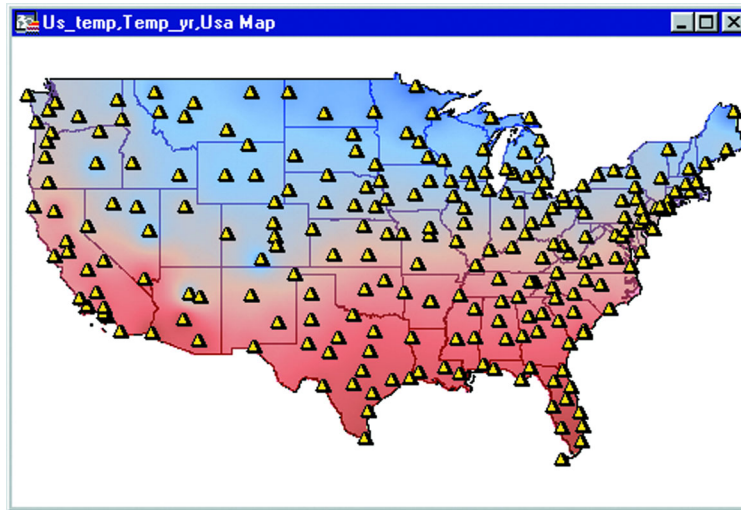
Theme legends are created automatically when you create a thematic map. They provide a key of the colors, symbols, and styles used in the map. Their display is controlled via the Show/Hide Theme Legend Window command in the Options menu. Use the appropriate command in the Map menu to modify them (on the **MAP** menu, click **MODIFY THEMATIC MAP**), or simply double-click the legend to display the Modify Thematic Map dialog box.

If a theme legend is part of a cartographic legend, and you click it to modify it, the Modify Thematic Map dialog box displays. Click the **LEGEND** button to modify the legend. For more on theme legends and thematic mapping, see [Using Thematic Mapping to Analyze Information in Chapter 9 on page 313](#).

Working with Grid Surface Maps

Up to now, the thematic maps we have discussed are based on vector layers. MapInfo Professional takes thematic mapping to a new level with a method that displays data as continuous color gradations across the map. This type of thematic mapping, known as grid mapping or surface theme mapping, is produced by an interpolating point data from the source table. MapInfo Professional generates a grid file from the data interpolation and displays it as a raster image in a Map window.

Grid theme maps are appropriate analytical tools in traditional GIS environments and other industries where the data points have measured values that reflect those locations. For example, use grid shading to illustrate temperature changes, snowfall amounts, or change in elevation. The next figure shows the light to dark gradual transition across the United States, which represents low to high average annual temperatures. The continuous shading allows you to derive measurements at places other than where measurements were taken.



Grid Image Files

Grid mapping produces a file type called a grid image. When you create a grid thematic map using MapInfo Professional's grid handler, MapInfo Professional generates a default file name of *tablename_fieldname* with the extension .MIG (e.g., USELEV_ELEVFEET.MIG). In the Step 2 of 3 dialog box MapInfo Professional displays the path and the root file name, where you can change it as necessary.

MapInfo Professional contains one read/write grid handler and a Grid Engine tool kit that shows you how to create your own. Once you have written a grid engine, you place this file in your MapInfo Professional application directory and set the preference in the Map window dialog box. Specifically, to set the default grid writeable handler, go to the Map window preferences and specify your grid handler file. The available handler formats depend on what grid handlers have been installed. Changing the default grid handler will change the default file extension of the grid file name.

Grid files are stored by default in the data directory specified as a preference. Grid files can be opened from the **FILE** menu, click **OPEN** command like other MapInfo Professional supported file types.

When you open a table that has a grid filename associated with it, MapInfo Professional searches for the file if it cannot find it immediately. For example, the search capability can simplify opening tables if your .tab file refers to an image that resides on a CD-ROM drive, and different letters are used to designate the CD-ROM drive on different systems.

MapInfo Professional uses the following search order:

1. Search for the file where specified by the FILE tag in the .tab file.
2. Search for the file in the same directory as the .tab file.
3. Search for the file in the Table Search path specified in the Directories preferences.

MapInfo Professional either opens the table as though it found the file in the specified location, or it will report an error because the file could not be found in any location.

Grid Handlers

In addition to the MapInfo Professional read/write grid handler (*.MIG) we also supply READ-ONLY grid handlers to support the direct opening of the following grid file formats:

- DEM-USGS ASCII(*.DEM)
- DTED-levels 1, 2, and 3 (*.DT0, *.DT1, *.DT2)
- GTOPO30 (*.DEM)
- MapInfo Vertical Mapper (*.GRD, *.GRC)

You can open these grid file types directly from the Open dialog box. You will see the file extensions listed next to the Grid Image file type in the Files of Type drop-down list in the bottom of the dialog box. Because the handlers are read-only, they cannot be used to create grid files during the thematic mapping process.

If the relief shading option is enabled (Create Thematic Map Step 3 of 3 > **STYLES** > **GRID APPEARANCE**), a separate file will be created to store the hill shade information. The hillshade file is stored in the same location as the grid file and has the same base name as the grid but with the extension ".MIH". If the grid file is read-only, e.g., it's located on a CD, the .MIH files will be created in the same location as the .tab file. The .tab file will contain a new metadata key, for example:

```
"\Grid\Hillshade File" = "d:\tmp\AntiochSouth.MIH"
```

Vertical Mapper Grid Handler

MapInfo Professional also includes the Vertical Mapper Grid handler to enable users who have not purchased the full Vertical Mapper add-on product to open, view, and print Vertical Mapper Grid (*.GRD, *.GRC) format files.

The Vertical Mapper Grid files can also be opened directly in MapInfo Professional. The *.GRD or *.GRC extension is listed with the other Grid Image formats in the Files of Type drop-down list.

Currently, grids using the Vertical Mapper handler cannot be modified in the Modify Thematic Map dialog box. They are read-only. They must be created or modified in the Vertical Mapper source application, which is available from MapInfo. In addition, you cannot create .GRD or .GRC files in MapInfo Professional, however, you can convert *.GRD files to *.MIG files with Gridtools.MBX.

Creating Custom Read/Write Grid Handlers

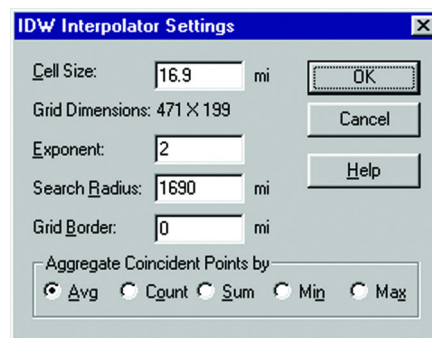
This section shows how to write your own read/write grid handler. MapInfo Professional provides two interpolators for creating grid themes: Inverse Distance Weighting (IDW) and Triangulated Irregular Network (TIN).

IDW Interpolator

The IDW interpolator is best suited for data values that produce arbitrary values over the grid, that is, data that does not have any relationship or influence over neighboring data values, such as population. This method of interpolation also works well for sparse data.

The IDW interpolator calculates the value of grid cells that cover the mapping area. Each data point value from your source table that is considered in the calculation for a cell value is weighted by its distance from the center of the cell. Because the interpolation is an inverse distance weighting calculation, the farther the point is from the cell, the less influence its value will have on the resulting cell value.

MapInfo Professional's grid mapping process begins by determining the minimum bounding rectangle (MBR) of the source table. The grid is divided into equal sized square cells of some size. For example, using the Grid default template, the STATES table in MapInfo Professional's sample data set creates a grid dimension of 200 cells by 303 cells. By calculating the number of cells in the grid and knowing the dimension of the MBR, MapInfo Professional determines that each cell needs to be 18.1 by 18.1 miles square. (Your cell size will be in whatever distance units you have set for the Map window. To change the units, go to the **MAP** menu, point to **OPTIONS** and click **MAP UNITS**).



The settings for the IDW interpolator are controlled via the Settings button in the Step 3 of 3 dialog box. The illustration above shows the settings for the STATES table if you are basing the grid theme on the Grid Default or Grid Gray Default templates that ship with MapInfo Professional. Note the cell size number represents both the height and width of the cell. Any change to the cell size will result in an automatic update of the grid dimensions.

With the cell size and the source points and values known, MapInfo Professional calculates a value for each cell. This value is determined by calculating a distance-weighted average of the points that lie within the specified search radius. Points are inversely weighted by their distance from the center of the cell.

In IDW, the exponent determines how much influence each point will have on the result. The higher the exponent the greater the influence closer points will have on the cell value. Exponents can range from one to 10.

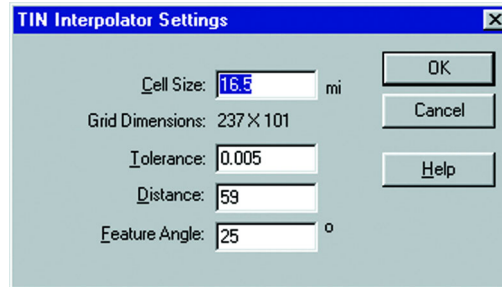
You can also choose an aggregation method for the z-values of source data points that are in the same grid cell. Choose from: average, count, sum, min, and max.

TIN Interpolator

The TIN interpolator works best for terrain data and for data points that have a linear progression or relationship to each other across the grid, such as temperature.

The TIN interpolator produces triangles from a network of points that more closely reproduces the original map terrain than the IDW interpolator. It draws lines between points, dividing them into triangles and connecting all the points that it can. It creates a mesh of connectivity so that the grid points can be interpolated. The interpolation is not influenced by the neighboring original data values, so you do not get the “false bumping” of data that you can get with the IDW interpolator.

Included in the Grid templates in the Create Thematic Map—Step 1 of 3 dialog box are two templates that work best with the TIN interpolator. The TIN interpolator settings are specified in the Step 3 of 3 dialog box. Click the Settings button to display the TIN Interpolator Settings dialog box.



As in the IDW interpolator, the cell size indicated in the TIN interpolator is square: the number represents both the height and width of the cell. The grid dimensions are automatically updated when the cell size is changed.

The TIN settings can be manipulated to give more or less detail to the map terrain. The Tolerance setting controls whether closely spaced points are discarded. The tolerance is a fraction of the diagonal length of the bounding box of the points.

The Distance value controls the output. For non-zero distance values, only edges or triangles contained within a sphere centered at mesh vertices are output. This is useful to constrain the triangulated irregular network to a specified distance; otherwise, the triangulation will cross concave regions.

The Feature Angle setting controls the angle (in degrees) that defines a sharp edge. This setting is used for smoothing the final grid. If the difference in angle across neighboring polygons is greater than this value, the shared edge is considered “sharp.”

Grid Appearance

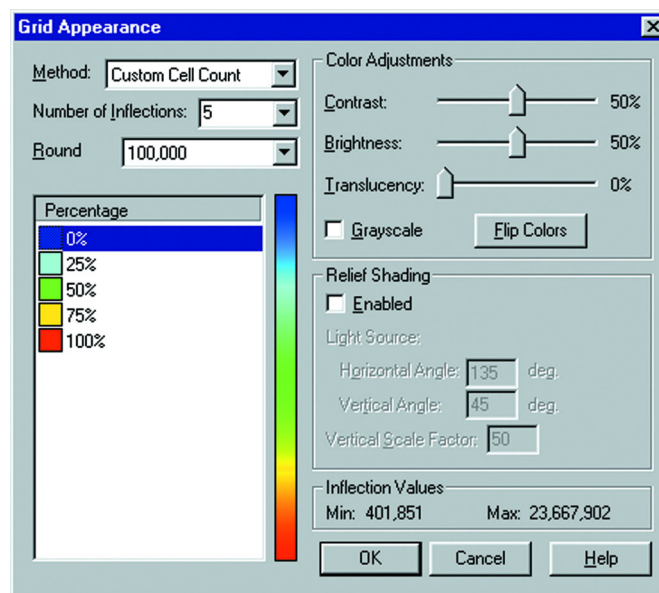
Once the cell values are calculated, MapInfo Professional groups them into a color spectrum that is bounded by the minimum and maximum values in the table. The grid’s appearance is controlled in the Grid Appearance dialog box, which you can access by clicking the Styles button in Step 3.

Inflection Methods

You can control how the color is spread by specifying an inflection method, and the number of inflection points. The Number of inflections drop-down list shows numbers 2–16, but you can type any number between 2 and 255. You can also apply a rounding factor to the inflection values. If the inflection method is based on cell count, you may not see the effects of the rounding factor until the inflection values are calculated. The inflection methods include:

- Equal Cell Count—Sets the inflections so that approximately an equal number of grid cells fall between each inflection value.
- Equal Value Ranges—Spreads the inflections evenly between the minimum and maximum values of the data range.
- Custom Cell Count—Use this method to specify your own percentages.
- Custom Value Ranges—Use this method to specify your own values.

The Grid default template assigns blue to the minimum value and red to the maximum value. These minimum and maximum values are also expressed as percentages of the range. These color settings/values are known as inflection points and will display in the legend with a particular color, value and percentage. If a cell has the exact value as the inflection point, it will display that color on the map. A cell value that falls between two inflection points displays with the color that is in between the colors of those inflection points.



When you increase the number of inflections, MapInfo Professional chooses default colors for the new inflections. The last inflection color remains the same. New ones are inserted between the new last inflection and the one before it.

To change the color of an inflection point, double-click the color swatch and choose a new color from the palette. To edit the inflection percentages/values, single or double-click a value. You can type the new value right over the old value.

Relief Shading

Relief shading allows you to shade your grid surface map according to a virtual light source. MapInfo Professional adjusts the brightness of each grid cell based on its orientation to the light source. This enables you to take surface slope and direction into account relative to the direction of the light.

The brightness values that MapInfo Professional assigns to each cell correspond to light striking the surface. The light source can be the sun shining on a topographic surface. The maximum brightness is assigned at points where the sun's rays are perpendicular to the surface (the slope directly faces the light source). As the slope faces turn away from the light source, lower brightness values are assigned.

Grid Translucency

The translucency setting allows you to set how much you can see through the grid layer. For example, in a boundary map, you may want to be able to see the boundaries as well as the topological terrain. A translucency setting of 0% produces a completely opaque image. A setting of 100% produces a completely transparent image. Set the translucency according to how much of the details in the layers underneath the grid you want to see.

Final Adjustments

You can make other color adjustments to your grid surface map. You can set the contrast and brightness level, or show the grid in gray-scale. You can also invert the inflection colors using the Flip Colors button.

Once the inflection settings, any relief shading, and other color settings are finalized, you are ready to produce the map. MapInfo Professional generates the grid theme map layer as a raster image. The inflection points grade from one color to another in smooth transitions to illustrate the distribution of the data.

Zoom Layering

Zoom layering for grid layers is now controlled in the Map window preferences. To change the zoom layering setting for a grid surface map that you are currently working with, go to the Map Options dialog box (**MAP > OPTIONS**) and either activate or turn off zoom layering. The setting is turned off by default.

Working with Grid Theme Layers

The grid thematic layer is different from other thematic layers in that, once it is created, it is independent of its base layer. Because it is a type of raster image, it can be reordered in the Map window as a separate layer. If the data in the base layer changes, the grid will not automatically update. In that case, you must re-interpolate the grid. The layer displays in Layer Control with a default layer name of *table name_fieldname*.

Info Tool and InfoTips

You can use the Info tool to get information on individual grid cells. When the Map window is active, click the Info tool button on the Main toolbar to select it and click the map. The Info tool displays the surface grid's name and the data value associated with it. The information in the Info tool window is read-only in this instance, as you cannot change the cell's value.

When InfoTips are active, hovering the cursor over a grid cell will display the cell's value.

Grid Tools Tool

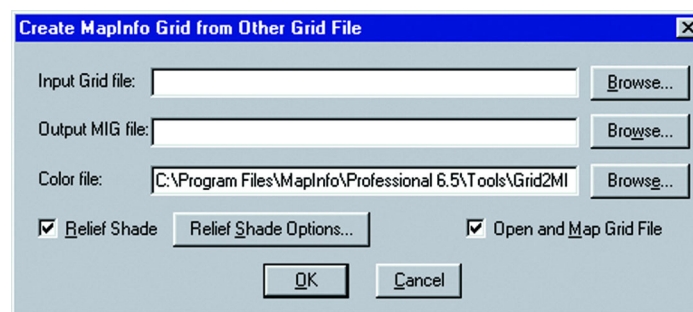
The Grid Tools tool contains three tools that help you get the most from your grid layers.

Note: Grid Tools replaces the DEM2Grid tool included in earlier versions of MapInfo Professional.

Converting Grid Files

The Grid File Converter enables you to convert any grid file supported by a grid handler to an MapInfo Professional grid file (.MIG). You must provide a color file that defines the inflection points of the new grid file. The tool gives you the option of generating relief shading for the new file, and opening the file after the conversion. It replaces the DEM2Grid MapBasic tool included in earlier versions of MapInfo Professional.

To load Grid Tools, choose **TOOLS > TOOL MANAGER**, and select the Loaded check box next to the Grid Tools tool. Then choose **TOOLS > GRID TOOLS > CREATE MAPINFO GRID FROM OTHER GRID FILE** to display the dialog box.



To select the input and output grid files and the color file:

1. Use the corresponding **BROWSE** buttons to navigate to their respective locations.
2. Select the **RELIEF SHADE** check box to activate relief shading for the converted grid file. Click the **RELIEF SHADE OPTIONS** button to display the Relief Shade Options dialog box, where you can specify the angle of the light source and the vertical scale factor.
3. Select the **OPEN AND MAP GRID FILE** check box to have MapInfo Professional display the grid in a Map window.
4. Click **OK**.

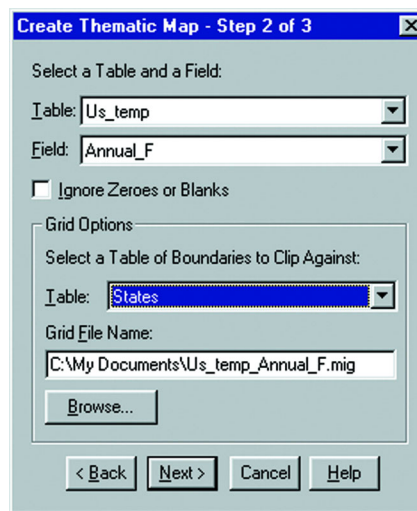
Other Grid Tools

In addition to the Grid File Converter, Grid Tools enables you to create a MapInfo Professional grid file from a table of points. This works best if the records in your table represent a regular grid of points. On the **TOOLS** menu, point to **GRID TOOLS** and click **CREATE MAPINFO GRID FROM TABLE OF OBJECTS** to display the Grid File Converter dialog box.

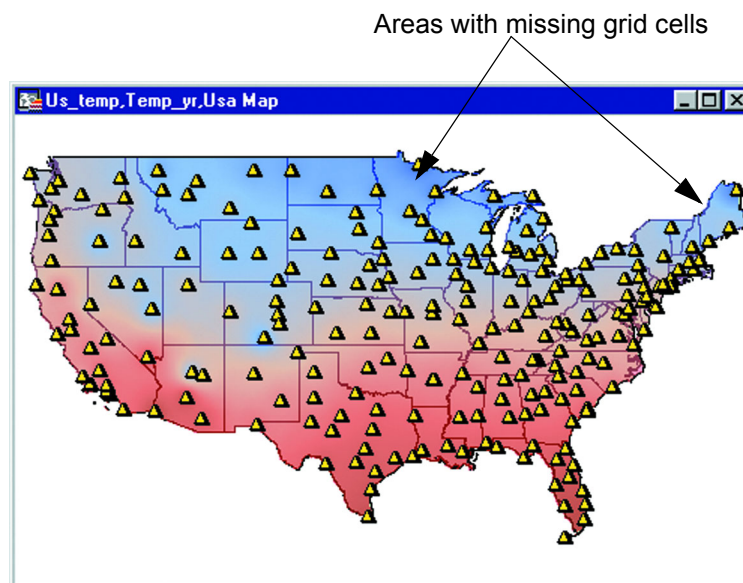
Finally, loading Grid Tools places a grid “info tool” on the Tools toolbar that you can use to display the x, y, and z coordinates of a mouse-click location in a grid layer. Click the button to activate it, and then click anywhere on your grid layer to display the coordinates for that location.

Clipping a Grid Map

MapInfo Professional's grid feature allows you to clip the grid map with a table of region objects. MapInfo Professional generates a rectangular grid based on the MBR of the source table. In order for the grid boundary to follow the outline of your map boundary, specify that the grid be clipped by the map or another table of boundaries. MapInfo Professional first creates a single object out of all objects in the clipping table and then clips the grid to match it. Set the clipping table in the Step 2 of 3 dialog box under Grid Options.



If your source data points do not extend beyond your clipping region, your grid map will not be completely filled with grid cells. To avoid this, in the Interpolator Settings dialog box for IDW Interpolation (reached by the Settings button in the Step 3 of 3 dialog box), type a value in the Grid Border box to represent the miles you want added to the grid that will meet or exceed the source table's MBR. This value will add the same amount to all four sides of the grid.

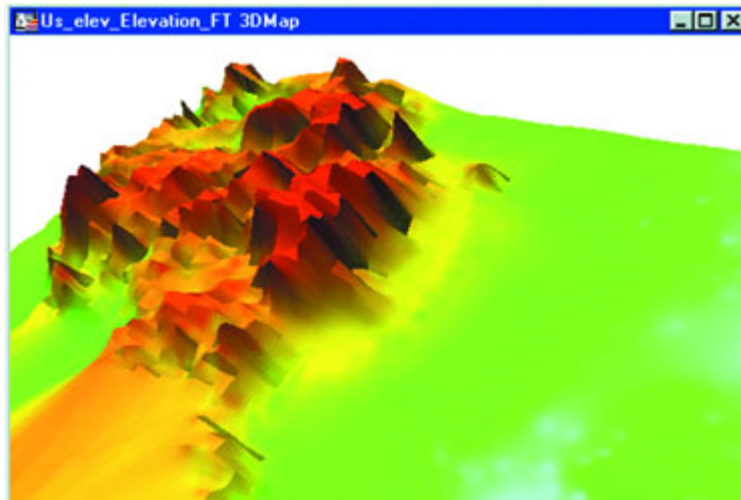


Working with 3D and Prism Maps

A 3D Map allows you to express your data using three axes: length, width, and height, which can give your maps greater impact. Prism Maps are a type of 3D map in which the height of the geography correlates to a specific value so that the greater the value, the higher the height of the geography. For more about prism maps, see [Working with Prism Maps on page 348](#).

MapInfo Professional contains a 3D viewing capability. Based on Microsoft's implementation of OpenGL software graphics interface, it allows freehand tilt and rotation of the image. The traditional pan, zoom, and Info tools also operate in the 3DMap window.

You can create a 3D view of any map that contains a continuous grid layer. For example, import digital elevation model (DEM) files or interpolate from a layer of points that contain elevation values. The image of any other layers will be draped over the 3D surface. Keep in mind, the 3D surface is not limited to representing elevation. It can also be used to show property value, sales potential, population density, air temperature, etc.



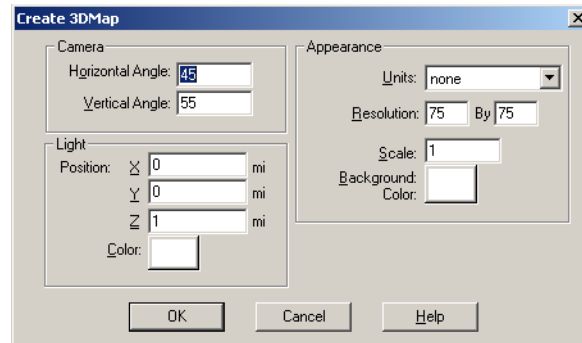
Use the Create 3DMap command (**MAP > CREATE 3DMAP**) to create a 3D view of a Grid Thematic map when the Grid Thematic map is in the active window. You can rotate, zoom, and pan the 3D view. Additionally, you can clone the 3D view.

The 3DMap window is a stand-alone window. If you modify the tables in the Grid Thematic map used to create the map, you can update it using the Refresh Grid Texture option in the 3DWindow menu. To change the settings in a 3DMap window, select **PROPERTIES** on the 3DWindow menu.

Creating a 3DMap

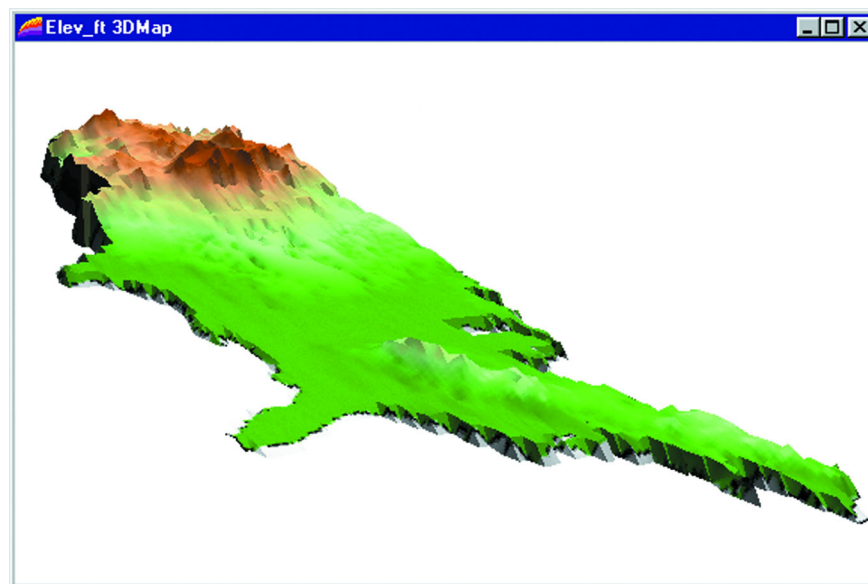
To create a 3DMap:

1. Create a Grid Thematic map or open an existing grid layer. See [Working with Grid Surface Maps on page 336](#) for more information.
2. Choose **MAP > CREATE 3DMAP**. The Create 3DMap dialog box displays.



From this dialog box you can set:

- **CAMERA:** Specify the camera position and orientation.
 - **LIGHT:** Designate the position and color of the light source.
 - **APPEARANCE:** Specify appearance attributes including Units, Resolution, and Scale. Units is only available when first creating a 3DMap. Resolution and scale are available later as well.
3. To create a 3DMap using the default settings click **OK**. The 3D View of the map displays. The map displays land elevations in the United States. It is available from the MapInfo Professional CD. Open the Elev_ft.MIG file from the NAMrca\USA\Grid folder.



Understanding the 3DWindow Menu

When the 3DMap is the active window, the 3DWindow menu displays in the menu bar. The 3DWindow menu contains the following commands:

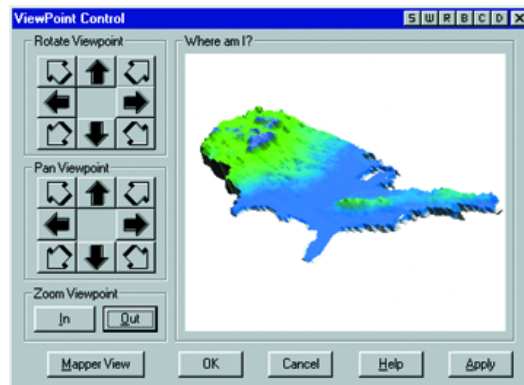
Refresh Texture: Regenerates the image used for the texture on the grid. Use this option if you change or update the tables or objects used in the 3DMap.

Clone View: Creates a clone of the 3DMap window.

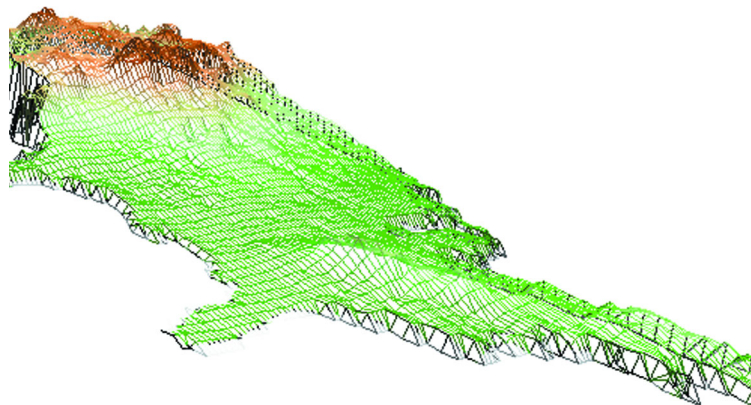
Previous View: Returns to the previous view of the 3DMap.

View Entire Layer: Re-centers the 3DMap in the window. If you zoom or pan the map from view, use this option to redisplay the map in the window.

Viewpoint Control: Displays the Viewpoint Control dialog box which duplicates the functionality you have with the selection and the zoom tools, and includes a **MAPPER VIEW** button that repositions the 3DMap window to match the view from the original Map window.

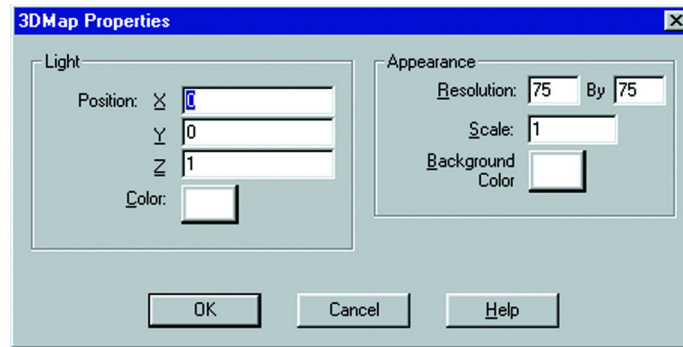


WireFrame: Toggles between a wireframe and surface representation of the grid. Additionally, cloned 3DMap windows have the surface representation of the grid, even if the cloned window is in wireframe mode. To toggle the wireframe mode on and off, press the **'W'** key on the keyboard while the 3DMap window is active. Here is an example of a wireframe map:



Note: This option is not saved to a workspace.

Properties: Display the 3DMap Properties dialog box displaying the current 3DMap settings. Use this dialog box to modify the Light and Appearance settings of the active 3DMap. Additionally, display this menu by right-clicking when in the 3DMap window.



Manipulating a 3DMap

You can move the 3DMap window around to determine the most effective angle for displaying your information.

To manipulate the view of a 3DMap window:

1. Display a 3D Map.
2. Choose the Select tool.
3. Click and hold the left mouse button in the 3DMap window. As you move the mouse the viewpoint will be rotated around the focal point.

You can also use the Grabber, and Zoom tools to move the 3DMap window around the Map window.

The Info tool displays the grid elevation value at the point you select.

Working with Prism Maps

Prism maps offer another way to create a three-dimensional view of your map. In a Prism map, the height of the geography is raised according to a specified column value from your table or a derived value from an expression—the greater the value, the higher the height of the geography. Each geography becomes a prism, allowing you to compare data values of objects relative to each other according to the height of each prism.

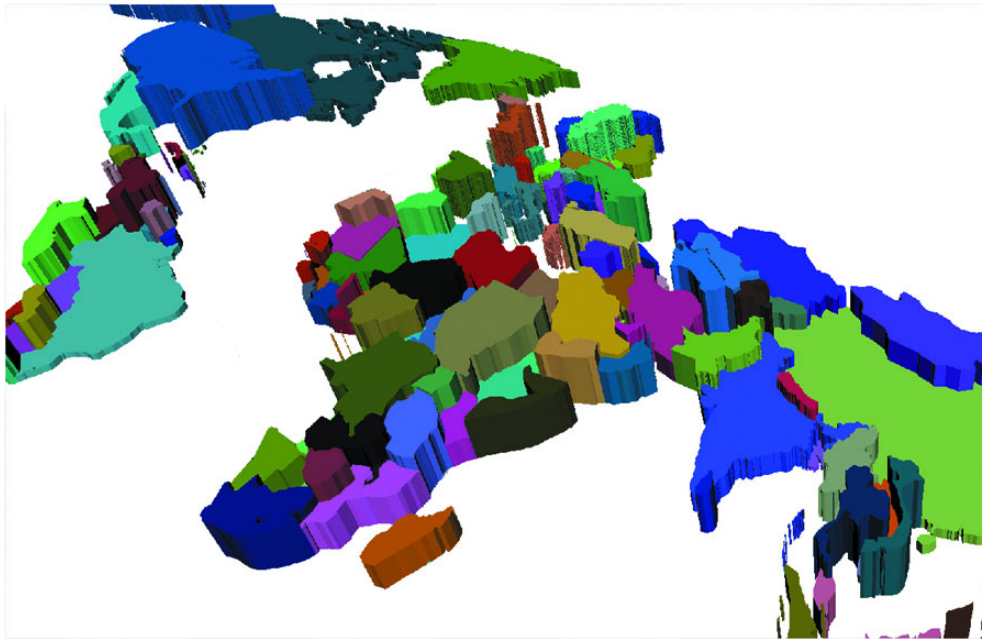
Prism maps are created using region layers. Other closed objects such as rectangles, ellipses, and rounded rectangles are also included in the Prism map, as well as the region portion of Collection objects. Point objects are not included in the Prism Map.

The prism effect does not interfere with the display of other components in a Map window, including other map layers, themes, or labels. When the Prism map is created, the image from the original Map window is “pasted” on the resulting 3D objects.

Note: Creating a Prism map from complex geographical objects (e.g. high resolution boundaries) requires a significant amount of memory and time. Memory resources may run out on some systems.

The 3DWindow menu is shared between 3DMaps and Prism maps. When a Prism map is the active Map window, the 3DWindow menu displays on the menu bar.

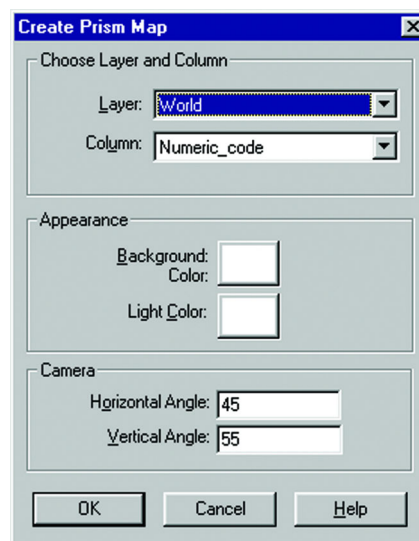
The commands in the 3DWindow menu for Prism maps are the same as those for 3DMaps. You can control the view of the map, create a duplicate view, and set the map's point of view, enabling you to choose the angle that will best emphasize the prism effect of the raised geographies.



Creating a Prism Map

To create a Prism map:

1. Make sure a Map window is the active window and that it contains a region layer.
2. Choose **MAP > CREATE PRISM MAP**. The Create Prism Map dialog box displays.



3. In the Choose Layer and Column group, choose the layer to map, and choose a column value. Only numeric columns from the layer you chose display in the dialog box. To use a character column, create an expression. Choose **EXPRESSION** from the Column drop-down list to display the Expression dialog box.

Select the character column you want to use, and use the Val() function to convert a character string to a numeric value. This function returns zero for any character string that has no numeric meaning.

4. In the Appearance group, specify the Background color. This color is used for the window's background. Also specify the Light color. This color is the lighting for your map. It acts as a "cover" to the camera lens as it views the map.
5. In the Camera group, choose the camera's position and orientation. The Horizontal Angle measures the rotation of the map around the center point of the grid. This value can range from 0–360 degrees. The Vertical Angle measures the rotation in elevation from the start point directly over the map. This value ranges from 0–90 degrees.
6. Click **OK**. The Prism map displays in your Map window.

Bivariate Prism Maps

Because prism maps preserve the display of other map elements, including themes, you can easily add a second theme to your prism map, such as ranges or individual values, to create a bivariate map. For more about Bivariate maps in general, see [Bivariate Thematic Mapping on page 331](#).

Prism Map and Browser Editing

If you change a row value of an object in a Prism map or edit an object directly in a Map window, the Prism map will reflect these changes. For example, if you change a data value that was used directly in a Prism map, or as part of an expression that was used to calculate a value, the prism height of the corresponding objects will change to reflect the new value. This includes single row changes and column updates.

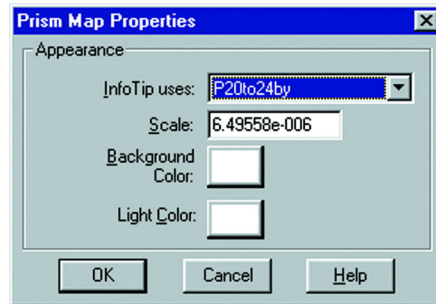
When you move objects in a Prism map, the Prism map object that is based on the original object will also move. When you add objects to the Prism map, they will display flat because data values for new objects are initially set as zero.

Sometimes an object in a Prism map displays the incorrect texture or image. This usually occurs when the geometry of an object has changed for some reason, for example, as a result of map clipping, moving the object, or adding or removing nodes. Use the Refresh Texture command in the 3DWindow menu or the shortcut menu in the Prism map window to correct the display.

Modifying a Prism Map

To modify a Prism map:

1. Do one of the following:
 - Choose **PROPERTIES** from the 3DWindow menu
 - Right-click to display the shortcut menu, and then choose **PROPERTIES**.Using either method, the Prism Map Properties dialog box displays.



2. In addition to modifying the Background and Light color settings, you can specify InfoTips and set a scale for the Z direction (vertical) of the map.
3. The InfoTip information can come from any column in the table or valid expression. The values will display when you hover the cursor over an object using a tool that supports ToolTips.

A scale for the Z direction is calculated during the initial creation of the Prism map. If you decide to modify it, keep in mind that the values used for the prism height may greatly exceed the x and y dimensions.

For example, in a Prism map of population, values could easily be in the millions. The scale must be small enough so that the objects can be viewed. A scale value >1 will exaggerate the topology in the Z direction; a value <1 will scale down the topological features in the Z direction.

4. Click **OK** to save the prism properties.

Buffering and Working with Objects

Two of the most important features in MapInfo Professional are buffers and the tools we provide to work with objects. Buffers allow you to create grouping areas around objects, lines and regions, which is important for providing a visual analysis. You can edit and manipulate objects in a wide variety of ways. The Set Target editing model allows you to apply a wide range of editing operations to an object or a series of objects. Using MapInfo Professional you can also create territories and create objects. This chapter covers these topics and discusses the advanced topics of enclosing, checking, and cleaning objects.

In this Chapter:

- ♦ **Buffering Your Data** 353
- ♦ **Editing Objects using the Set Target Model** 361
- ♦ **Creating Territories by Combining Objects** 367
- ♦ **Creating and Manipulating Objects** 376

Buffering Your Data

If you would like to search for all underground cable wires that are buried within 440 yards of Interstate 490 or you would like to contact all families with pre-school age children who live within five miles of a proposed school district, buffering is the tool for you.

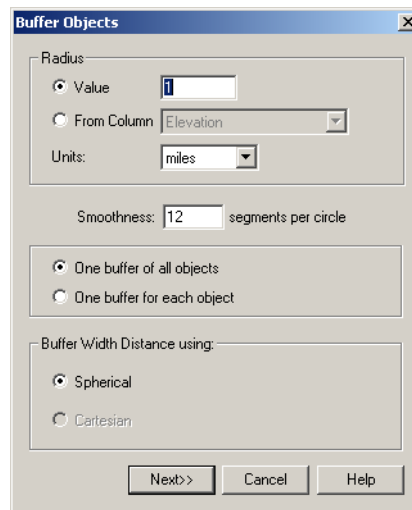
Understanding Buffers

A buffer is a region that surrounds a line object, another region, symbol, or any other object in a Map window. For example, you can create a buffer region that surrounds Interstate 90 by 440 yards on either side. You can create a buffer region that surrounds the proposed school district by five miles on all borders. Both the 440 yards and five miles are their respective regions' buffer radii. The buffer table is then joined to data associated with the original buffered objects.

Creating a Buffer

To buffer objects:

1. Select the objects that you want to buffer. Make sure there is an editable layer in the Map window. The output buffered objects will be placed in that layer.
2. On the **OBJECTS** menu, click **BUFFER**. The Buffer Objects dialog box displays.



3. Select appropriate buffer radius, segments per circle, distance type calculation to use, and buffer method as described.
 - **RADIUS** — The radius is the width of the buffer you want to create around the object you selected. The Value and the From Column radio buttons give you different ways to specify that width.
 - **VALUE** — Type a value into this field if the radius of the buffer you want to create is a specific distance. Examples might include 10 feet, 20 kilometers, 50 chains.
 - **FROM COLUMN** — Select this radio button if the buffer you want to create is specified in a particular column or is to be calculated by an expression. Then select the column or choose **EXPRESSION** from the drop-down list.

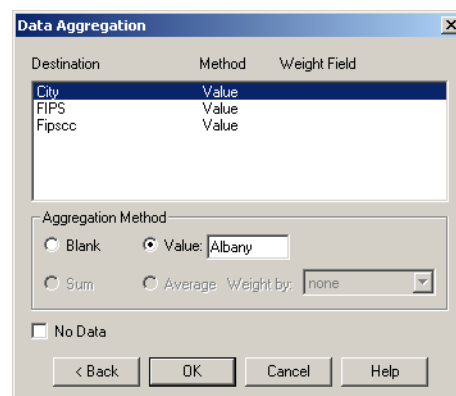
If you select **EXPRESSION**, the Expression dialog box displays. Specify the expression you want MapInfo Professional to use to calculate the buffer radius and click **OK** to return to the Buffer Objects dialog box.

- **UNITS** — Select the units for the buffer from this drop-down list. Options include: inches, links, feet, US Survey feet, yards, rods, chains, miles, nautical miles, millimeters, centimeters, meters, kilometers.
- **SMOOTHNESS** — Type the number of segments per circle that determines the resolution of the curves in the buffer polygon. You can enter a number between 3 and 100. The default value is 12 segments per circle.

The more segments you enter, the smoother the curve. The fewer segments, the more jagged the curve. More segments produce a smoother curve; fewer segments make a more jagged curve.

- **ONE BUFFER OF ALL OBJECTS** — Select this option to create one buffer for all of the objects you have selected. For example, if you are buffering Pennsylvania, New York and New Hampshire, one buffer will be created for all three of these objects.
 - **ONE BUFFER FOR EACH OBJECT** — Select this option to create one buffer for each object you have selected. For example, if you are buffering Pennsylvania, New York and New Hampshire, each object will have a separate buffer.
 - **BUFFER WIDTH DISTANCE USING SPHERICAL** — Select this option if you want the buffer to take into account the curvature of the Earth. Using this method, MapInfo Professional converts the data to Latitude/Longitude and then creates a mathematical calculation of the buffer. You cannot use this method for non-Earth projections.
 - **BUFFER WIDTH DISTANCE USING CARTESIAN** — Select this option if you want the buffer to be calculated as if the map is on a flat plane. Cartesian coordinates are a pair of numbers, (x, y), defining the position of a point in a two-dimensional space by its perpendicular projection onto two axes which are at right angles to each other. If you are using a Latitude/Longitude projection, this option is disabled.
4. When you have completed your entries and selections in this dialog box, press the **NEXT** button. The standard Data Aggregation dialog box displays.

Note: If the editable layer is the Cosmetic layer, the Data Aggregation dialog box will not display because there is no data in the layer to aggregate. The **OK** button displays in place of the **NEXT** button. Press **OK** to begin the buffer operation.



5. Highlight each of the columns you want to complete the fields in this dialog box.
- **BLANK** — Select this option to store blank values in the selected column(s). To store blank values in all displayed columns, check the **NO DATA** check box. Only choose the Blank option to blank out individual columns.

- **VALUE** — Select this option to store the value that displays in the edit field in the new row. When you select this option, enter an appropriate value in the field.
 - **NO DATA** — Check this check box if you want no data aggregated to any column.
6. After setting the appropriate data aggregation parameters, press **OK**. MapInfo Professional calculates the buffer according to the parameters you sent and creates the new objects in the editable layer. The original objects remain unchanged.
- Once MapInfo Professional has created the buffer region, it puts it in the editable layer.



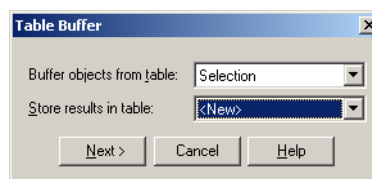
Saving your Buffer as a New Layer

You can create a buffer and save it as a new table (layer) or as part of another layer in your map. This process is similar to the Voronoi process described in [Saving your Voronoi Polygon as a New Layer on page 371](#). This process is also similar to the Combine Using Column process, except that there is no “Group By” functionality for buffers.

Note: The table must be mappable to use this feature.

To create the buffer as a distinct layer:

1. To create a selection to buffer, select the object in the map. This step is not required if you want to buffer all objects in a particular table.
2. On the **TABLE** menu, click **BUFFER**. The Table Buffer dialog box displays.



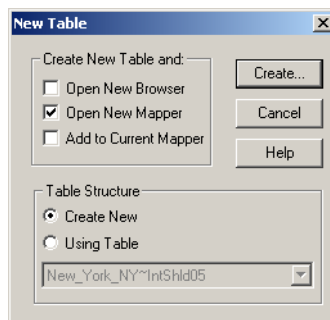
3. Do one of the following:
 - To buffer the selected object, leave the **SELECTION** object selected in the **BUFFER OBJECTS IN TABLE** drop-down list box.
 - To buffer objects from a particular table, select the table in the **BUFFER OBJECTS IN TABLE** drop-down list box.
4. Select the type of table you want to place the buffer into from the **STORE RESULTS IN TABLE** drop-down list box. Select one of the following:
 - **NEW TABLE** — allows you to save the buffer in a new table
 - **<TABLENAMES>** — allows you to save the buffer in one of the currently open tables
 After you make this selection, click **NEXT** to continue.

Note: You cannot save a buffer to the Cosmetic Layer.

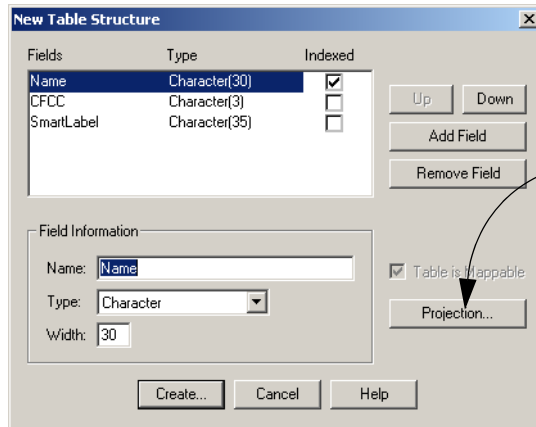
5. Do one of the following:
 - If you chose the **NEW TABLE** option, go to [Saving a Buffer to a New Table on page 356](#).
 - If you chose **<TABLENAMES>**, go to [Saving a Buffer to an Existing Table on page 357](#).

Saving a Buffer to a New Table

You can create a buffer and save it as a new table (layer) in your map. You must complete the instructions in [Saving your Buffer as a New Layer on page 355](#) before you begin this operation.



1. Use the Create New Table and check boxes to indicate where you want the new buffer to display. You can click more than one check box.
 - OPEN NEW BROWSER** — Click this check box to display the new buffer in a new Browser window only.
 - OPEN NEW MAPPER** — Click this check box to display the new buffer in a new Map window.
 - ADD TO CURRENT MAPPER** — Click this check box to display the new buffer in the current Map window.
2. Choose the table structure for the new table, using only one of these options:
 - CREATE NEW** — Click this check box to specify a new table structure and create the new fields in the New Table Structure dialog box.
 - USE TABLE** — Click this check box to create the new table structure based on the fields in an existing table. You can base your new table structure on any open table.
3. Click **CREATE**. The New Table Structure dialog box displays.
 - If you selected **CREATE NEW** in the last step, the New Table Structure dialog box displays no fields and you need to add the fields you need.



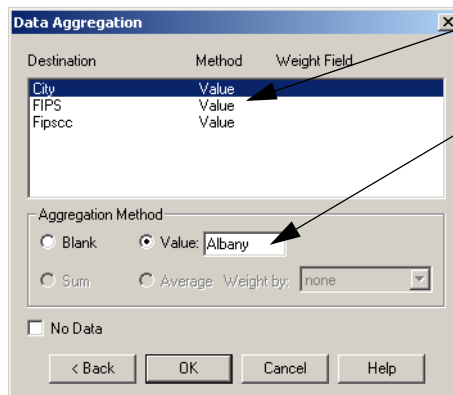
Click the **PROJECTION** button to set the projection for this table. For more about Projection, see [Understanding Coordinate Systems, Projections, and their Parameters in Chapter 14 on page 474](#).

4. Click the **ADD FIELD** button and enter the field name, select the field type, and enter the field width for each new field in your table. Continue this process until your table structure is complete.
5. Click **CREATE** to create the table and display the buffer according to the display instructions you specified. The Create New Table dialog box displays prompting you to save the name of the new table.
6. Select the directory for this table and type the name of the new table in the File Name field. Click **SAVE**.

Saving a Buffer to an Existing Table

You can create a buffer and save it as a layer in an existing table in your map. You must complete the instructions in [Saving your Buffer as a New Layer on page 355](#) before you begin this operation.

1. When you choose to store the table results in the existing table, the Data Aggregation dialog box displays.



Click a field here
Specify the data aggregation method here.

Note: If you selected tables with disparate values, there may be additional fields in this dialog box. You need to reconcile these table values using this dialog box.

2. In the Data Aggregation dialog box, click a field and specify an aggregation method:
 - BLANK** — Click this radio button to indicate that this field should remain blank.
 - VALUE** — Click this radio button to indicate that this field should contain a specific value or should retain its existing value. If the field should contain a specific value, enter that value into the Value field.

SUM — Click this radio button to add the field values from the original objects to create a field total for the field in the new column. (Applies to numeric fields only.)

AVERAGE — Click this radio button to average the field values from the original objects. (Applies to numeric fields only.)

WEIGHTED BY — Click this radio button to give more weight to one value over another when averaging. You can choose a numeric field in your table as the weighting factor or choose area (where the weighted average is based on the relative geographic area of the regions to be combined). Applies to numeric fields only.

3. To add no data to the existing table, select the **NO DATA** check box. This disables the Blank and Value radio buttons.
4. After you have completed these selections and entries, click **OK**.
5. The Buffer Objects dialog displays. From here the process is the same as described in [Creating a Buffer on page 353](#).

Note: The values in the Buffer Objects dialog box are saved at the end of the operation. If you perform another Buffer operation using the Table Buffering option or the Objects Buffering option using the same base table, MapInfo Professional restores the previous values.

Buffer Radius

The buffer radius determines the dimensions of the buffer region. For example, if you want to create a region that covers an area one mile on either side of a freeway, set your buffer radius to 1 mile. If you choose to use a field from the table or an expression, MapInfo Professional will calculate the radius of the buffer based on that value.

You can set the radius to be a constant value or you can choose a data value from the table to be used as the radius. For example, to create buffers around major cities that reflect the size of their population, choose the population field as the value.

You can go even further to calculate the buffer radius using an expression. For instance, you want to create buffers around cities showing the population density. Since you do not have a field containing population density, you will need to write an expression that can calculate density from population and area. This is no different than writing an expression for thematic mapping or query selection.

Buffering - Setting the Number of Segments per Circle

The number of segments per circle determines the level of detail in the buffer region. The more segments per circle, the higher the level of detail. The default level is 12 segments per circle.

Buffer Width Distance

MapInfo Professional's buffering feature calculates the buffer width to create a buffer that is some measured distance from the outline of the object. This distance is calculated using either the Spherical or Cartesian method.

Spherical calculations measure distance according to the curved surface of the Earth. This means that the distance from the boundary of the original object to the boundary of the new buffered object may vary from node to node.

Cartesian calculations measure distance on data that has been projected onto a flat, X-Y plane. This produces buffers that are exact in width, as long as the data is not in a Latitude/Longitude projection.

The availability of the Spherical and Cartesian buttons depends on the type of calculation that is appropriate to the table's projection. The Cartesian button will not be available if the table is in a Latitude/Longitude projection. Conversely, the Spherical button will not be available if the table is in a Non-Earth projection.

Buffer Methods

You can create a single buffer to include all selected objects, or create individual buffers for each object.

There are two ways you can buffer multiple objects at the same time. The first method is to create one buffer for all objects. Buffers are produced around each input object, and the resulting buffer objects are combined into a single output object.

The more powerful method is to create one buffer for each object. For example, you have a layer of satellite offices. You would like to create a five-mile radius buffer around every satellite office symbol. You select all office symbols (with either the Select All command or Select tool), on the **OBJECTS** menu, click **BUFFER**, and select the option to create one buffer for each object. MapInfo Professional creates five mile buffer polygons around each point. With this method, MapInfo Professional considers the resulting buffers as individual region objects and does not combine them into one region.

Once you create a buffer region, you can search for objects within it, as with any other boundary.

Types of Buffers

There are two basic types of buffers that we support in MapInfo Professional.

- **Concentric ring buffers** allow you to create circles around map object(s) or point(s) and compute aggregated values for underlying data that occur within each ring. You would use concentric ring buffers to determine the number of customers within a certain radius of a store or other location.
- **Convex hull buffers** create a region object that represents a polygon based on the nodes from the input object. You can think of the convex hull polygon as an operator which places a rubber band around all of the points. It will consist of the minimum number of points so that all points lie on or inside the polygon. With convex hull buffers, no interior angle can be greater than 180 degrees.

Concentric Ring Buffers

In the [Creating a Buffer on page 353](#), you learned how to create a buffer around one or more objects. Concentric ring buffers allow you to create multiple buffers of different radii around an object or a set of selected objects.

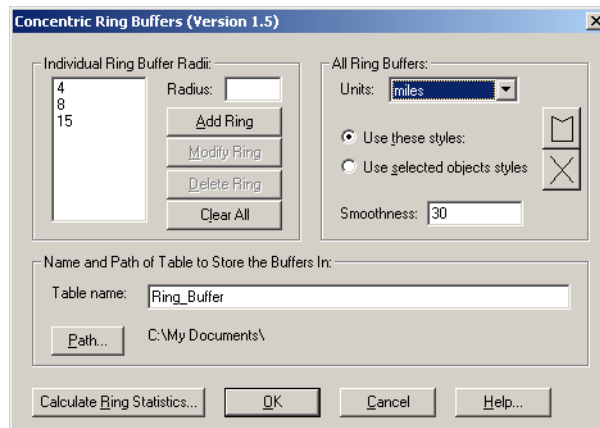
To access the Concentric Ring Buffer tool, use the Tool Manager:

1. On the **TOOLS** menu, click **TOOL MANAGER**. The Tool Manager dialog box displays.

- Find the Concentric Ring Buffer Tool in the list, and check the **LOADED** and **AUTOLOAD** boxes next to it.
- Click **OK**. The tool is added to the Tools menu, and will be loaded automatically each time you start MapInfo Professional.

To create concentric ring buffers:

- In the Map window, select the object(s) you want to place buffers around.
- On the **TOOLS** menu, point to **CONCENTRIC RING BUFFERS** and click **CREATE RING BUFFERS**. The Concentric Ring Buffers dialog box displays.



- To add a ring, specify the radius in the Radius field and click **ADD RING**. Continue this until you have added all of the rings you want from the smallest to largest.
- Select the units of each radius in the Units drop-down list.
- To set the smoothness of the ring buffer, type a number between 3 and 100 in the Smoothness field. The larger the number, the smoother and less jagged the curves of the ring.
- Type the table name and select the path in which you want to store this buffer information. MapInfo Professional stores the concentric ring buffer information into this table including the columns containing the ring number, radius value, radius units, area, and area units for each ring.
- When you have finished the buffer settings, click **OK**.

Use the **MODIFY RING** and **DELETE RING** buttons to change the ring settings, or click **CLEAR ALL** to start all over and create new concentric rings. To change the style of a buffer ring, select it in the Buffer Radii list, and use the style buttons to change the fill pattern and line style for the buffer. You can also collect data within each buffer ring using the **CALCULATE RING STATISTICS** button.

Convex Hull Buffers

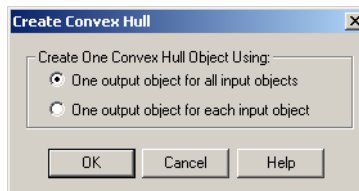
The Convex Hull command provides another means of creating a polygon around a selected object or objects. Convex Hull is similar to creating a buffer in several ways. Like a buffer, the Convex Hull command always creates an object from the input objects, and it will place the result objects into the editable layer. In addition, you have a choice to create one convex hull object from all of the input objects, or to create one convex hull object for each input object.

The resulting region object(s) are based on the nodes from the input object. The Convex Hull operation can be thought of as an operator that places a rubber band around all of the points. It consists of a minimal set of points such that all other points lie on or inside the polygon. Since the polygon is convex, no interior angles are greater than 180 degrees. No attribute data is aggregated in this operation.

To use Convex Hull, a Map window must be active, it must have an editable layer, and objects in the editable layer must be selected.

To create convex hull objects:

1. On the **OBJECTS** menu, click **CONVEX HULL**. The Create Convex Hull dialog box displays.



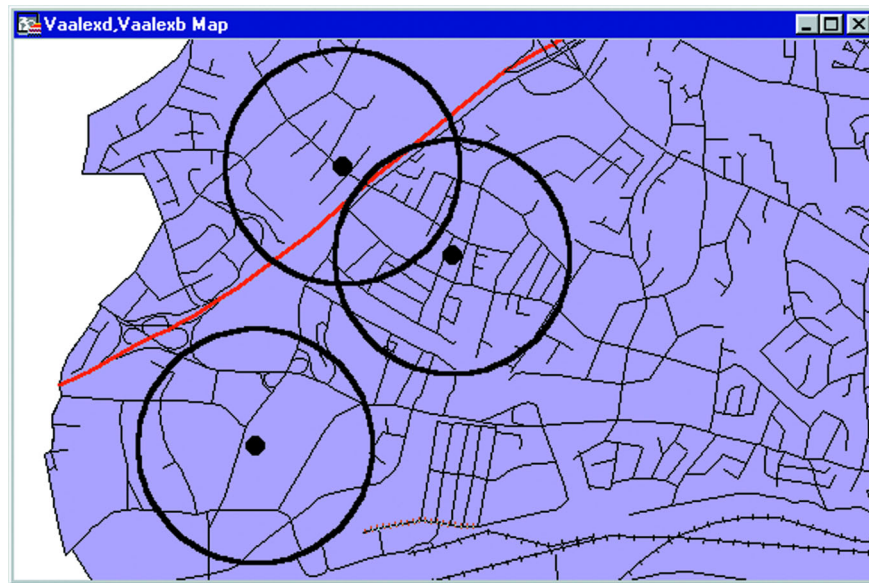
2. Select the type of convex hull objects you want to create. You have two options:
 - **ONE OUTPUT OBJECT FOR ALL INPUT OBJECTS** button is the default setting. It creates one convex hull object around all of the selected objects.
 - **ONE OUTPUT OBJECT FOR EACH INPUT OBJECT** button creates a convex hull object around each selected object.
3. Click **OK**. Your map redisplay. The convex hull object(s) is displayed over the input objects. If you want to save this data, save the editable table.

The convex hull object is selected when it displays. To change the fill of the convex hull object, do one of the following:

- Double-click it to display the Region Object dialog box. Click the **STYLE** icon at the bottom of the dialog box to display the Region Style dialog box. Make any changes you like and click **OK**.
- Select the convex hull object, if it is not already, and on the **OPTIONS** menu, click **REGION STYLE**. The Region Style dialog box displays. Make the changes you want and click **OK**.

Editing Objects using the Set Target Model

With MapInfo Professional's advanced set target editing functionality, you can combine, split, erase map objects, and overlay nodes using a "Set Target – Apply Action" editing model. This model allows you to use objects from the same table or another table to create new objects. Sophisticated data aggregation methods allow you to calculate new data values that match the new objects.

Buffered retail locations showing market penetration

The Set Target editing model in MapInfo Professional allows you to set a map object as the target for editing, then create a modifying object that will act as the cookie cutter that overlays the target and performs the editing action on the target. Set Target is located under the Objects menu.

The Set Target model for editing map objects can be broadly described as a three-step process:

1. Set the object you want to edit as the target.
2. Choose and select another object or objects to act as the modifying object for the editing operation. You can also create a new object.
3. Perform the edit operation (combine, split, erase, erase outside, or overlay nodes).

A new object (or objects) is created in place of the target object.

The following table describes valid cutter/target objects for supported object processing operations:

Object Type	Overlay Nodes		Split, Erase, Erase Outside		Combine	
	Cutter	Target	Cutter	Target	Target	Other non-target
Closed	X	X	X	X	X	X
Linear	X	X		X	X	X
Text						
Points				X	X	X
Multipoints				X	X	X
Collections				X	X	X

You are not limited to working with map objects in the same layer. While the target objects must be in the Editable layer, you can choose the modifying objects from another layer.

The set target process is essentially the same whether you want to combine objects or create new objects by splitting objects or erasing portions of objects. Each operation is discussed individually in this chapter.

In addition to creating new map objects, the Set Target model allows you to control how the data associated with the target object will be transferred to the new object or objects. The next section discusses a number of data aggregation and disaggregation methods that give you tremendous flexibility with editing map objects.

Aggregating and Disaggregating Data

If you have data attached to map objects that will be edited, you can proportion the data for each field to match the new object(s). This is called data aggregation or disaggregation, depending on whether you are combining or splitting objects. MapInfo Professional calculates new data values for the object depending on how you specify the aggregation or disaggregation.

When combining objects, you can choose from several methods of data aggregation, including:

- **SUM** – adds the field values from the original objects to create a total for the field in the new object.
- **AVERAGE** – averages the field values from the original objects.
- **WEIGHTED AVERAGE** – gives more weight to one value over another when averaging. You can choose a numeric field in your table as the weighting factor or choose area (where the weighted average is based on the relative geographic area of the regions to be combined).
- **VALUE** – stores a specific value in the field of the new object.
- **NO CHANGE** – maintains the value of the target object in the new object.

When splitting or erasing portions of a map object, you can choose from:

- **BLANK** – removes the original value of the target object.
- **VALUE** – maintains the original value of the target object.
- **AREA PROPORTION** – removes a portion of the original value based on the size of the new object.

With any of the editing operations under Set Target, you can elect not to bring over any data at all by choosing the **NO DATA** check box. You might do this, for instance, if you are only editing map objects for presentation purposes and do not need any data associated with the objects.

The data aggregation (or disaggregation) dialog box displays after you have set the target, chosen the modifying object, and chosen an editing operation. In these dialog boxes, you must specify how you want the data calculated for each field. Once you are satisfied with the aggregation method, you can carry out the editing operation.

Combining Objects with Set Target

Combine allows you to combine separate map objects from the same layer into a single object. By using **COMBINE WITH SET TARGET**, you can use objects from another layer as the modifying object for editing, which can be more powerful than using the Combine functionality alone. It is also

useful when one object is more important than the others you are combining it with, for instance, when adding islands to a mainland region. Using Combine with Set Target allows the mainland region to retain its name after the objects are combined.

You can only set one object as the target at a time when using Combine with Set Target. The modifying object can consist of more than one object.

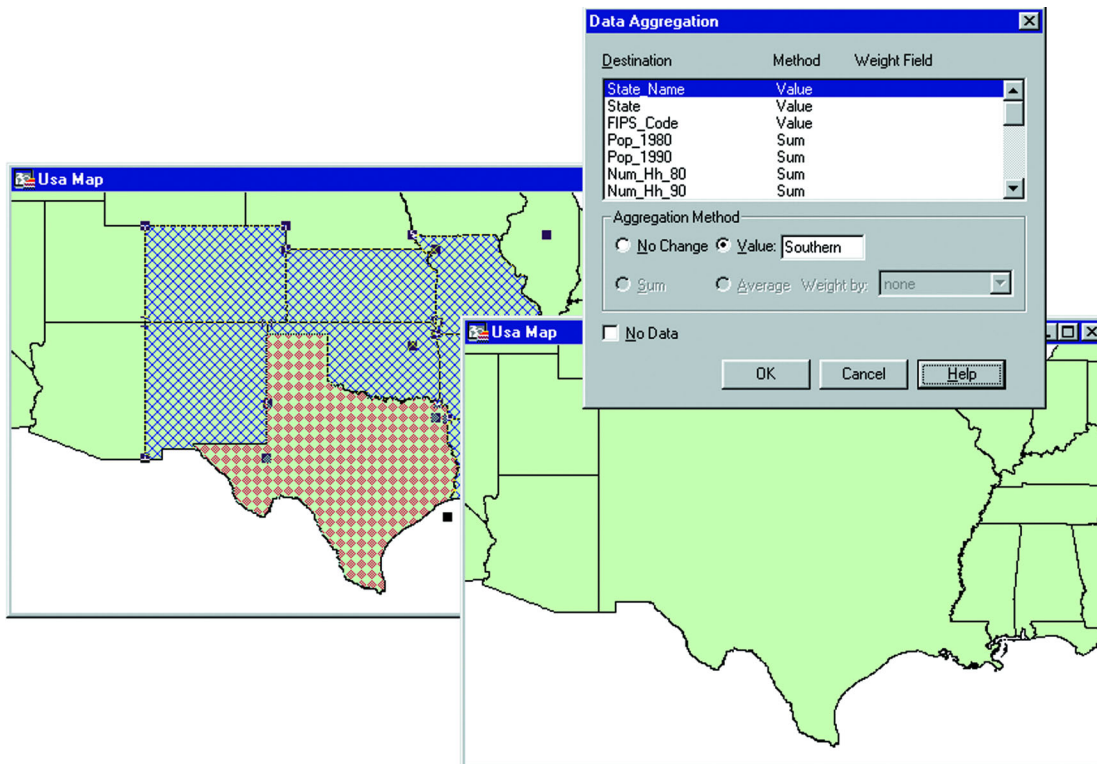
To combine map objects using Set Target:

1. Select one object in an editable layer to be the target object.
2. On the **OBJECTS** menu, click **SET TARGET**. The object displays in a different style to indicate that it is the target object.
3. Select (or create and select) one or more map objects from any layer in the Map window. This is the modifying object.
4. On the **OBJECTS** menu, click **COMBINE**. The Data Aggregation dialog box displays.
5. Choose the appropriate aggregation method (or **NO DATA**) for each field in the Destination list. See the definitions for these methods in [Aggregating and Disaggregating Data on page 363](#).

Note: To select more than one field in the Data Aggregation dialog box at a time, use these keystrokes:

- **SHIFT-CLICK** to apply the same method to consecutive fields
- **CONTROL-CLICK** for non-consecutive fields.

When you have chosen the aggregation methods for each field, click **OK**.



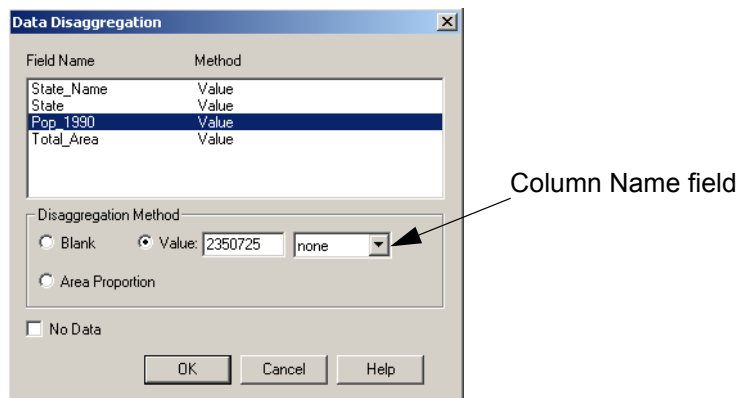
MapInfo Professional computes the new object and displays it as a single object. Use the Info tool to view the aggregated data (if any) associated with the object.

Keep in mind that the Objects Combine command works with selected map objects. To apply the combine operation to an entire table, use **SELECT ALL** in the **QUERY** menu. To combine into groups rather than objects, or output to a separate table, use **COMBINE OBJECTS USING COLUMN** in the **TABLE** menu.

Combining Objects with Different Table Structures

If the tables you are combining have the same table structure, the process we have discussed in [Combining Objects with Set Target on page 363](#) works perfectly. When you are working with two tables with different table structures, the Data Disaggregation options are slightly different.

When the input table has a different table structure from the output table, the Data Disaggregation dialog box displays a Column Name field to accommodate the table structure.



The **AREA PROPORTION** radio button is active if the selected field is numeric. Also the Value entry field is enabled when you select the Value radio button and the drop-down list contains “none”.

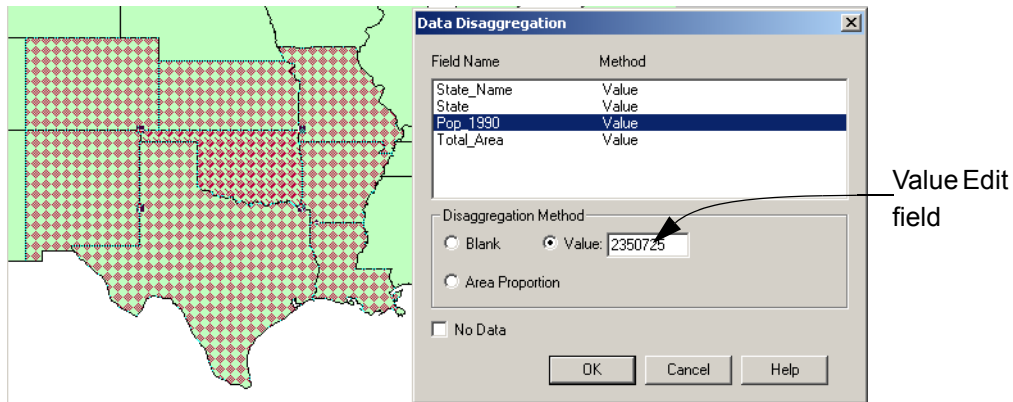
Splitting Objects

Splitting Objects allows you to divide the target object into smaller objects, using another object as a cutter. You can also combine objects into territories using redistricting. For more about the redistricting process, see [Redistricting — Grouping Map Objects into Districts in Chapter 15 on page 518](#).

For instance, you might use Split to separate a large territory into smaller units.

To split map objects using Set Target:

1. Select the object(s) in an editable layer to be the target.
2. On the **OBJECTS** menu, click **SET TARGET**. The object(s) displays in a different style to indicate that it is the target object.
3. Select (or create and select) one or more map objects from any layer in the Map window to be the cutter object. The object must be a closed object.
4. On the **OBJECTS** menu, click **SPLIT**. The Data Disaggregation dialog box displays.



5. Highlight each field and select the appropriate disaggregation method in the Destination list. You can select the **NO DATA** check box to indicate that you want to bring over no data for any fields. See the definitions for these methods in [Aggregating and Disaggregating Data on page 363](#).

- **BLANK** — Select this option to store blank values in the selected field(s). We recommend you choose the Blank option to blank out individual fields only.
- **VALUE** — Select this option to store the value that you enter in the Value Edit field in the selected field(s) of the new table.

If the table structure you are splitting from has a different table structure than the table you are saving the results to, a drop-down list displays beside the Value Edit field. This list contains the columns associated with the table you are saving the split data to.

To save the value in this field to a particular column in the new table (layer), select the column from the list.

- **AREA PROPORTION** — Select this option if the field is a numeric field, to adjust the area proportion to reflect the proportion of the newly split object.

Note: To select more than one field in this dialog box at a time:

- **SHIFT-CLICK** to apply the same method to consecutive fields
- **CONTROL-CLICK** for non-consecutive fields

6. Click **OK**.

MapInfo Professional computes the new objects and displays them. Use the Info tool to view the disaggregated data (if any) of the split objects.

Splitting Map Objects Using a Polyline

You can split multipoints and collections, as well as closed objects (regions, ellipses, rectangles, and rounded rectangles), and linear objects (polylines, lines and arcs) using the Polyline Split command.

As mentioned previously, splitting objects requires that the cutter be a closed object. With Split Using Polyline, the polyline cutter will first be transformed into a region suitable for the cutter operation. The region created will be displayed for acceptance. The polyline(s) used as the cutter must be contiguous and non-branching. In general, if the cutter polylines were to be combined, the result would be a one single section polyline. If the cutters are not polylines, and are not contiguous and non-branching, then an error will occur, and the operation will be cancelled.

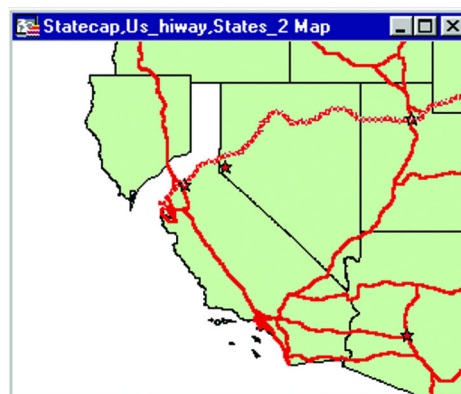
You cannot use Polyline Split on text objects or to cut objects that are not in editable layers. To split a map object:

1. Make the Target Table editable (on the **MAP** menu, click **LAYER CONTROL**) or by picking the editable layer in the Editing box in the bottom tray.
2. Select the object(s) to be used as targets for editing using the selection tools or by using the **QUERY** menu to click **SELECT** or **SQL SELECT**.
3. Set the objects as targets using the Set Target command, or by using the MapBasic Set Target On statement.
4. Create the cutting object(s) (or use objects from the same or different layer). The cutter object(s) must be contiguous, non-branching polylines.
5. Select the cutting object.
6. On the **OBJECTS** menu, click **POLYLINE SPLIT**.
7. A region object is created from the polyline to be used as the cutter object.

Note: Only objects that intersect the original polyline will remain as targets. Some objects may be removed from the list of target objects.

8. Choose **NEXT** to display the Data Disaggregation dialog box.
The Data Disaggregation splits the data associated with a map object into smaller parts to match the new map objects. For example, you may want to split a state into regions and have the data previously associated with the entire state proportioned for each new region. Complete the Data Disaggregation dialog box.
9. Click **OK**. The target object(s) will now be split into smaller map objects.

After splitting the target object(s), MapInfo Professional deletes the original target from the table. The new objects are appended to the end of the table.



Creating Territories by Combining Objects

Creating territories is one of the most common tasks performed with MapInfo Professional. Most people create territories by combining two or more smaller regions to create a larger one. Police departments combine postal code boundaries to create precinct boundaries. Sales managers combine county boundaries or state boundaries to create sales territories. Political analysts combine census tract boundaries to create voting districts.

Remember, when you are combining regions, you are also combining the data associated with the regions. If you combine regions without somehow aggregating the data associated with the regions, that data will be lost. For some applications, you might not want to save your data. For example, you are merging census tract boundaries to create school districts. The census tract data is of no interest to you; you merely want the boundaries. There is no reason to aggregate the data, but you would want to apportion the demographic data. For most tasks, you'll want to save the data associated with the regions.

MapInfo Professional gives you three methods for combining regions.

1. The first method, Combine, works with objects that are selected.
2. The second method, Combine Objects Using Column, is used to combine objects into groups based on a specified column.
3. The third method, Redistricting, is covered in [Redistricting — Grouping Map Objects into Districts in Chapter 15 on page 518](#).

Most frequently, the Combine Regions options are your easiest and quickest options for combining regions and creating territories.

Combining Selected Objects

When you choose to combine objects, MapInfo Professional performs two operations:

- MapInfo Professional geographically combines the selected objects. The new object represents the geographical union of the original objects and the border between the regions disappears.
- MapInfo Professional performs data aggregation. As described earlier in this chapter, data aggregation is a process where MapInfo Professional calculates what the column values for the new object should be, based on sums or averages of the original objects.

Your setup of the Layer Control dialog box depends on whether you want to copy the result object to another layer (and, thus, save the original objects) or combine the objects in the original layer (and, thus, lose the original objects).

If you want to copy the result object, make the region's layer Selectable and another layer Editable. Specify a target object, then select the objects using any selection method and on the **OBJECTS** menu, click **COMBINE**. This will display the Data Aggregation dialog box where you tell MapInfo Professional how to combine the data. Fill in this dialog box and click **OK** to combine the objects to combine the objects' data. This method was discussed earlier in this chapter.

If you want to combine objects in the original layer, make sure that the layer is editable, select the objects in the layer, and on the **OBJECTS** menu, click **COMBINE**. Do not set a target. The data Aggregation dialog box displays. After the operation is complete, a new object will be added to the layer, and the original objects will be deleted.

Combining Objects Using Column

Combine Objects Using Column allows you to modify geographic data to create new map objects that contain data about the group. This feature is similar to redistricting in that it groups objects together, but goes beyond redistricting to combine a copy of the relevant objects while leaving the original objects untouched.

To access Combine Objects Using Column:

1. On the **TABLE** menu, click **COMBINE OBJECTS USING COLUMN**.

For example, you have a layer of states. You want to combine the state boundaries to create sales territories. The data record associated with each state looks like this:

SALES_REP	STATE	CUSTOMERS	AVG_SALES
Benita	West Virginia	1782	24231.4
Benita	Ohio	121	33265.0

- SALES_REP: Sales representative assigned to that state
- CUSTOMERS: Number of customers per state
- AVG_SALES: Average spent per customer

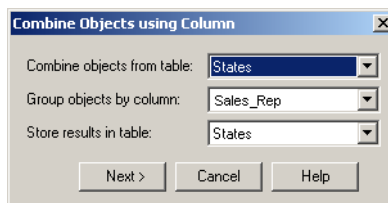
You would like to aggregate the data in the following manner:

- SALES_REP: Combine all records that list Benita as the sales representative
- CUSTOMERS: Sum up the number of customers in the sales territory
- AVG_SALES: Average the amount spent per customer in the sales territory

When performing a Combine Objects Using Column operation, you must specify which column contains the grouping information. In the preceding example, the grouping information is located in the SALES_REP column. We want to combine all of Benita's individual territories into one large territory.

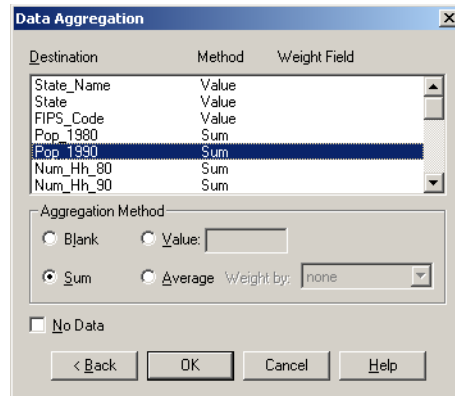
2. Choose the appropriate column from the Group Objects by Column popup.

In our example, you would choose the SALES_REP column from the Group Objects By Column popup. MapInfo Professional combines all records that have common data in the column. In other words, MapInfo Professional combines all records that have the same sales representative.



3. Specify the table and the grouping column.

- If you choose **<NEW>** from the **STORE RESULTS IN TABLE** drop-down list to create a new table for the combined objects you will be prompted with a series of dialog boxes to create a new table.
- If you specified an existing table, you need to tell MapInfo Professional how to combine the data. To aggregate your data, press the **NEXT** button to display the Data Aggregation dialog box.



- Once you have completed both dialog boxes, press **OK**. MapInfo Professional combines the records based on the column specified in the Group Objects By Column drop-down list. MapInfo Professional also aggregates the data and combines any objects associated with the records.

Creating a Voronoi Polygon

The Voronoi polygon is a partition of space into cells. Voronoi takes points and produces regions (cells) as output where each cell contains exactly one point. Each cell is an area in which the contained points are closer to the enclosed site than to any others. Use Voronoi to generate these polygons from a designated set of points. It is useful for dividing areas of responsibilities for field offices or possibly postal zones. It ultimately gives you the areas that are closest to your point of interest. You can create a Voronoi polygon within the same layer, or select points from one layer and place the Voronoi polygon in another layer.

To create a Voronoi polygon:

- Select at least three points. The Voronoi polygon is constrained by the bounding box of the selected points. You can also use a target region to constrain the size of your polygon.
- On the **OBJECTS** menu, click **VORONOI**. The Data Aggregation dialog box displays.

Note: To save the Voronoi polygons you create to a new table, see [Saving your Voronoi Polygon as a New Layer on page 371](#).

- Select a column from the list and select the data aggregation method for that column by selecting one of the following:

Note: Not all of these data aggregation methods display. The options depend upon the kind of data you are aggregating and whether the columns match.

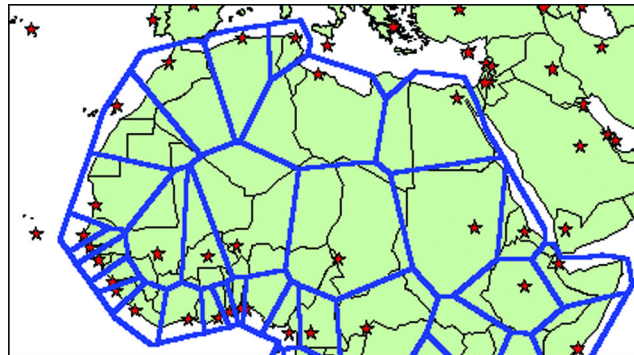
- Click the **BLANK** radio button to store blank values in the selected columns.
- Click the **VALUE** radio button to enter an appropriate value which to be stored in the new row.

Note: You can specify the data aggregation method to be performed for one column or for more than one by following these directions:

- Click a column name to select a single column
- SHIFT-CLICK** columns to select contiguous column names and apply the selected aggregation method to all of them
- CONTROL-CLICK** to de-select a column

Note: To create a voronoi table of the selected objects with no data in them, click the **NO DATA** check box instead. Selecting this check box disables the column selection in the Data Aggregation list.

The following is a sample of a Voronoi polygon used in northern Africa:



Saving your Voronoi Polygon as a New Layer

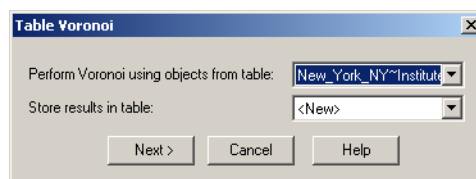
The Table Voronoi operation provides another way to create Voronoi polygons from a table and provides a mechanism to place the results into a new table. This process is not directly available using the Objects Voronoi operation.

Note: You cannot place Voronoi polygons in the Cosmetic Layer.

To set up a Voronoi polygon in new table or in an existing table:

1. Open and display the table for which you want to create Voronoi polygons.

Note: If you want to use a selection to create the Voronoi polygon, hold down the **SHIFT** key and select the points you want. This is not required. If you do not make a selection at this point, MapInfo Professional will use all of the points on the selected layer to create the polygon.
2. To create a boundary for the Voronoi polygon layer you are creating, use the Target Object feature described in [Overlaying Nodes on page 386](#). This is not required.
3. On the **TABLE** menu, click **VORONOI**. The Table Voronoi dialog box displays.



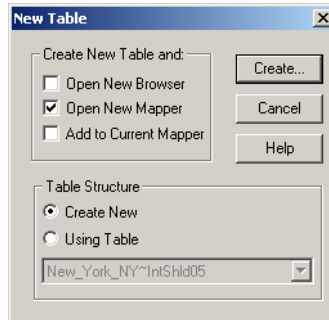
4. Select the layer you want to create the Voronoi polygon with in the **PERFORM VORONOI USING OBJECTS FROM TABLE** drop-down list. If you selected points you want to use to create this polygon, choose the "Selection" entry in this list.
5. Select the table type for the results of the Voronoi polygon from the Store results in table drop-down list:
 - **NEW TABLE** — allows you to save the Voronoi polygon in a new table
 - **<TABLENAMES>** — allows you to save the Voronoi polygon into one of the currently open tables that contain point objects
6. After you make this selection, click **NEXT** to continue. Do one of the following:
 - If you selected the **NEW TABLE** option, go to [Save the Voronoi Polygon to a New Table on page 372](#).

- If you selected the <TABLENAMES> option, go to [Save the Voronoi Polygon to an Existing Table on page 373](#).

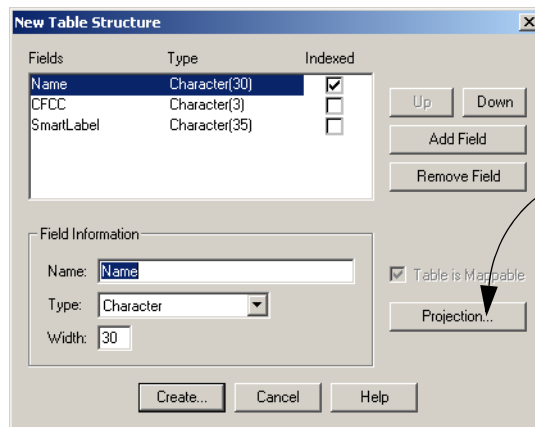
Save the Voronoi Polygon to a New Table

To save the Voronoi Polygon to a new table:

1. In the New Table dialog box, follow these directions:



2. Use the **CREATE NEW TABLE AND** check boxes to indicate where you want the new Voronoi polygon to display. You can click more than one option. The options include:
 - **OPEN NEW BROWSER** — Click this check box to display the new Voronoi polygon in a new Browser window only.
 - **OPEN NEW MAPPER** — Click this check box to display the new Voronoi polygon in a new Map window.
 - **ADD TO CURRENT MAPPER** — Click this check box to display the new Voronoi polygon in the current Map window.
3. Choose one of these options to specify the table structure for the new table:
 - **CREATE NEW** — Click this option to create a new table structure and add the new fields in the New Table Structure dialog box.
 - **USE TABLE** — Click this option to create the new table structure based on the fields in an existing table. You can base your new table structure on any open table.
4. Click **CREATE**. The New Table Structure dialog box displays.



Click the **PROJECTION** button to set the projection for this table. For more about Projections, see [Understanding Coordinate Systems, Projections, and their Parameters in Chapter 14 on page 474](#).

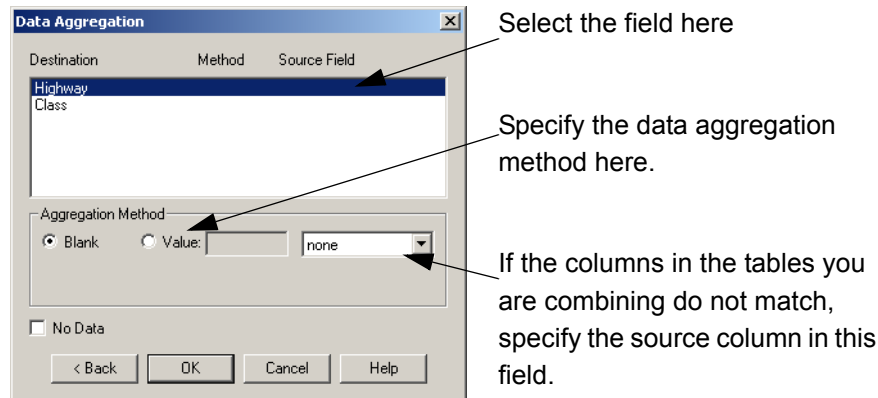
Note: If there are entries in this dialog box, you are copying the table structure of an existing table. If you opted to create a new table structure, there are no fields to list.

5. In the New Table Structure dialog box, you can add and remove fields to create a new table structure. Click the **ADD** button and type a name, field type, and field width in the fields and drop-down list provided to create a new field in the new table.

- When you have completed the table structure, click **CREATE** to create the table and display the Voronoi polygon according to the display settings you specified. The Create New Table dialog box displays so you can save the name of the new table.
- Type the name you want the new table to have in the File Name field and click **SAVE** to save it. You can choose a new directory in this dialog box as well.

Save the Voronoi Polygon to an Existing Table

- When you choose to store the table results in the existing table, the Data Aggregation box displays.



Note: If you selected tables with disparate values, there may be additional fields in this dialog box. You need to reconcile these table values using this dialog box.

- To specify the data aggregation you want MapInfo Professional to use to create the new table structure, highlight each field in turn and do one of the following:
 - BLANK** — Use this option to indicate that this field should remain blank.
 - VALUE** — Use this option to indicate that this field should contain a specific value or should retain its existing value. If the field should contain a specific value, enter that value into the Value field.
- Note:** Other aggregation methods may be available based on the data columns in the tables. See [Aggregating and Disaggregating Data on page 363](#) for these details.
- If the new table information should add no data to the existing table, select the **NO DATA** check box to disable the other field options.
 - After you have completed these selections and entries, click **OK**.

Grouping Objects using Multipoint and Collection Object Types

The Multipoint and Collection object types allow you to group multiple objects into a single object. One way to create multipoints and collections is by using the Combine command (on the **OBJECTS** menu, click **COMBINE**). These object types aid in the translation and live access of other GIS data formats, such as ArcView Shape Files, and are more compatible with GIS standards. This is particularly useful for sharing maps with others using different software.

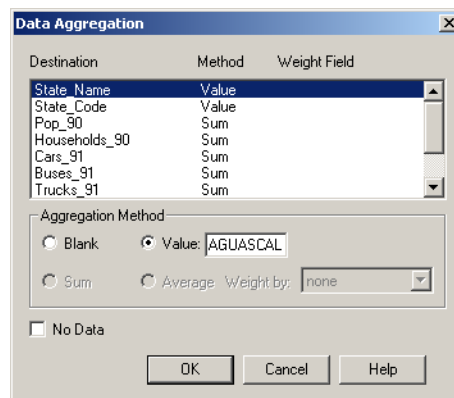
A Multipoint object consists of a number of points that have been grouped into a single object. The Multipoint object displays in a Browser window as a single record, and all the points within the object have the same symbol. One method you can use to create a multipoint object is to select a group of point objects and combine them.

A Collection object consists of multipoint objects, zero or one polyline objects, and zero or one region objects that have been grouped into a single object.

MapInfo Professional automatically converts homogeneous Collection objects to a more specific type, e.g., a Collection object that contains only polylines is automatically converted to a multipolyline object.

To create a Multipoint or Collection object using Combine:

1. Make the layer that you are going to select from editable if it is not already.
2. Select the objects you want to combine.
3. On the **OBJECTS** menu, click **COMBINE**. The Data Aggregation dialog box displays.

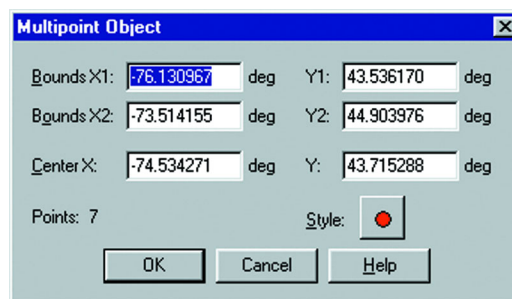


Note: Text objects cannot be used as input in a Combine operation.

4. Select the column(s) that you want to use in the aggregation and an aggregation method.
5. Click **OK**. The objects are combined into a single object.

Any point objects selected are combined to form a multipoint object. Any polyline objects selected are combined to form a new region object. The resulting multipoint (if one exists), polyline (if one exists) and region (if one exists) are grouped together to form a new collection object.

For an existing multipoint or collection object, you may need to change its styles or view the bounds information. To do so, either double-click the object, or right-click the object to display the shortcut menu and choose **GET INFO**. The Object Info dialog box for the selected object displays. If the object is not editable, the controls in the Object Info dialog box are read only.



In multipoint objects, you can change the style of the symbol that represents the multipoint. Click the **STYLE** button to display the Symbol Style dialog box.

In a collection object, you can change the styles of the different object types in your collection. Click the corresponding **STYLE** button for each object type you want to change.

Collection Object

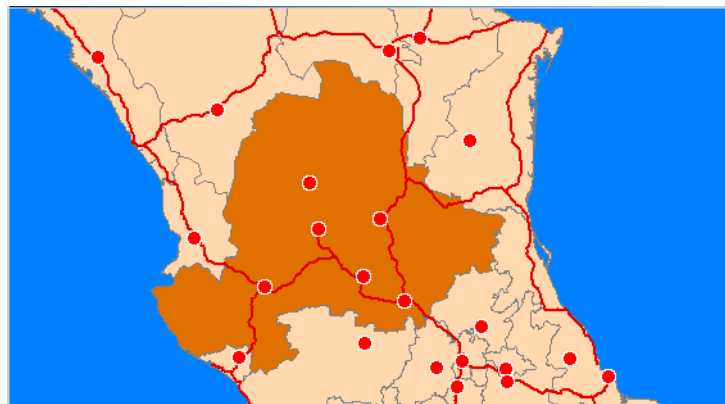
Bounds X1: deg Y1: deg
 Bounds X2: deg Y2: deg
 Center X: deg Y: deg

Region
 Total Area: 10,750 sq mi (Spherical)
 Total Perimeter: 585.2 mi (Spherical)
 Line Segments: 1047
 Polygons: 34 Style:

Polyline
 Total Length:
 Line Segments:
 Sections:
 Smooth

Multipoint
 Points: 5 Style:

OK Cancel Help



Combining Objects with Multipoint and Collection Objects

The Combine command makes use of the Multipoint and Collection object types introduced in MapInfo Professional 6.5. You can use Points, Multipoints, and Collections as input in a Combine operation.

In addition, heterogeneous combines are now possible using any combination of input objects, including Multipoints and Collections.

Note: Text objects cannot be used as input in a Combine operation.

The result of such a Combine is a Collection object.

Multipoint Objects

If you are combining point or Multipoint objects, the Combine operation produces a single Multipoint object comprising all input points.

Combining points is similar to other Combine operations in that the symbol style of the resulting object is the same as that of the first object to be combined. This object is normally the first object, in row order, of the table being combined.

Collection Objects

The result of a Combine operation that uses heterogeneous object types as input is a Collection object. The input objects of a Collection object can be a mix of any of the following:

- Point or multipoint objects (zero-dimensional)
- Linear objects – lines, polylines, and arcs (one-dimensional)
- Closed objects – regions, rectangles, rounded rectangles, and ellipses (two-dimensional)
- Collection objects

Heterogeneous Combine operations take place in stages. First, all objects of the same dimension are combined separately. The Combine operations are done in the following manner:

- All point and Multipoint objects, as well as the Multipoint component of any Collection object in the input are combined into a new Multipoint object.
- All line, polyline, and arc objects, as well as the polyline component of any Collection objects in the input are combined into a new polyline object.
- All regions, rectangles, rounded rectangles, and ellipses, as well as the region component of any Collection objects in the input are combined into a new region object.

Note: As in other Combine operations that involve rounded rectangles, all rounded rectangles are treated as rectangles.

The resulting Multipoint, polyline, and/or region objects are then assembled into a new Collection object.

The styles for the new Collection object are derived from the styles of the separate Combine operations. These styles are assigned according to the style of the first object, in row order, of the table being combined. Keep in mind that the row order of an object may have nothing to do with the order in which you selected the objects for the Collection.

For example, the style of a Multipoint component of a Collection object is the style of the first point, Multipoint, or Multipoint component of a Collection encountered in row order. The style of a polyline component of a Collection object is the style of the first linear object or polyline component of a Collection encountered in row order. The style of a region component of a Collection object is the style of the first closed object or the region component of a Collection encountered in the input, in row order.

Creating and Manipulating Objects

The operations in this section do not make use of a target object to perform analysis or data aggregation. These tasks use selections to create new objects so that you can perform further mapping operations on those objects. The results of the operation are placed in the editable layer. The original objects remain unchanged.

Enclosing Objects

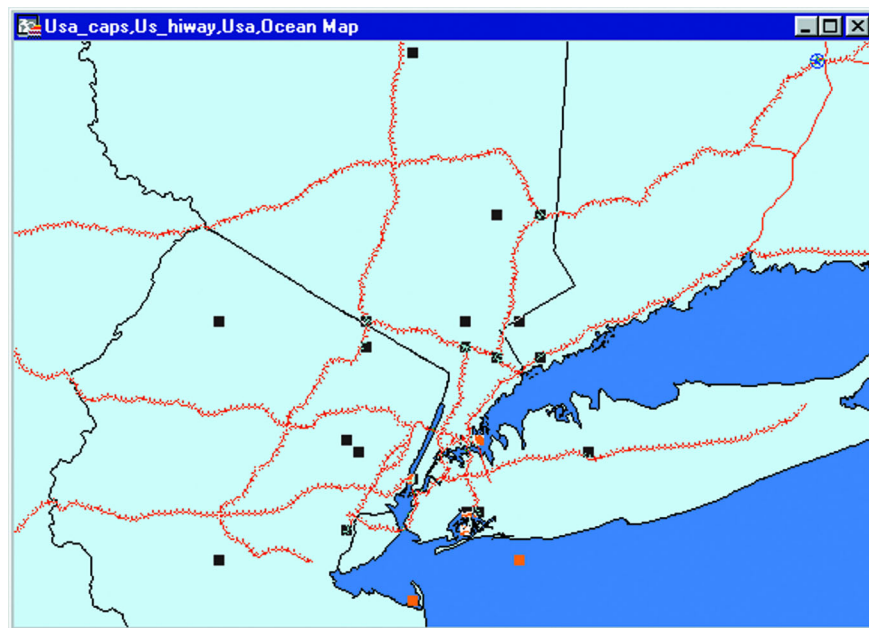
The Enclose command enables you take polyline objects and create regions from the polygonal areas formed by the intersecting polylines. You can form a new region network anyplace where the polylines form an enclosed area. For example, you could create regions from a road network, where the regions would be the parcels of land between the roads.

You can also use the Enclose command with region objects.

This command is modeled after the Combine command, but has two important differences:

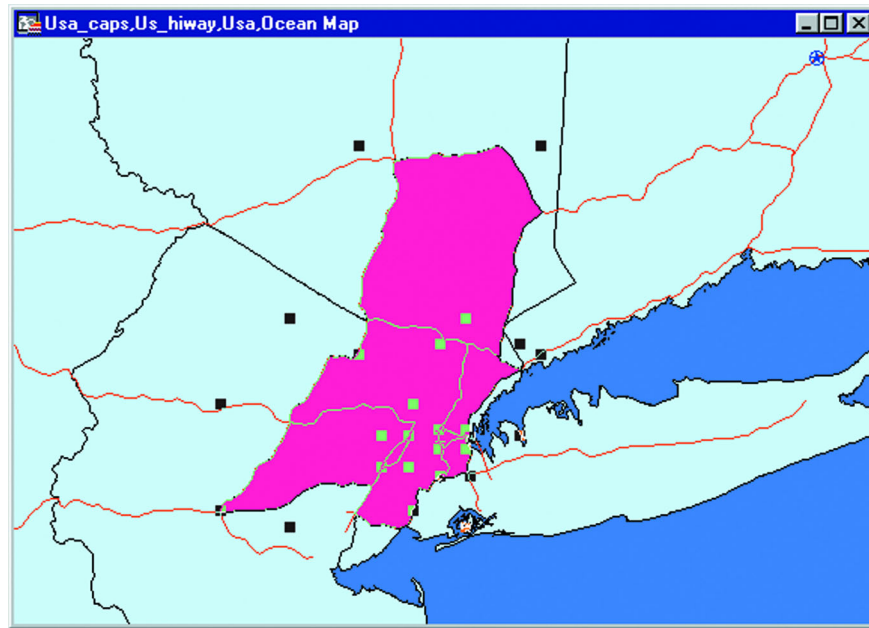
- Combine always produces one object, while Enclose may produce many objects.
- No data aggregation is performed with the Enclose command.

To use the Enclose command, your Map window must be active, it must contain an editable layer, and objects in the editable layer must be selected. This is a highway map of the greater New York City metropolitan area. A number of the highways have been selected.



To form regions from the selected polylines:

1. In the active Map window, make the layer you want to select from editable.
2. Select the objects you want to enclose.
3. On the **OBJECTS** menu, click **ENCLOSE**. The Create Region Objects from Enclosed Areas dialog box displays.
4. To ignore region objects in the operation, leave the box checked. To include region objects, clear the box. If regions are to be used as input objects, they are automatically converted to polylines for the Enclose operation.
5. Your map displays. The newly formed polygons are selected.



Enclose preserves the original objects. The selected objects are used as the input objects, and the results of the operation are placed in the current editable layer in the active Map window.

When you include regions and other closed objects in the Enclose command (regions, rectangles, rounded rectangles, and ellipses), the input regions are considered polylines for the purposes of this operation. The regions are converted to polyline objects, and then the Enclose operation is performed. It is the same as if you were to first convert any closed objects to polyline objects, and then perform the Enclose operation.

If your selection contains objects that are not linear and are not closed (e.g., points, multipoints, collections or text objects), you will get an error. If the selection contains closed objects, and the *Ignore Region Objects* box is checked, then these closed objects will be ignored.

Checking Regions

You can check region maps for possibly badly formed objects with the Check Regions command, which is available by selecting the object you want to check and on the **OBJECTS** menu, click **CHECK REGIONS**.

Check Regions detects errors in your data that may produce problems or incorrect results when various operations are performed. There are a couple of rules associated with the Check Regions dialog box. You must select the regions you want to check before you use the Check Regions command. The objects must reside in one layer, and they must all be closed objects. MapInfo Professional places the Check Region results in the current editable layer in the active Map window. There is no data aggregation or disaggregation performed on this data and no data is associated with the objects created. The options for the Check Region dialog box are explained in detail in this section. To see examples of the gap and overlap regions, see the illustrations at the end of the [Cleaning Objects on page 380](#) section.

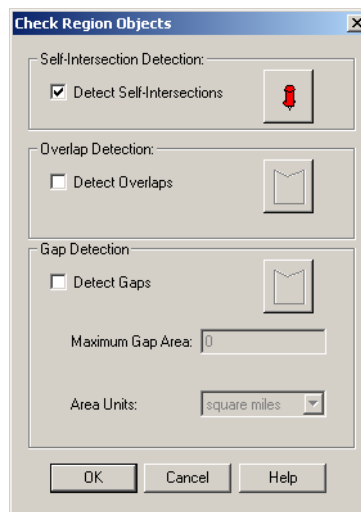
The Self-Intersection Detection option helps you to check your regions for areas that cross over themselves, which could cause errors later on. When you use this option, Check Regions creates a point at the location where the data may self intersect. To change the symbol used to indicate self intersections, click the **STYLE** button in the Self-Intersection Detection group to display the Symbol Style dialog box. You can make the desired changes here.

The Overlap Detection option checks the data for places where regions overlap each other. When you use this option, Check Regions creates regions that represent any areas of overlap. To change the fill of the overlap regions, click the **STYLE** button in the Overlap Detection group to display the Region Style dialog box. You can make the desired changes here.

The Gap Detection option checks the data for places where region boundaries do not line up, causing a space or gap between regions. Some gaps in boundary data may be naturally occurring, such as a lake. Generally, gaps that are errors are caused by misaligned boundaries, and are generally small. A maximum gap area must be entered for gap detection. Gaps larger than this area are ignored and not flagged. This should help differentiate natural gaps, such as lakes, from misalignment errors. To change the fill of the gap regions, click the Style button in Gap Detection group to display the Region Style dialog box.

To use the Check Regions command:

1. Make sure your Map window is active and that you have an editable layer.
2. Select the region object(s) that you want to check.
3. On the **OBJECTS** menu, click **CHECK REGIONS**. The Check Region Objects dialog box displays.



4. To check for self-intersections, select the **DETECT SELF-INTERSECTION** check box. The **SYMBOL STYLE** button enables. The check box is set by default.
5. To check for region overlaps, select the **DETECT OVERLAYS** check box. The **STYLE** button for Overlap Detection enables. The check box is cleared by default.
6. To check for gaps, select the **DETECT GAPS** check box. The **REGION STYLE** button, the **MAXIMUM GAP AREA**, and the **AREA UNITS** are activated. The check box is cleared by default.
7. Click the **SYMBOL STYLE** button to change the symbol style used to indicate the location style of the self intersections.

If you specified Overlap Detection, click the **REGION STYLE** button to change the fill pattern for the regions that represent the areas of overlap.

8. Click **OK**. Your map redraws, and the self intersections, overlapping regions and gaps, if specified, are displayed. If you specified Gap Detection, check the **REGION STYLE** button in the Gap Detection group to change the fill pattern and color used to represent gaps.

The settings are retained per session and per layer. When you close MapInfo Professional and reopen the program, the Overlap Detection check box is reset to the default. If you select another layer, Overlap Detection is also reset to the default (not selected). This per-session and per-layer scheme is also used in other operations such as Buffer and Convex Hull.

Note: Check Regions does not correct your data; it only shows the location of the incorrect data.

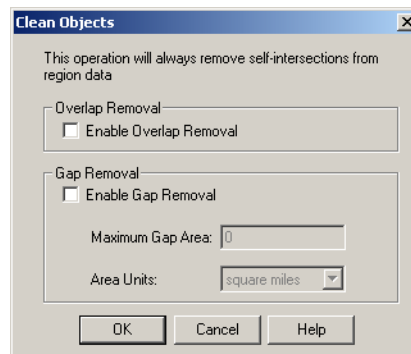
Cleaning Objects

The **CLEAN** command available from the **OBJECTS** menu enables you to remove any self-intersections in your region data and optionally alter region data to remove overlaps and/or gaps. **CLEAN** is available whenever there are objects selected, and the table that the objects are in is editable.

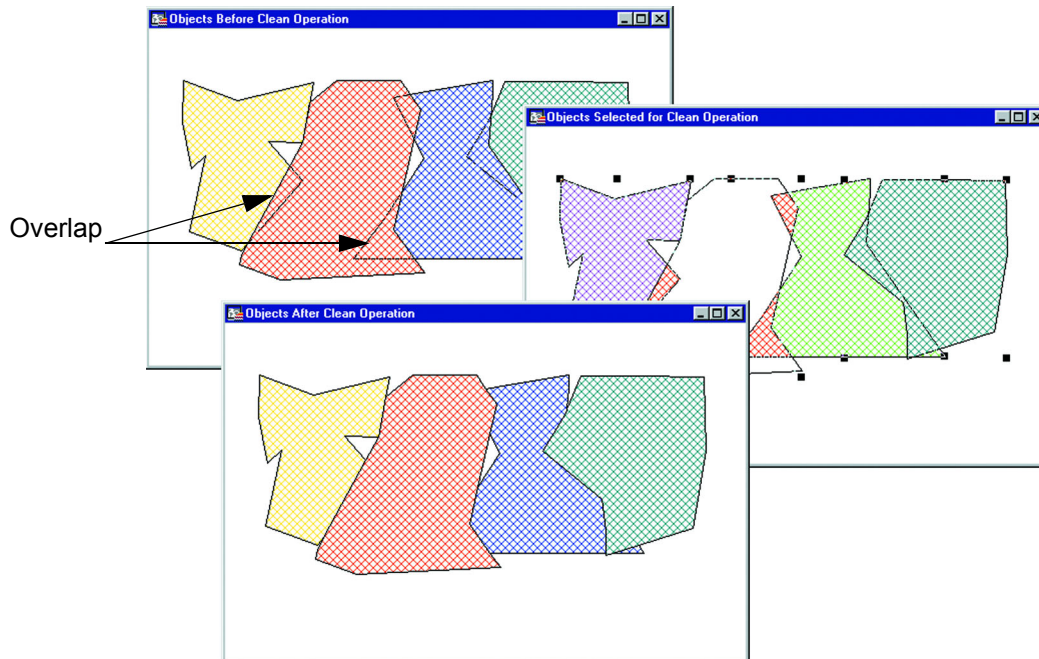
Note: All of the objects selected must be closed objects (e.g., regions, rectangles, rounded rectangles or ellipses).

To use the Clean command:

1. Open any Map window that includes a region layer.
2. Make the region layer editable if it is not already (on the **MAP** menu click **LAYER CONTROL**).
3. Select the objects that you want to clean. Ideally, all the objects in the table would be selected.
4. On the **OBJECTS** menu, click **CLEAN**. The Clean Objects dialog box displays.



5. Click the **ENABLE OVERLAP REMOVAL** check box to remove any overlapping areas. The area of overlap will be retained in the region that has the largest area; the overlap will be removed from any other overlapping regions.
6. Click the **ENABLE GAP REMOVAL** check box to remove any gaps between regions, where the area of the gap is less than the area provided. The area of the gap will be added to the adjacent region with the longest shared edge. Specify a maximum gap area and the area units you want to use.
7. Click **OK**.



There are several things you should be aware of when using the Clean command. Although Clean works on a selection of objects, it is designed to be used on an entire table at once. If clean is used on a selection, rather than on the whole table, problems can occur. For example, if not all the objects are included in the Clean operation, some of the object intersections can be missed, and problems can remain.

In addition, Clean could introduce new overlaps and gaps if not all of the objects in the table are used as input. The Clean operation places new nodes at the point of each intersection it encounters. The presence of these nodes can slightly change the size and shape of objects, although you would have to zoom in very closely to the site of the new nodes to notice it. These slight alterations have the potential to create small gaps and overlaps in what were previously common boundaries with other objects not included in the Clean operation.

Clean also removes the overlap when one object is completely inside another, however, if one object is completely inside another object, the object which is inside (often smaller than the containing object) remains, while a hole is punched in the containing object. The result does not contain any overlaps.

Snapping Nodes and Thinning Objects

The Snap/Thin command enables you to set snap tolerances for nodes in different objects, and node and polygon thinning settings for your data. Snap/Thin also removes any self-intersections and overlaps in region data.

The Snap/Thin command has three main functions:

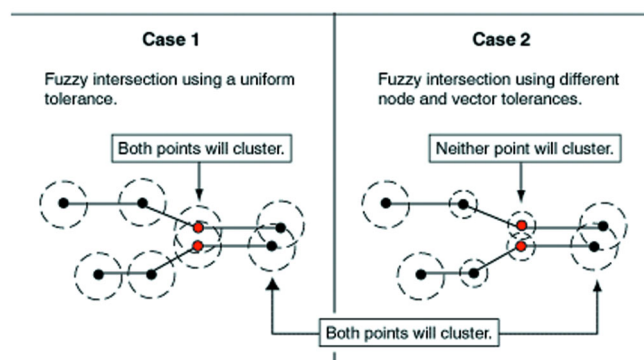
- The Inter-Object Node Snap – Snaps nodes from different objects together.
- The Node Thinning/Generalization – Removes nodes from objects while retaining their shape. When you thin region objects, shared boundaries are retained.
- Polygon Area Thinning – Removes small polygons from selection.

Snap/Thin is available whenever objects are selected in an editable table. The selected objects must either be all closed objects or all linear objects. Snap/Thin cannot be used on a selection that contains a mix of closed and linear objects.

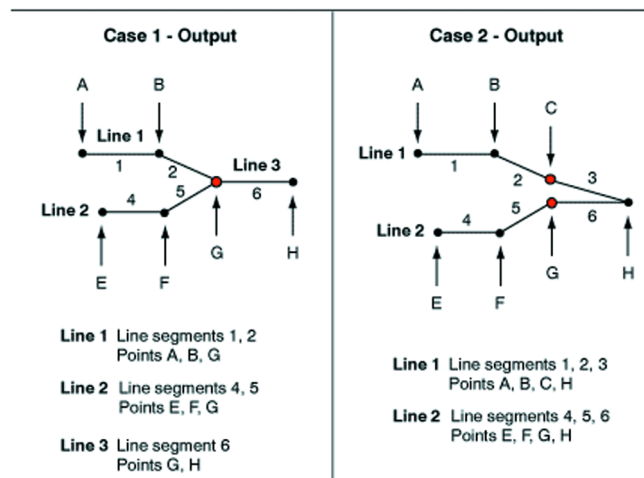
Inter-Object Node Snap

In addition to snapping nodes of different objects together, Inter-Object Node Snap enables you to eliminate small overlaps and gaps in region objects as well as connect polyline objects that are close, but do not touch each other.

The End Node tolerance setting is the tolerance value for the end nodes of a polyline. If there is another node in the same object or a different object that is within the specified tolerance of an end node of a polyline, one or both of these nodes will be snapped together so that they occupy the same point. The Internal Node tolerance is used for all other non-end point nodes of a polyline.



For polylines, the End Node tolerance must be greater than or equal to the Internal Node tolerance. You will receive a warning message if they are not. In many instances, the End Node and Internal Node tolerances should be set to the same value, although they can be set separately.



For regions, the designation of end nodes and internal nodes is irrelevant, since the nodes of regions form closed loops. Therefore, when you specify tolerance settings for regions, the End Nodes Tolerance box is unavailable. The only tolerance value you specify is the Internal Node Tolerance. This value is used for all nodes in region objects.

Specify the unit of measurement for the snap tolerance in the Tolerance Units drop-down list.

Node Thinning and Generalization

In node thinning and generalization, nodes are removed using a 3-Node Co-linear Deviation value. This value is determined by connecting three nodes to form a triangle and measuring the perpendicular distance between the second node and the line segment connecting the first and third nodes. If this distance is less than or equal to the 3-Node Co-linear Deviation distance, the three points are considered co-linear and the middle (second) point is removed from the object.

The Node Separation tolerance is used to thin nodes within an object that are close together. If two successive nodes in an object are closer than the Distance tolerance, then one of the nodes is removed from the object. Set the unit of measurement for the Thinning/Generalization values in the Distance Units drop-down list.

Polygon Area Thinning

In polygon area thinning, polygons that are smaller in area than the Minimum Area value will automatically be removed. The polygon can be part of a multi-polygon region, in which case only that polygon is removed from the region, and the rest of the polygons in the region are retained. Set the unit of measurement polygon thinning in the Area Units drop-down list.

To use Snap/Thin:

1. Open a Map window containing the layer whose objects you want to work with.
2. Make sure the layer is editable (on the **MAP** menu, click **LAYER CONTROL**).
3. Select the objects you want to manipulate.
4. On the **OBJECTS** menu, click **SNAP/THIN**. The Set Values for Snap & Thinning dialog box displays.

Set Values For Node Snap & Thinning

This operation will also clean data: removing any self intersections and overlaps in region data

Inter-Object Node Snap
Nodes in different objects within tolerance will snap together

Enable Node Snap

End Node Tolerance: 0
Internal Node Tolerance: 0
Tolerance Units: miles

Node Thinning/Generalization
Removes Polygon/Polyline nodes when a 3-node sequence is almost linear or nodes are close together.

Enable Node Thinning/Generalization

3-Node Collinear Deviation: 0
Node Separation: 0
Distance Units: miles

Polygon Area Thinning:
Polygons smaller than this area will be removed

Enable Polygon Area Thinning

Minimum Area: 0
Area Units: square miles

OK Cancel Help

5. Specify the Inter-Object Node Snap settings. Select the **ENABLE NODE SNAP** check box to activate the settings.
6. Specify the End Node, Internal Node, and the Tolerance units.
7. Specify the Node Thinning/Generalization settings.
8. Select the **ENABLE NODE THINNING/GENERALIZATION** check box to activate the settings.
9. Specify the 3-Node Co-linear Deviation, Node Separation, and Distance Units values.
10. Specify the Polygon Area Thinning settings. Select the **POLYGON AREA THINNING** check box to activate the settings.
11. Specify the Minimum Area and Area Units for the polygons to be removed.

Note: Distance measurements for all three Snap/Thin operations are calculated using the Cartesian method. Tables that are in a Latitude/Longitude coordinate system will not measure these tolerances accurately.

Snap/Thin will clean bad data (self-intersections and overlaps), even if no Snap or Thin values are used. It uses a related, but not identical, mechanism as is used in the Clean command, and thus may produce similar, but different, results than can be obtained using Clean. For example, overlapping polygons will have the overlap removed, but which region retains the overlap, and which region it is removed from will often be different from those that result from the Clean command. It is generally not easily determine this before the operation.

Disaggregating Objects

The Disaggregation feature breaks apart objects and their data into their component parts.

You can use Collections as input, ignoring all other objects, to produce a region object, a polyline object, and a multipoint object, if each exists in the Collection. As many as three new objects will be created from disaggregating the Collection.

You can also break any multi-part object into its components:

- Regions produce new region objects with one polygon per object. Optionally, holes (interior boundaries) of the original object can be retained as a hole in the result object. Otherwise, a hole will produce a separate, single (solid) polygon region.
- Polylines produce new Polyline objects with one single segment polyline per object.
- Multipoint objects produce Point objects, with one new Point object produced for each node in the Multipoint.
- Collections will be recursively broken up. If a Collection contains a region, then that region will be broken up into multiple region objects as noted above. If the Collection contains a polyline, then it will be broken up into multiple polyline objects as noted above. If the Collection contains a Multipoint, then it will be broken up into point objects as noted above.

All other object types, including Points, Lines, Arcs, Rectangles, Rounded Rectangles, and Ellipses, will remain unchanged. This is only for Regions, Plines, Multipoints, and Collection objects.

To disaggregate objects:

1. Select the objects you want to disaggregate.
2. On the **OBJECTS** menu, click **DISAGGREGATE**. The Disaggregate Objects dialog box displays.
3. Choose one of the following:

- Select the **ALL OBJECTS** button to break up a multi-part object into its component parts.
 - Select the **COLLECTIONS ONLY** button to break up Collection objects.
4. If you selected All Objects, check the **RETAIN HOLES IN REGION** box to retain holes in the output objects. If you do not select the check box, a series of single polygon region objects will be produced, one object for each polygon in the original object. Holes, or interior boundaries, will produce solid polygon regions. No output region object will contain any holes.
 5. Choose **NEXT**. The Data Disaggregation dialog box displays.
 6. Select the **NO DATA** check box to prevent columns from the input table being carried to the output table.
 7. Select a Disaggregation method: **VALUE**, **BLANK**, or **AREA PROPORTION**.
 8. Click **OK**.

Erasing Objects

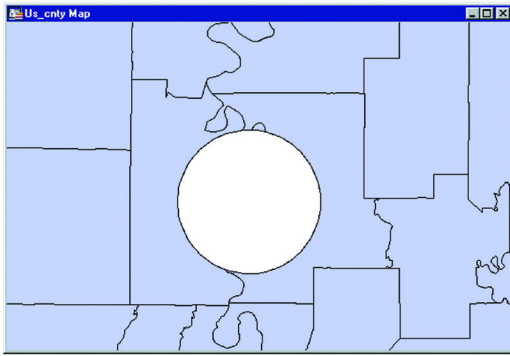
You have two choices in the Objects menu when you want to remove some portion of the target map object. Use **ERASE** to erase the portion of the target object that is overlapped by the cutter object. Use **ERASE OUTSIDE** to remove the portion of the target object that is *not* overlapped by the cutter object.

For example, to add a lake to a region, create the lake as the cutter, position it appropriately and use the Erase command to remove that portion of the target object under the lake.

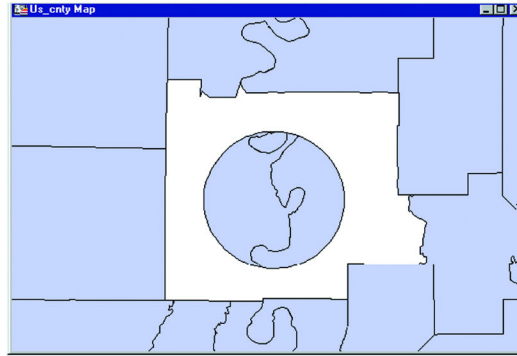
Both the Erase and Erase Outside commands support point, multipoint, and collection objects.

To erase map objects using Set Target:

1. Select the object(s) in an Editable layer to be the target.
2. On the **OBJECTS** menu, click **SET TARGET**. The object(s) displays in a different style to indicate that it is the target object.
3. Select (or create and select) one or more map objects from any layer in the Map window to be the cutter object. The object must be a closed object.
4. On the **OBJECTS** menu, click **ERASE** (or **ERASE OUTSIDE**). The Data Disaggregation dialog box displays.
5. Choose the appropriate disaggregation method (or **NO DATA**) for each field in the Destination list.
 - Shift-click to apply the same method to consecutive fields
 - Control-click for non-consecutive fields
6. Click **OK**.



End result of Set Target - Erase. Circular object is removed.



End result of Set Target - Erase Outside. All but circular object is removed.

MapInfo Professional will compute the new object and display it. Use the Info tool to view the disaggregated data (if any) of the split objects.

Overlaying Nodes

Overlay Nodes allows you to add nodes to the target objects at the points where the target intersects the cutter object.

For instance, when adding streets to a map that cross existing streets at intersections, use the Overlay Nodes command on the new street to add nodes that exactly overlay the nodes from the existing street.

To overlay nodes with Set Target:

1. Select the object(s) in an editable layer as the target. This is the object to which you want to add nodes. The objects may be closed or linear objects.
2. On the **OBJECTS** menu, click **SET TARGET**. The object(s) displays in a different style to indicate that it is the target object.
3. Select as the modifying object one or more map objects that intersects the target from any layer in the Map window. The cutter object may be closed or linear objects.
4. On the **OBJECTS** menu, click **OVERLAY NODES**.

MapInfo Professional adds the intersecting nodes to the target object(s).

Note: No data aggregation or disaggregation is performed with Overlay Nodes. The data after the operation remains unchanged.

Graphing Your Data

The graphing feature in MapInfo Professional® enables you to create a myriad of different graphs from three-dimensional bar graphs to exploded pie graphs. Each type of graph has its own set of features that you can customize to emphasize a particular piece of information, or create the aesthetic look you want for your graph. These features, plus additional formatting options, give you full control over the look and content of the graph.

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- ♦ **Graphing Your Data** 392
- ♦ **Working with Multi-Table and Multi-Variable Graphs** 398

Identifying the Right Type of Graph

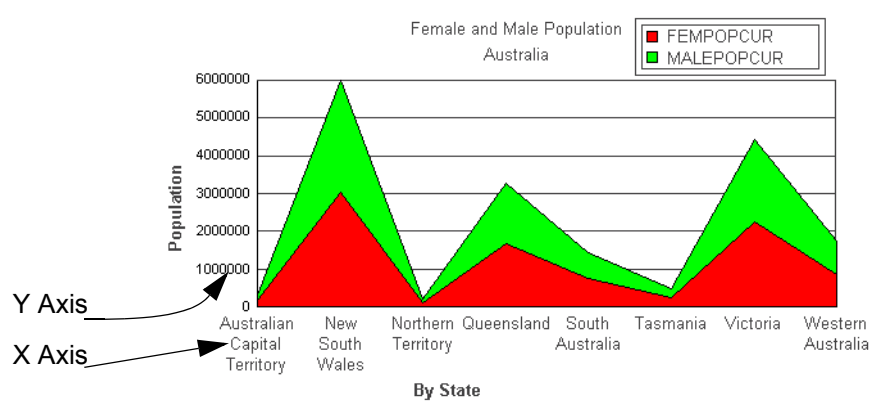
Think about this. What do you need your graph to tell your audience? This determines the type of graph you should select. In MapInfo Professional, you can choose from 10 different graph types. Each type of graph includes at least one graph template that you can use to create your graph. Each graph type, with a brief description of each template, is explained in the next section.

Graphing Terms

There are a couple of graphing terms you should be aware of as you read this chapter.

Axis (Axes)

An axis refers to a graduated line bordering the plot area of a graph. Coordinates are measured relative to the axes. By convention, the X-axis is horizontal and the Y-axis is vertical.



Data Series

A data series is the information your graph is based on.

Graph Object

A graph object is any selectable element in your graph.

Graph Series

A graph series is the row of objects you are graphing.

3D Graphs

The 3D graph option enables you to create three-dimensional (3D) graphs, which can give your information impact and depth. Most of the 3D template options are variations of a bar graph. Choose from any of the 3D templates listed in this section for the look you want for your graph. Once you create the basic graph, many more customizing options enable you to fine-tune its appearance, particularly the 3D Viewing Angle feature, where you can set the angle at which your 3D graph displays.

3D Bar – A conventional bar graph in 3 dimensions.

3D Floating Cube – Each value being measured, such as population, is displayed as a cube. The value is indicated by the placement of the cube in the graph. Cubes that have higher values appear to float within the graph.

3D Floating Sphere – This graph is the same as the 3D Floating Cube, except that each value being measured is displayed as a sphere.

3D Line – The values being measured for a category, such as a country or a city, are displayed as a continuous line across the axis. The line will dip and spike according to the values.

3D Pyramid – Each value being measured is displayed as a 3-dimensional pyramid. This graph is based on a bar graph — the higher the value, the taller the pyramid.

3D Round – This graph is the same as the 3D Bar graph, except that the values are displayed as cylinders instead of bars.

Area Graphs

Area graphs enable you to view your graph series as an area, where the area from the X axis to the plot line of the data series is filled in with a pattern or color. You can choose from the following templates:

Clustered – A clustered area graph draws area risers overlapping each other to show the absolute relationship between data series.

Percent – The percent area graph is an area version of a pie graph whose parts total 100%. Each group calculates the percent of the total required for each series. The axis goes from 0 to 100%.

Stacked – The area risers are stacked on top of each other. The axis is the cumulative total of all the groups.

Bar Graphs

Clustered – The clustered bar graph is a side-by-side group of bars. This is the standard type of two-dimensional graph.

Percent – The percent bar graph is a bar-graph representation of a pie graph. Each group calculates the percent of the total required for each series. The axis goes from 0 to 100%.

Stacked – The stacked bar graph displays stacked groups of bars. Each stack is made up of all series in this group, added up to obtain a total. The axis is the total value of the cumulative points.

Bubble Graphs

The bubble graph allows you to plot values on an X-Y axis and compare a third value, Z, by the size of the markers in the graph. The bubble graph requires three values per marker, X, Y, and Z, in that order. Another way to think of it is that the graph is an X-Y plot where the marker size depends on a third value, Z.

Column Graphs

Clustered – Each group of columns for a category are clustered together.

Percent – The percent column graph is a column-graph representation of a pie graph. Each group calculates the percent of the total required for each series. The axis goes from 0 to 100%.

Stacked – The stacked column graph shows stacked groups of columns. Each stack is made up of all series in this group, added up to obtain a total. The axis is the total value of the cumulative points.

Histogram Graphs

Histograms show frequency distribution. This graph type groups your values into ranges based on value. It measures the number of data values that fall within each range. The ranges are displayed as bars. Choose from these templates:

Horizontal – The orientation of the bars is horizontal.

Vertical – The orientation of the bars is vertical.

Line Graphs

Clustered – In a clustered line graph, lines draw on top of each other to show the absolute relationships between data series.

Percent – The percent line graph is a line-graph representation of a pie graph. Each group calculates the percent of the total required for each series. The axis goes from 0 to 100%.

Stacked – In a stacked line graph, lines stack on top of each other. The axis is the cumulative total of the all the groups.

Pie Graphs

Pie – The pie graph displays percentages of a total as pie wedges.

Ring Pie – The ring pie graph is a variation of the standard pie graph. It looks like a ring or donut. The total value of all the pie slices displays in the center.

Scatter Graphs

A scatter graph is a standard X-Y plot. It requires two values per marker, X and Y, in that order.

Surface Graphs

Surface – The surface graph displays all data points as a surface, like a rolling wave.

Surface with Sides – A variation of the surface graph, where the surfaces in the graph have solid sides.

Surface, Honeycombed – A variation of the surface graph, where the surfaces in the graph have a honeycombed look.

Graphing Your Data

As in earlier versions of MapInfo Professional, you create a graph via the New Graph Window menu command in the Window menu. You choose tables and fields to graph similarly, but you are no longer limited to four fields. Older versions of MapInfo Professional may behave differently. See the Help System for a description of these differences.

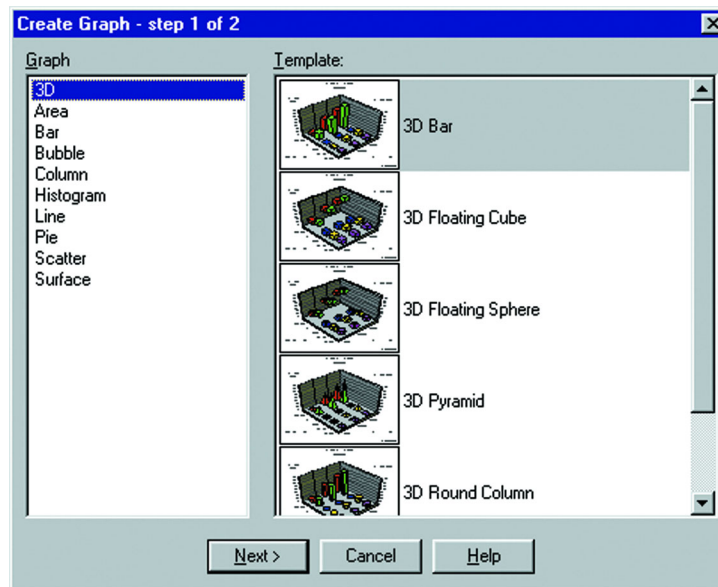
Creating a Graph using the Graph Wizard

Graphing in MapInfo Professional is done through a two-step graph wizard, similar to the Create Thematic Map wizard.

To access the wizard and create a graph:

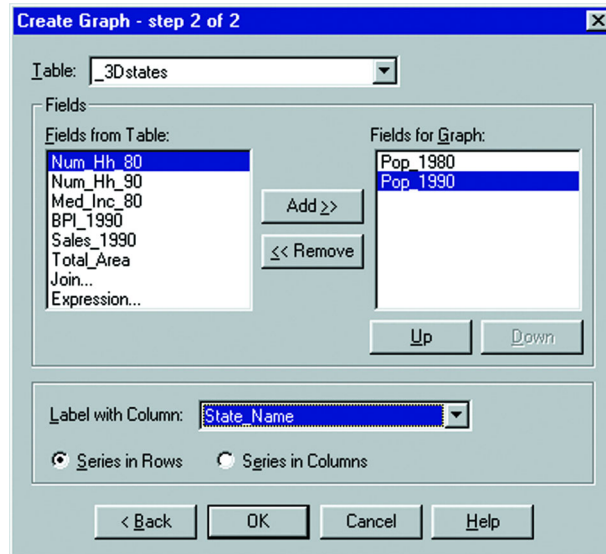
1. On the **WINDOW** menu, click **NEW GRAPH WINDOW**. The Create Graph – Step 1 of 2 dialog box displays.

Here, select the graph type and the graph template you would like to use.



2. Click one of the graph types shown in the Graph group in the left pane. When you select a graph type, the templates for that graph type display in the Template group.
3. Next, choose a template from the right pane. Some graph types have several templates to choose from. Others, such as the bubble and scatter graph types, have only one template. See [Using Graph Templates on page 404](#) for more information about templates.
4. Click **NEXT** when you have selected a template. The Create Graph – step 2 of 2 dialog box displays.

Here, select the table and the fields from the table you want to graph. You can also choose what column you want to use for your labels.



Note: This dialog box is the same for all graph types.

5. Choose the table you want to graph from the Table drop-down list. The list displays the currently open tables.
6. Choose the fields from the table you want to graph. Select a field from the Fields from Table list, and either double-click it, or highlight it (single click) and click the **ADD** button. Both methods will move the field to the Fields for Graph list. You can use the **REMOVE** button in the same way to move fields back to the Fields from Table list.
7. Arrange the fields in the desired order using the Up and Down buttons. Select a field you want to move and use the Up and Down buttons to place it in the position you want. Some graph types use the first field for axis labels (bar, 3D, column), and other graph types use the order of the fields to determine X and Y values. In the case of bubble graphs, the field order also determines the Z value.
8. If applicable, choose whether you want to graph your series by row or by column. This option is not available for bubble, histogram, or scatter graphs. Click the button beside the option you want.
9. Click **OK**. Your graph displays in a Graph window.

Editing a Graph

Once you create the basic graph, your ability to customize it is unlimited and depends only upon the message your graph needs to convey. You have complete control over virtually every aspect of your graph and every item in the Graph window. The customizing options available depend on the graph type you have selected.

Selecting Graph Objects

To select a graph object to format it, click the object. When you make a graph selection, related graph objects may also be selected. For example, if you click a series bar in a column graph, all the series bars and the corresponding legend marker will also be selected. If you select an axis label, all the labels on that axis will be selected. All the items that are selected will be altered when you make your selections.

Moving and Resizing Graph Objects

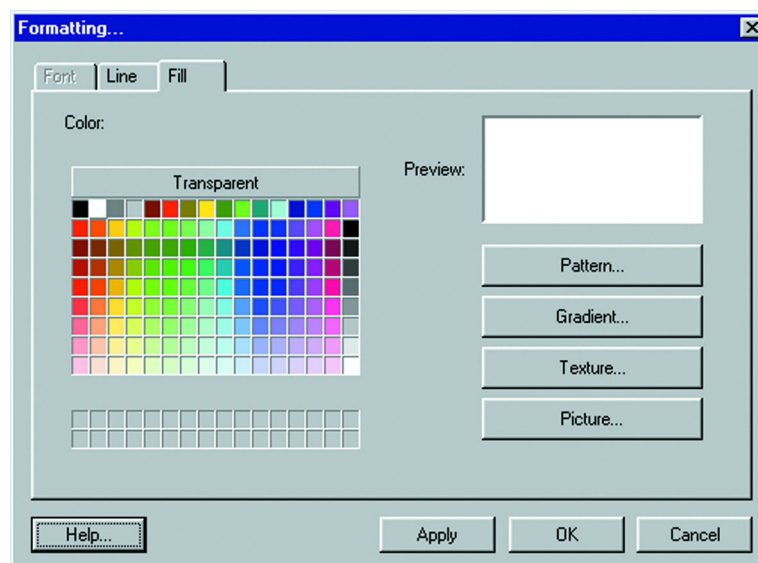
To move a graph object, click it in the Graph window and drag it to the desired location. You can move the titles, data labels, and the legend. To resize the legend, select it to display legend handles. Click and drag on one of the edit handles to make the legend larger or smaller.

Using the Graph Menu

The Graph menu contains all the editing options to customize your graph. When you create a graph, the Graph menu displays in the MapInfo Professional menu bar. You can also access the Graph menu options by right-clicking in the Graph window to display a shortcut menu.

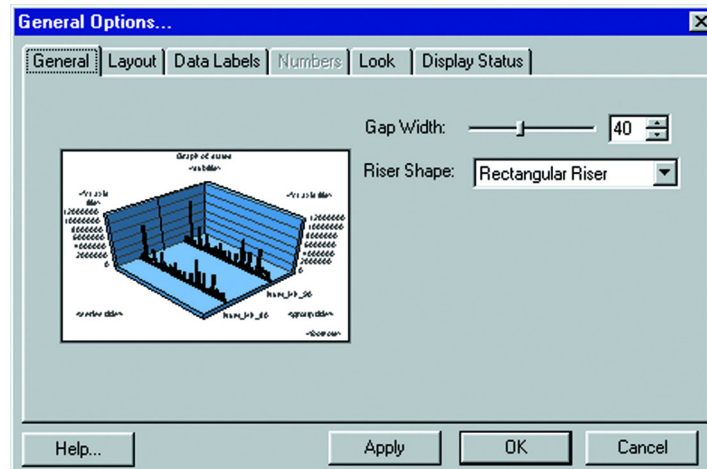
Formatting Graph Objects

On the **GRAPH** menu, click **FORMATTING** to access the formatting options, which allow you to customize the line and fill patterns of your graph objects and graph titles. You can also add color gradients, different textures, and pictures to your graph. You can quickly access the Formatting dialog box by selecting a graph object and double-clicking in the Graph window. The formatting will apply to whatever object is selected in the Graph window. It could be the background, the titles, the axes, the graph series, graph markers, etc. The formatting options that display in the dialog box depend on what element in the Graph window is selected.



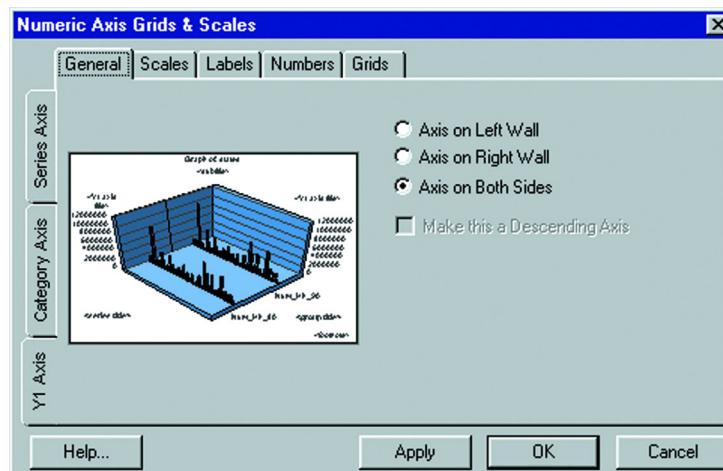
Layout and Display

Go to the General Options command (On the **GRAPH** menu, click **GENERAL OPTIONS**) to change the general options for the type of graph you are creating, as well as customize its display. The General tab displays options that enable you to customize the markers for the type of graph you selected. For 3D graphs, you can change the shape of the risers, and the gap between the risers. For pie graphs, you can create an exploded pie graph, as well as specify the pie's rotation, tilt, and depth. For bubble graphs, you can customize the size and shape of the marker. In column graphs, you can customize the columns, etc.



Modifying Axis Attributes

The Grids and Scales dialog box (on the **GRAPH** menu, click **GRIDS AND SCALES**) is used to format graph axes, gridlines, and perform scaling. The tabs on the left of the dialog box indicate the available axes in the graph: Category Axis, Y1 Axis, Y2 Axis (for dual-axes graphs), X Axis (for bubble and scatter graphs), and Series Axis (for 3D graphs).



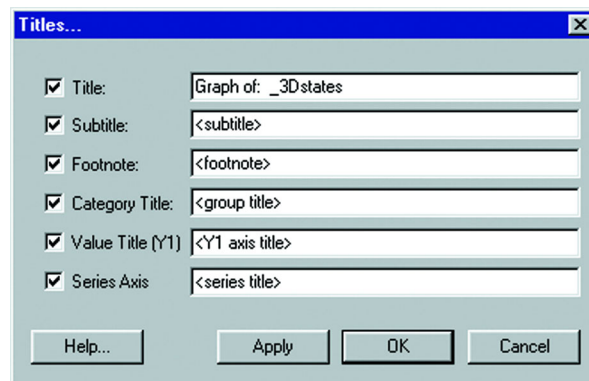
When you select an axis tab, the tabs at the top of the dialog box will change to reflect the available formatting options for that axis. Each axis is described in this section:

- **Category Axis** – All graph types, except bubble, histogram, and scatter graphs, have a category axis. The category axis defines the groups of items that are being graphed. When category axis labels are displayed, the labels are taken from the first row in your table.
- **Y1 Axis** – All graph types except pie graphs have a Y1 axis, or primary numeric axis. This axis plots the values from the rows and columns in your table.
- **Y2 Axis** – Area, bar, bubble, column, line, and scatter charts can be drawn on two numeric axes, Y1 and Y2. When a dual-axes graph is selected, MapInfo Professional automatically divides the number of series in half and assigns half of the series to one axis and the other half to the second axis. The two axes can be drawn up or out from the same plane/base line or physically split into two separate sections on the graph.

- X-Axis – Bubble, histogram, and scatter graphs include an X-axis. These graphs have two numeric axes—a Y1 axis that is drawn on the left side of the graph and an X axis that is drawn on the bottom of the graph frame.
- Series Axis – A series axis is included only in 3D riser and 3D surface graphs. The series axis is also called a secondary ordinal or O2 axis. In two-dimensional graphs, the series or rows of objects being graphed are shown in the legend area of the chart. In 3D graphs, these objects are shown on the series axis, which is on the lower left side of the 3D graph.

Specifying Titles for Your Graph

On the **GRAPH** menu, click **TITLES** to specify titles for your graph. In the Titles dialog box, check the boxes next to the titles that you want to display in the graph.



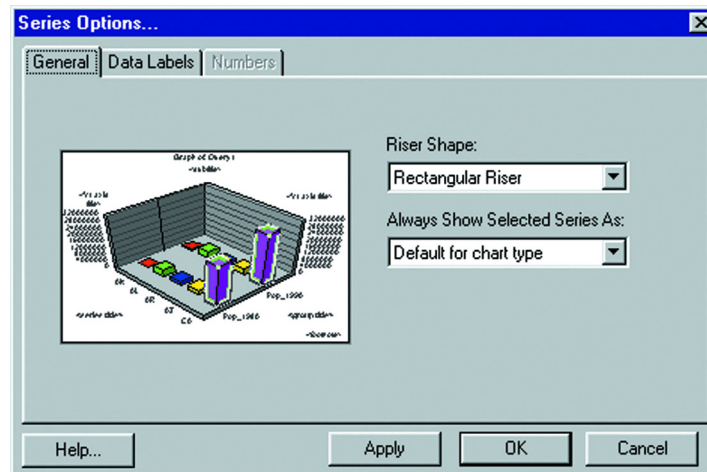
The text boxes next to those titles become available. You can use the default titles or create your own. Choose from these titles:

- Title – Displays the main title of the graph. The title is centered over the top of the graph.
- Subtitle – Displays the subtitle of the graph. The subtitle displays directly underneath the main title.
- Footnote – Displays a note at the bottom right hand corner of the graph.
- Category title – Displays a title for the category axis of the graph. It is placed just above, below, or next to the category axis labels.
- Value title (Y1) – Displays a title for the primary numeric (Y1) axis of your graph. Use the title to explain what is being plotted on this axis.
- Value title (Y2) – Displays a title for the secondary numeric (Y2) axis of your graph. In dual-axes graphs, the primary (Y1) axis shows some of the groups in your data, and the secondary numeric (Y2) axis plots other groups of data. Use the title to explain what is being plotted on this axis.
- X-Axis title – Displays a title for the X-axis, where applicable. Histogram, bubble, and scatter graphs include a numeric X-axis.
- Series Axis – Displays series labels along the lower left side of a 3D graph. Series titles can further describe the information that is being graphed on this series axis. These titles normally correspond to the series labels displayed in the legend.

All graphs can include a title, subtitle, and footnote. Most graphs can also include a Category Axis title and a numeric Y1-Axis title. Other axis titles may be available depending on the graph type. Titles can be moved from their default positions by clicking and dragging them to the desired position. To change other elements in the title, such as the font or the text color, select the title directly in the Graph window and choose the Formatting command in the Graph menu.

Editing a Graph Series

You can apply formatting changes to an individual series in your graph, as well as to the whole graph. The Series Options command in the Graph menu is available whenever a series is selected in your graph. If no series is selected, the message, “No series is selected” displays when you attempt to access the dialog box.



To format an individual series:

1. Click a riser (area, bar, line, marker, pie slice, etc.) or a legend marker to select a series.
2. On the **GRAPH** menu, click **SERIES OPTIONS**. The Series Options dialog box displays.
3. Make the desired changes in each of the dialog box tabs and click **OK**. You can also apply changes as you go by clicking the **APPLY** button. The Apply operation applies your changes to the graph without closing the dialog box. This enables you to see your changes in the Graph window, continue working, and experiment with different options without having to close and reopen the dialog box.
4. Click **OK** when you are finished.

The options available in the Series Options dialog box depend on the graph type you have selected. Each of the dialog box tabs is explained briefly in this section:

- **General** – Contains general formatting options for a series for each type of graph. For instance, in 3D column graphs, you can change the riser shape; in bubble graphs and other graph types that may use markers such as line graphs, you can change the shape of the markers. In pie graphs, you can manipulate the individual pie slices. You can detach a slice from the pie, delete a slice, or restore the pie back to its original state. In many graph types, you can also display the selected series as another graph type. For example, if you create a bar graph, you can change a selected series to display as a line or an area, contrasting that series to the rest of the series in the graph.
- **Data Labels** – Specify whether you want to display data labels for the selected series and where you want to place the labels. Data labels show the actual values from your table.
- **Number** – Specify how you want to display data label numbers. You can choose from a number of categories: general, number, currency, date, time, percentage, fraction, scientific, special, and custom. This tab is available when the Data Labels box is checked in the Data Labels tab.
- **Trendlines** – Contains formatting and display options for trend lines. This tab is unavailable for 3D and pie graphs. You can display a trend line according to different types of regression: Linear, Logarithmic, Polynomial, or Exponential. You also have several

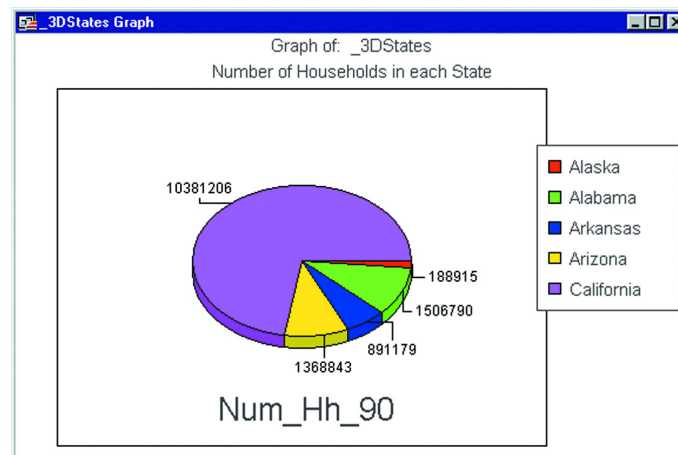
other display options. You can display the equation used to create the trend line, show the coefficient values, or specify that the trend line display in the same color as the series.

Working with Multi-Table and Multi-Variable Graphs

This section of the chapter provides some examples of ways you can customize your graphs. The first example illustrates some of the ways you can customize a pie graph. The second example demonstrates how you can customize a 3D graph using the 3D viewing angle feature.

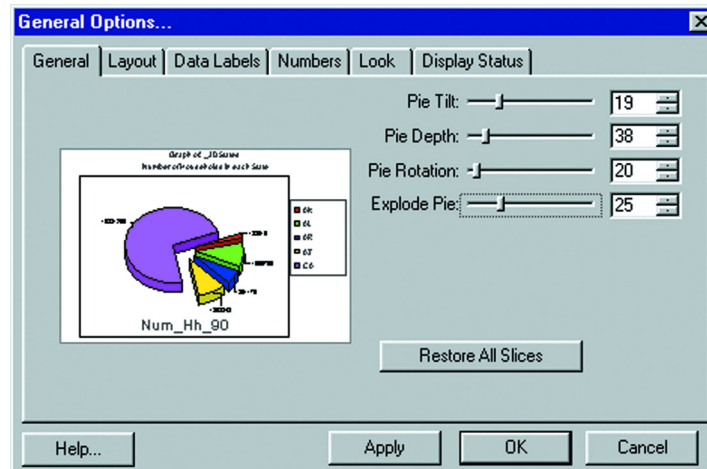
Exploding a Pie Graph

Creating a basic pie graph is easy using the Graph wizard. Simply select the table and the fields you want to graph. You can also graph a subset of a table, as shown in the next figure, by browsing the selection, and using the Save Copy As command to save the selection as a permanent .tab file. This example graphs selected states from the STATES table.



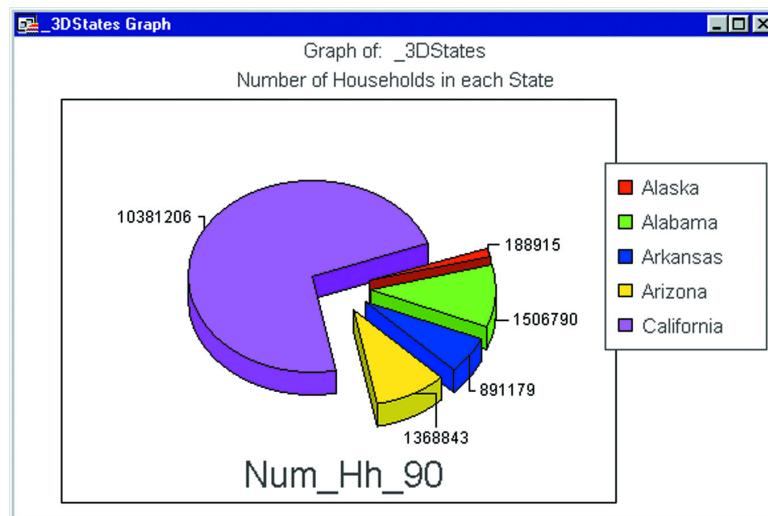
Note: Some of the files described in this example may refer to MapInfo Professional Tutorial data, which is available on the MapInfo web site, www.mapinfo.com/miprotutorial.

The General Options for pie graphs enable you to manipulate the look and rotation of the pie slices easily. The left side of the dialog box shows a preview of what the finished pie graph will look like. You can change the tilt, or the angle at which you view the pie. You can give the pie a 3D look by using the Pie Depth setting.



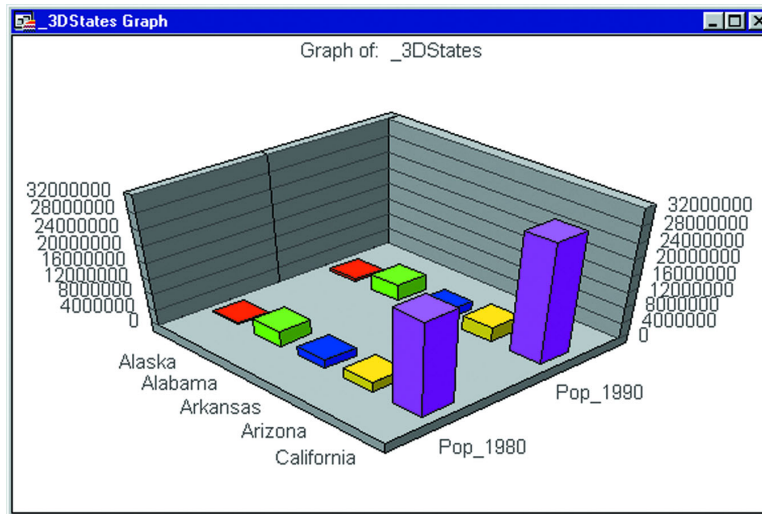
You can also rotate the pie or explode the pie. When you explode the pie, you detach all the slices away from the center. You can also detach an individual slice away from the pie center using the Series Options (on the **GRAPH** menu, click **SERIES**).

The next graph shows the same pie graph, based on the General Options settings indicated above.

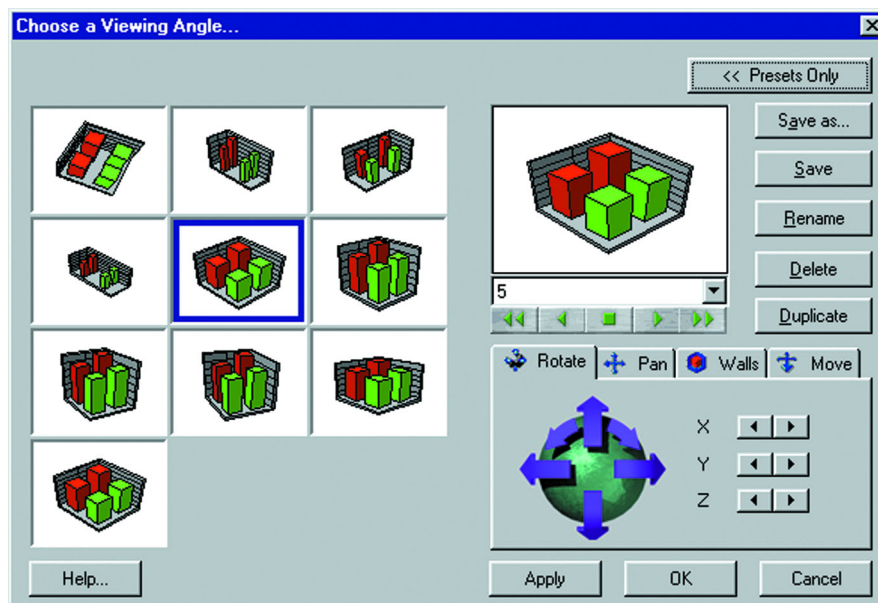


3D Graphs - Using the 3D Viewing Angle

The 3D Viewing Angle feature enables you to display your 3D graph at different angles, as well as customize other aspects of the graph's position, such as its rotation and position in the Graph window. The 3D graph graphs the same selection from the STATES table that was used in the pie graph, but graphs different columns of the table. Here, the angle of the 3D graph has been rotated, and the thickness of the walls of the 3D cube has been changed.



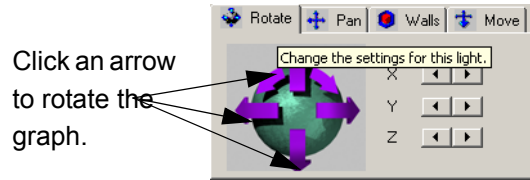
When you choose the 3D Viewing Angle option, preset angles for your graph display. You can choose one of these, or use the Advanced options to create your own angle, position, and rotation. The Advanced portion of the dialog box displays additional controls that allow you to scroll through the presets more quickly, and manipulate the angle and position of the graph manually.



Use the controls along the bottom of the graph preview to scroll through the preset viewing angles. You can also select one from the drop-down list.

Rotating Your 3D Graph

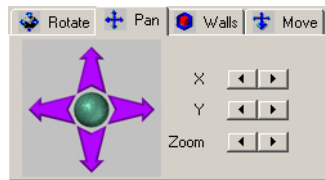
Use the options Rotate, Pan, Walls, and Move at the lower right of the dialog box to manipulate the graph. In the **ROTATE** tab, you can click directly on the arrows to rotate your graph in the direction indicated by the arrow. A preview of the graph in its new position displays above. You can also rotate the graph one click at a time using the X, Y, and Z buttons.



Click the X, Y, and Z arrows to rotate the graph one click.

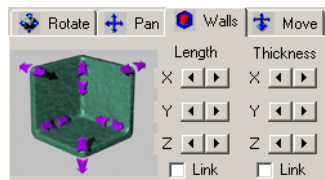
Panning Your 3D Graph

Use the Pan tab options to move the graph across the window. Again, click directly on the arrows to move the graph in the direction indicated by the arrow, or use the X and Y buttons to move the graph one click at a time. Use the Zoom buttons to zoom the graph in and out.



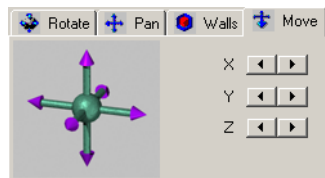
Customizing Cube Walls

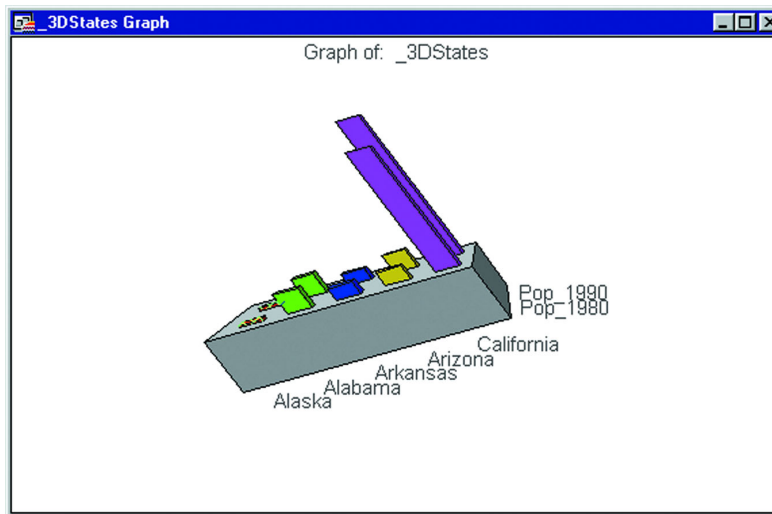
The Walls tab helps you change the dimensions of the 3D graph walls. You can alter the length and thickness of the walls directly using the arrow keys on the wall image on the left side of the tab, or use the X, Y, and Z buttons.



Moving Your 3D Graph at an Angle

The Move tab options are used to move the graph diagonally across the window. Click the arrows on the diagram in the Move tab to move the graph in the direction indicated by the arrow, or use the X, Y, and Z buttons. The X button moves your graph from the top left to the bottom right of the window. The Y button moves your graph from top to bottom. The Z button moves your graph from the bottom left to the top right of the window.





Above, the same graph that was shown earlier is displayed here using a different preset angle. The walls of the cube have also been removed, as well as the values for the Value Axis, in the Display Status tab of the General Options dialog box.

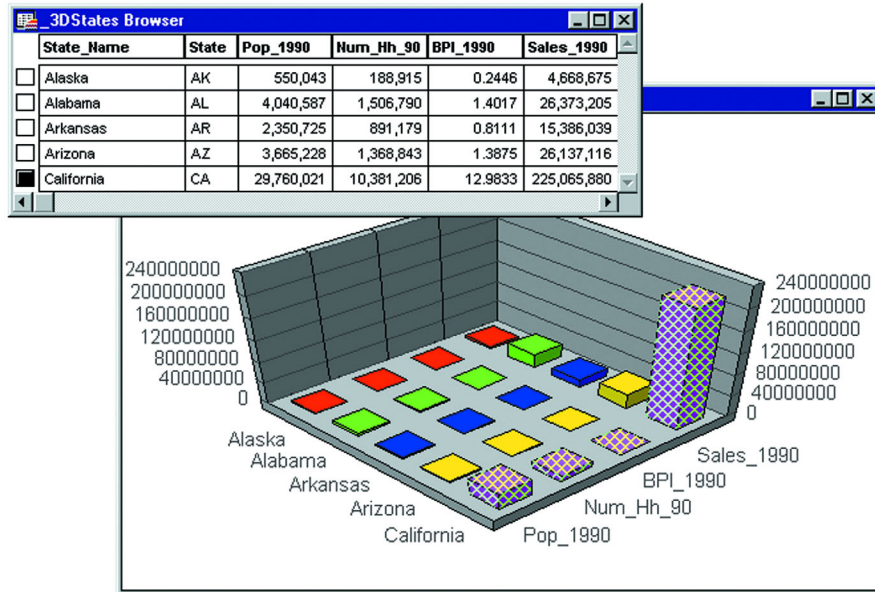
All of the 3D Viewing Angle options have been used in this graph. The graph has been rotated about 90 degrees from the earlier example. The Pan and Move options have also been used to position the graph. And the Walls option has been used to increase the thickness of the floor of the cube.

Selections in Graphs and Their Tables

Selections you make in your graphed table will also be highlighted in your Graph window. Conversely, using the new Graph Select tool, selections in the Graph window change the current selection in the graphed table.

Table Selections

In a graphed table, any selections you make in the table with the Select tool will be reflected in the corresponding Graph window as long as the selected table row or map object corresponds to an object in the graph. For example, in a bar graph, one or more of the bars will be highlighted. In a pie graph, one or more of the pie wedges will be highlighted. The selection in the Graph window uses the same pen and brush styles that are used to highlight selected objects in the Map window.



Using the Graph Select Tool

When you select objects in a Graph window using the Graph Select tool, you also change the current selection in the graphed table. Your Graph window selection must correspond to a row in the table. Your Graph window selection will be reflected in the Map or Browser window.

If you select an object in the Graph window that does not correspond to a row in the table, any other selections in the Graph window are cleared. As in other types of windows, selecting multiple objects by shift-clicking works the same way in Graph windows—either adding the target object to, or removing it from, the selection.

Note that selecting graph objects with the Graph Select tool is not the same process as selecting objects in the Graph window to edit the graph object. The default mode is to select graph objects with the Select tool in order to edit them. To select graph objects for the purpose of changing the selections in the table, you must use the Graph Select tool.

In some graph types, there is no relationship between the graph objects and the rows in the table, e.g., histograms. The Graph Select tool is unavailable for these graph types. Selections in the Graph window will not highlight any records or map objects in the table.

Saving a Graph

Graphs are saved to workspaces. For each Graph window in the workspace, MapInfo Professional saves a uniquely named .3TF file in the same directory as the workspace. The name of the graph file is:

<WORKSPACE NAME>, <WINDOW TITLE>.3TF

The <workspace name> is the root name of the workspace being saved and <window title> is the title of the Graph window being saved. For example, if you save a workspace named “MY WS.WOR” and it contains a Graph window with the title, “Scatter Graph,” MapInfo Professional creates the graph file “MY WS, SCATTER GRAPH.3TF” in the same directory as the original workspace, “MY WS.WOR.”

Using Graph Templates

MapInfo Professional stores the various graph template files in folders in the GraphSupport directory. The GraphSupport directory is located in the MapInfo Professional directory by default in versions 6.0 and earlier. In MapInfo Professional 7.5 files are stored on a per-user basis. Other support files containing numerous kinds of fill patterns, as well as the 3D viewing angle files, that help you format your graph are also located in this directory.

Each type of support file stored in the GraphSupport directory is listed in the next table, according to the name of the folder in which the files are stored:

Folder Name	File Description
3D Viewing Angles	Files correspond to the preset viewing angles available in the 3D Viewing Angle dialog box (on the GRAPH menu, click 3D VIEWING ANGLE).
Gradients	Files correspond to the preset gradients available in the Choose Gradient dialog box (on the GRAPH menu, point to FORMATTING and click FILL TAB).
Pictures	Files correspond to the pictures available in the Choose Picture dialog box (on the GRAPH menu, point to FORMATTING and click FILL TAB).
Templates	Contains the available graphing templates listed in the Graph wizard (Create Graph – step 1 of 2 dialog box).
Textures	Files correspond to the textures available in the Choose Gradient dialog box (on the GRAPH menu, point to FORMATTING and click FILL TAB).

Location Preferences

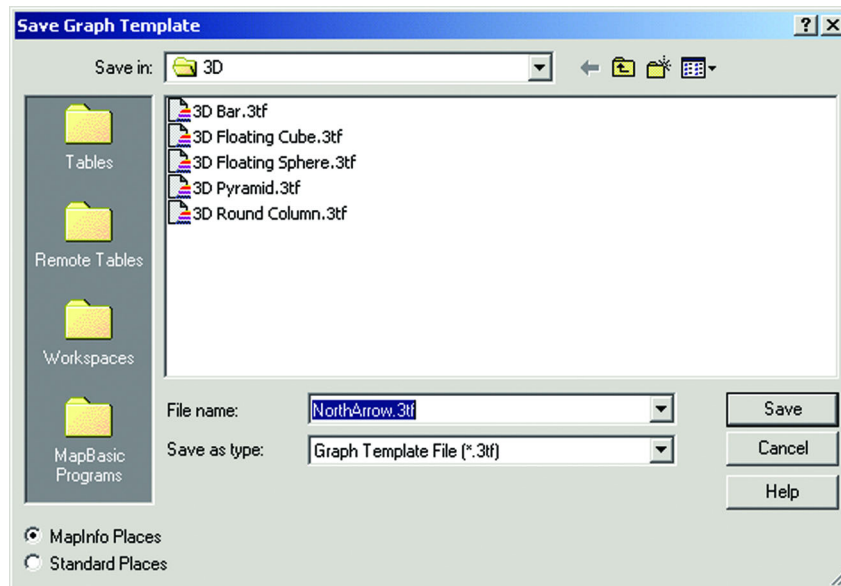
Using the Directory preferences, you can change the location where MapInfo Professional looks for all the support files. To do so:

1. On the **OPTIONS** menu, point to **PREFERENCES** and click **DIRECTORIES**. The Directory Preferences dialog box displays.
2. In the Initial Directories for File dialog boxes group, select Graph Support Files.
3. Click **MODIFY**. The Choose Directory dialog box displays. It shows the current location of the Graph Support files. Navigate to the directory where you want to store the files, and click **OK**. The new location of the files displays in the Initial Directories list.
4. Click **OK** to close the Directory Preferences dialog box.

Although the location of the GraphSupport directory can be changed, the names and locations of the support file folders inside the GraphSupport directory cannot. MapInfo Professional looks in the GraphSupport directory specifically for the appropriate support folders and files as listed above.

Saving a Graph Template

You can easily add to the available set of templates when you create a graph by saving an existing Graph window as a template file. For example, you prefer the legend to display on the left side of the Graph window instead of on the right (the default position). You can make this modification in the Graph window and then on the **GRAPH** menu, click **SAVE AS TEMPLATE**.



1. Make the modifications in the Graph window that you would like to save as a template.
2. On the **GRAPH** menu, click **SAVE AS TEMPLATE**. The Save Graph Template dialog box displays. It shows the template folder that corresponds to the type of graph you are saving as a template.
3. Name your graph template and click **SAVE**.

The next time you create a Graph window, the saved template file will be available in the Graph wizard for that graph type.

Note: You can save a template file to a location other than the GraphSupport\Templates directory; however, it will not be available unless you save it to a folder in the Templates directory.

Using Graphs From Earlier Versions of MapInfo Professional

If you are using graphs created in versions of MapInfo Professional prior to version 5.5 and you bring them into version 7.5, you will not be able to use the new graphing options on those graphs. The Help System topic, *Working with Graphs Prior to Version 5.5* can help you use these graphs effectively.

Stylizing Your Map for Presentations and Publishing

Most of us do not get to make maps solely for our own use. We use the maps we create in MapInfo Professional® to create presentations, to publish them on the web, or to include as part of another document. This chapter will help you create presentation quality maps and prepare you for printing and exporting your work.

Sections in this Chapter:


- ◆ **Changing a Map's Style** 407
- ◆ **Labeling Your Map** 411
- ◆ **Working with Layouts** 421
- ◆ **Creating a Cartographic Legend** 434
- ◆ **Printing and Exporting Your Results** 450

Changing a Map's Style

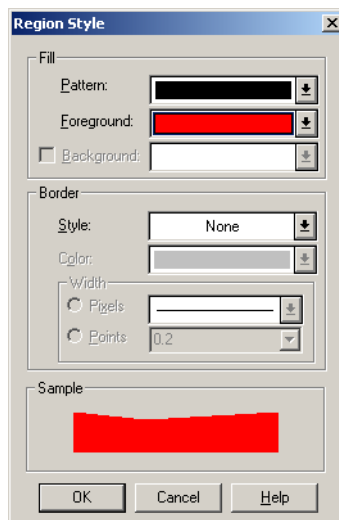
Changing the look of the map is an important part of making it more effective. In this section, we review how to change the way your map looks one piece at a time. For a more comprehensive change in your map's appearance, see [Creating Thematic Maps, Legends, and Other Maps in Chapter 9 on page 310](#).

Changing a Region's Style

To change the style of a region:

- Do one of the following:
 - To change the style of one region, click the region and on the **OPTIONS** menu, click **REGION STYLE** from the main menu.
 - To change the style of all regions in the same layer, click  to display the Layer Control dialog box, highlight the layer you want to change and click **DISPLAY**.

Using either method the Region Style dialog box displays.



- Make the region changes you want to see in your map window in this dialog box and click **OK** to save them. If you opened Layer Control, you will need to click the **OK** button in that dialog box as well to see the results.

Fill

These are the fill options you have in the Region Style dialog box.

- PATTERN** — Choose a palette for patterns. If you do not want to use a pattern, choose the letter N, for none; the foreground and background color are disabled. If you choose the solid black pattern, the background color is disabled.
- COLOR** — Choose a color for the object(s)' foreground. The Sample box displays the pattern using the foreground color you chose. The foreground color is applied to the part of the pattern that displays as black. Therefore, to make the object a solid color, choose the solid black pattern in the Fill Pattern palette and a color from the Foreground Color palette. The color you chose displays in the Sample box as a solid-colored region.

- **BACKGROUND COLOR** — Check the box to display a background color; clear for a “transparent” background. Choose a color for the object’s background. The background color is applied to the part of the pattern that displays as white. Background color is grayed if you have chosen the solid black pattern.


Border

These are the border options you have in the Region Style dialog box.

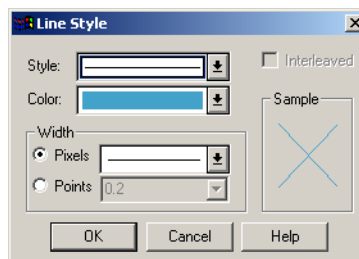
- **STYLE** — Choose the border line style.
- **COLOR** — Choose the border line color.
- **WIDTH** — Choose the border line width. In the Pixels field, enter a number from 1-7, each number represents a line width in pixels. In the Points field, select a point size from the drop-down list, or enter a point size.
- **SAMPLE** — Displays the sample of the pattern and color selections you have made.

Changing a Line’s Style

To change the style of a line:

1. Do one of the following:
 - To change the style of one line, click the line and on the **OPTIONS** menu, click **LINE STYLE** from the main menu.
 - To change the style of all lines in the same layer, click  to display the Layer Control dialog box, highlight the layer you want to change and click **DISPLAY**.


Using either method the Line Style dialog box displays.



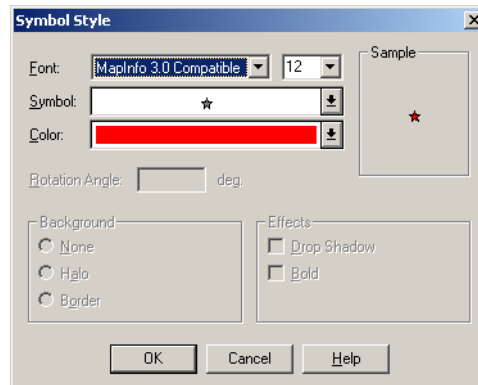
2. Make the line style changes you want to see in your map window in this dialog box and click **OK** to save them. If you opened this dialog box from Layer Control, click the **OK** button in that dialog box as well to see the results.
 - **STYLE** — Select the new line style from the drop-down list.
 - **COLOR** — Choose a color for the line from this drop-down list. The Sample box displays the pattern using the color and line style you select.
 - **WIDTH (IN PIXELS AND POINTS)** — Choose the line width from one of these drop-down lists. In the Pixels field, select a width of the line in pixels. In the Points field, select a point size from the drop-down list, or enter a point size.
 - **INTERLEAVED** — If you select a line style that uses multiple passes to create it, MapInfo Professional enables the Interleaved check box. Keep in mind these notes:
 - The Interleaved option is not enabled for solid lines
 - The Interleaved option is not activated for borders
 - The Interleaved option is not appropriate for all multiple pass lines

Changing a Symbol's Style

To change the style of a symbol:

- Do one of the following:
 - To change the style of one symbol, click the symbol and on the **OPTIONS** menu, click **SYMBOL STYLE** from the main menu.
 - To change the style of all symbols in the same layer, click  to display the Layer Control dialog box, highlight the layer the symbol displays in and click **DISPLAY**.

Using either method the Symbol Style dialog box displays.



Note: The options in this dialog box may be different based on the symbol(s) you selected.

- Complete your selections and entries in this dialog box and click **OK**. If you opened this dialog box from Layer Control, click the **OK** button in that dialog box as well to see the results.

Font

Choose a font from the drop-down list. In addition to the symbol sets provided by MapInfo, the list displays any fonts installed on Windows. The Custom Symbols category lists those bitmaps you have created and saved to the CUSTSYMB directory.

Size

Choose a size or type a different point size. The maximum size is 240 points.

Symbol

Choose a symbol type from the symbol palette.

Color

Choose a color from this list for the symbol.

Reload

Click this button when you have added your own custom symbols to update the list. If you restarted MapInfo Professional since adding the new custom symbols you do not need to select the **RELOAD** button.

Full View

Click this button to display large images in a separate window.

Rotation Angle

Specify number of degrees the symbol should be rotated; 0-360.

Background

In this box, you can specify a background. Select one of these:

- **NONE:** Click this option to display no background.
- **HALO:** Click this option to display the symbol with a white border outline.
- **BORDER:** Click this option to display the symbol with a black border outline.

Effects

In this box, you can specify special effects for the symbol. Not all of these options display all the time. You can select one or more of these:


- **BOLD:** Click this check box to draw the symbol in boldface.
- **DROP SHADOW:** Click this check box to draw a drop shadow under the symbol.
- **SHOW BACKGROUND:** Click this check box to display the custom bitmap symbol with the background with which it was created.
- **APPLY COLOR:** Click this check box to replace all non-white bitmap pixels with the color you select from the Color palette.
- **DISPLAY AT ACTUAL SIZE:** Click this check box to display the image at the actual size.

Sample

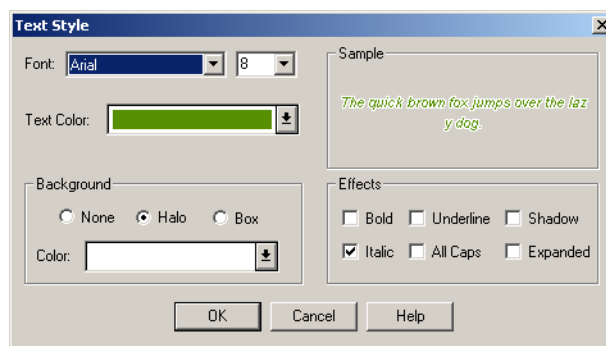
When you select a symbol style, it displays in this box to show you a sample of the symbol using the designated selections.

Changing the Text Style

To change the style of text:

1. Do one of the following:
 - To change the style of one text entry, click the text and on the **OPTIONS** menu, click **TEXT STYLE** from the main menu.
 - To change the style of all text entries in the same layer, click  to display the Layer Control dialog box, highlight the layer the text entries display in and click **DISPLAY**.

Using either method the Text Style dialog box displays.



2. Make your selections and entries in this dialog box and click **OK**. If you opened this dialog box from Layer Control, click the **OK** button in that dialog box as well to see the results.

Font

Choose a font from the font drop-down list.

Size

Choose a point size from the point size drop-down list.

Text Color

Display the color palette; choose a text color.

Background

In this box, you can specify background options for the selected text. You can select only one of these options:

- **NONE** — Set no specific background for the selected text.
- **HALO** — Display the text outlined in a designated color.
- **BOX** — Surround the text with a box in a designated color.
- **COLOR** — Display the color palette; select a color to halo or box the text.

Effects

In this box, you can specify special effects for the selected text. Not all of these options display all the time. You can select one or more of these:

- **BOLD** — Select this check box to display text in boldface.
- **ITALIC** — Select this check box to display text in italic.
- **UNDERLINE** — Select this check box to display text underlined.
- **ALL CAPS** — Select this check box to display text in all upper case letters.
- **SHADOW** — Select this check box to display a grey “drop” shadow under the text.
- **EXPANDED** — Select this check box to insert double spaces between each letter in the text.

Sample

The results of the options you choose show in this box.

Labeling Your Map

The labeling features in MapInfo Professional® make it easier for you to display, edit, and save labels. You can specify whether to display labels automatically when you display the map or display the map without labels. You can edit automatic labels, use the customizing options to make your labels unique, and create individual labels with the Label tool. Text enhancements such as haloing, and more positioning options enable you to get the precise look you want for your labels.

Designing Your Labels

The design of the label feature in MapInfo Professional is important for understanding how to create and manipulate labels on your map. Most important among the design elements are the following:

- Labels are not drawn to the Cosmetic layer.
- Labels are attributes of geographic objects in the map layer. The text is based on data associated with that object.
- Labels are always selectable and editable.
- Labels are saved to a workspace.

Labels are attributes of geographic objects in the map layer. They are not drawn to the Cosmetic layer, as in previous versions of MapInfo Professional, and they are not Cosmetic objects. Their drawn location is based on the location of the geographic object's centroid and additional information such as anchor point and offset controlled in the Label Options dialog box.

As attributes, labels are *dynamically* connected to their map objects. If the layer is closed or is made invisible, the labels no longer display. If the data or geographic information changes, the labels change. If you create an expression for your labels and change the expression, the current labels are dynamically replaced with new ones.

Labels are always selectable and editable, so you do not have to make the map layer editable or selectable to work with them. And, since labels are not Cosmetic objects, you do not have to remember to make the Cosmetic layer selectable or editable to label your map. They are already part of the map layer.

Saving labels is easy. Because labels are attributes of the map object, you do not have to remember to save them to a separate table. Any label edits you have pending, or changes you have made to the Label Options settings, are easily saved to a workspace.

You can label your map automatically through Layer Control, in the Label Options dialog box. All global settings for labels are controlled in the Label Options dialog box.

Choosing the Label Content

When you label your map automatically, or interactively using the Label tool, the content of the labels is determined by the data associated with the geographic object. You can obtain the labels from the columns in your table, or the derived result of an expression using the column information. If the column information or an expression does not suit your needs, you can edit the label content or type in new text. See [Editing Labels on page 417](#) for more information.

Text you create yourself using the Text tool is a text object and behaves like other objects you draw on your map such as squares and circles. Although labels are no longer text objects, text objects are still useful for additional map annotation such as titles. For information on text objects, see [Entering and Working with Text on the Map in Chapter 7 on page 261](#).

The Autolabeler tool, available from the Tool Manager (on the **TOOLS** menu, click **TOOL MANAGER**), creates labels as text objects in the Cosmetic Layer, emulating the way labeling worked in MapInfo 3.0. This application may be useful if you need to create labels that can be transferred to a permanent table. In addition, you can create text objects and convert labels into text objects using another tool from the Tool Manager set, the Labeler tool, which is explained later in this chapter.

Labeling with a Column

The content of labels is controlled in the Label with drop down list in the Label Options dialog box. You can label an object with any column from its associated table. For example, you can label the STATES table with the state name, abbreviation, 1990 population, or any other field in the STATES table. Simply choose a column from the list, and the objects in that layer will be labeled with the information contained in that column.

Labeling with Expressions

You can also label objects with an expression. Select Expression from the drop-down list in the Label Options dialog box. Create the expression in the Expression dialog box. You can type the expression directly or use the drop-down lists to create it.

For example, you want to label the countries of Africa with their name and population density on two lines. Your table contains the country names and population figures for each country. To figure the population density, divide population by each country's area. You can let MapInfo Professional calculate the area of each country using the Area function in the Expression dialog box. To create the expression, in Layer Control, highlight the Africa table and choose the Label button. Select Expression from the Label with drop-down list in the Label Options dialog box. The Expression dialog box displays. Using the drop-down lists, create the following expression:

```
Country + Chr$(13) + POPULATION / Area(Object, "sq mi")
```

The Chr\$(13) function tells MapInfo Professional to add a carriage return to the first line. Now using the Label tool, click a country. MapInfo Professional labels it with the result of the expression.

Packing a Table with Customized Labels

Note that packing a table that contains customized labels can corrupt the labels. For example, you delete one or more rows from your table and save the table. Then you create a map with customized labels and save the labels to a workspace. You pack the table to purge the deleted rows. Since the Pack command closes the Map window, you'll need to reload the workspace. When you do so, your labels are corrupted.

This problem occurs most often when the deleted rows are located near the top of the Browser. To avoid the problem, pack the table before you create the labels.

Using AutoLabeling

In addition to label content, you control the position, display and look of automatic labels in Layer Control. The settings in the Label Options dialog box allow you to set conditions for displaying labels, in what style they will display, and in what position for all the objects in the layer.

Controlling Label Display

The Auto Label attribute in Layer Control is off by default for all map layers.

To activate labels for a layer(s):

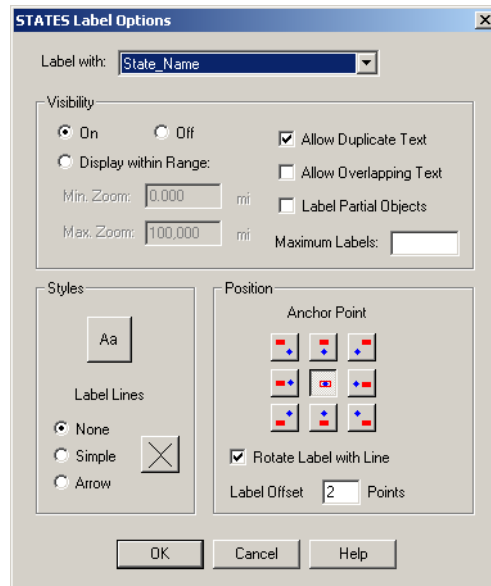
1. Select the layer or layers in the Layer Control dialog box and select the **AUTO LABEL** check box for each layer. When you return to your map, labels display for all layers you selected.

You can easily turn the display of automatic labels on or off. In Layer Control, clear the **AUTO LABEL** check box to turn labeling off. Any settings you have specified in the Label Options dialog box will be deactivated.

You can also go into the Label Options dialog box and click **OFF** in the Visibility group. Either way, when you go back to your map, the labels no longer display. These settings also apply to labels you have edited.

To make more changes to the labels of a selected layer:

1. Select a layer in the Layer Control dialog box and select the **LABEL** button. The Label Options dialog box displays.



2. Select the appropriate options for your new labels and click **OK** to save them.
 - **VISIBILITY** — Use these options to indicate whether this label should display. Click **ON** to display the labels for this layer. Click **OFF** to hide the labels for this layer.
 - **DISPLAY WITHIN RANGE** — You can also display labels within a specified zoom range, much the same way that you display map layers within a certain zoom range. Select a layer, click **LABEL**, and in the Label Options dialog box, click the **DISPLAY WITHIN RANGE** button. This activates the Min. and Max zoom boxes. Fill in the minimum and maximum zoom distances in the appropriate boxes.










When labeling a dense table of streets such as a StreetPro Display layer, only a few of the streets will be labeled when the map is zoomed out.

The check boxes on the right side of the Visibility group control which labels display and determine how they appear on the map.
 - **ALLOW DUPLICATE TEXT** — Select the **ALLOW DUPLICATE TEXT** check box to allow duplicate labels for different objects to display, e.g., Portland, OR and Portland, ME. This option is also used with street maps to label street segments individually.
 - **ALLOW OVERLAPPING TEXT** — Select the **ALLOW OVERLAPPING TEXT** check box to allow labels to be drawn on top of each other. Some labels do not display because they overlap labels that have been given higher priority on the map.
 - **LABEL PARTIAL OBJECTS** — Select the **LABEL PARTIAL OBJECTS** check box to label polylines and objects whose centroids are not visible in the Map window.
 - **MAXIMUM LABELS** — To specify the maximum number of labels you want to display on your map, type the number in the Maximum labels box.
 - **STYLES** — In this box, you can select the styles for the Labels and Lines in the selected layer.
 - No** — No line displays extending to the label.

SIMPLE — Create a callout by using a simple line that connects the label to the object's centroid. Label lines display after you move the label from where it was originally created.

ARROW — Create a callout by using an arrow and line that connects the label to the object's centroid. Label lines display after you move the label from where it was originally created.

- **POSITION** — Use the Anchor Point and Offset options to specify the label's placement. The anchor point is the label's position relative to the map object. Click one of the buttons to select an anchor point. The next table describes each of the nine anchor point buttons.

Anchor Point Button	Position	Description
	Top Left	Places the label above and to the left of the anchor point.
	Top Center	Centers the label directly above the anchor point.
	Top Right	Places the label above and to the right of the anchor point.
	Left	Places the label directly to the left of the anchor point.
	Center	Centers the label at the anchor point.
	Right	Places the label directly to the right of the anchor point.
	Below Left	Places the label below and to the left of the anchor point.
	Below Center	Centers the label directly below the anchor point.
	Below Right	Places the label below and to the right of the anchor point.

The anchor point is an ongoing attribute of the label. For example, if you anchor a point object's label at Center Left and you increase the label's font size, the text will grow to the left. This way, the text can never overwrite the point.

The default anchor point varies with the type of map object you are labeling:

- Regions default to **CENTER**.
- Lines default to **ABOVE CENTER**.
- Points default to **RIGHT**.

If you are working with a layer that has line objects such as a street map, check the Rotate Label with Line box to position the labels parallel to the lines.

Label offset is how far away a label is from its anchor point. Specify the number of points you want the label to be from the anchor point in the Label Offset box.

The label's anchor point and offset move a label with respect to its current location and the current zoom. Whenever you want to make minor adjustments to the label's position, you should use these two options.

You can also select and drag a label to move it, but this is not recommended because you are actually moving the label location on the map. If you drag a label a few pixels, the distance you move it is in the current map units, regardless of the zoom. For example, if you are displaying a map of the United States and drag New York state's label a few pixels, at that zoom, the label looks fine. However, if the Map Units distance is in miles and you zoom in on New York state, the label will display much farther away than at the previous zoom.

Note: Affecting Label Priority: Labels display following the order of records in the table. To change the order of priority for displaying labels, save a copy of the table, sorted in order of priority -- most important record first -- and use that table for labeling instead of the original.

In a table sorted alphabetically by street (like the StreetPro Display layer) this often means that streets with names beginning with A, B, or C are almost the only labeled streets on your map. Labeling effectively gives a small side street like "Aberdeen Street" priority over "State Highway 177" or other major roads that might actually be useful in navigating or orienting a viewer. This will be true for any dense StreetPro Display layer.

Creating Callouts

Callouts are labels with lines pointing to the objects they are labeling. They are very useful when there are many labels in a relatively small area. For example, you are labeling a map of Asia. There are many small countries that are relatively close together. If you tried to label all the countries, the labels would overlap and be difficult to read.

To create callouts, set the Label Lines option in the **LAYER CONTROL** menu, click **LABEL OPTIONS** dialog box to **SIMPLE** or **ARROW** for the layer that you want to label. Click the **LINE STYLE** button to choose the style of line you want for your callouts. On the map, select a label with the Select tool and drag it away from its anchor point. When you release the mouse, MapInfo Professional draws a line from the label to the anchor point.

You can move the endpoint of the callout to position it more precisely. Select the label and drag the edit handle at the end of the callout to its new position.

Note: As in previous versions, you can double-click the text and set the label line in the Text Object dialog box.

Label Styles

The Text Style dialog box gives you a number of choices for label and text object styles. You can also change the styles of multiple selected labels at a time.

To make style changes for all the labels, click the Style button in the Label Options dialog box to display the Text Style dialog box.

To change the styles of a selected label or labels, select the label(s) and either on the **OPTIONS** menu, click **TEXT STYLE**, or click the **TEXT STYLE** button in the Drawing toolbar to display the Text Style dialog box. If you change the styles of multiple labels at once, hold down the Shift key as you select each label.

Make the style changes you want. When you return to the map, the selected labels display with the style changes you specified. The available styles are explained in the next table.

Option	Description
Bold	Uses bold text to create the label.
Italic	Uses italic text to create the label.
Underline	Places a line underneath the text.
All Caps	TEXT DISPLAYS IN ALL CAPITAL LETTERS.
Shadow	Creates a shadow behind the text. (not shown)
Expanded	A space is placed between each character in the label or text object.

There are also three background options.

- Click **NONE** to have no background.
- Choose **HALO** to create a halo effect around the text. This puts the text into relief from whatever it covers (e.g., part of a region, or a street, etc.).
- Click **BOX** to create a background box behind the text.

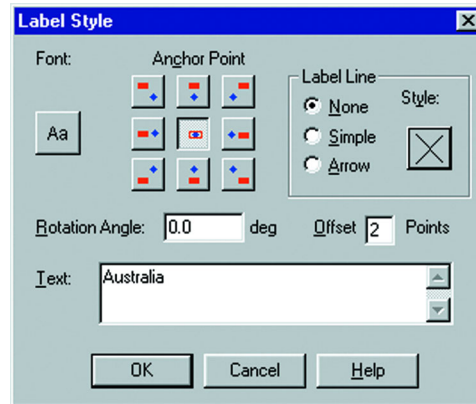
When you choose either the **BOX** or **HALO** backgrounds, the Color list is activated. Click it to display a palette of colors for the halo or the background. The color you choose corresponds to the button that is currently activated. The color displays in the box and in the Sample. Click **OK** to accept.

Labeling Interactively

Although you will probably do most of your labeling automatically, you will need interactive labeling to edit and create individual labels.

Editing Labels

It is very easy to edit individual labels, either those you have displayed automatically or those you have created interactively with the Label tool. Using the Select tool, double-click the label. The Label Style dialog box displays. The changes you make in Label Style dialog box apply only to the selected label. Changes you want to apply to all the labels must be done through Layer Control in the Label Options dialog box.



The Label Style dialog box allows you to make changes to the text, position, and angle of the labels. You can also make changes to callouts, add, or delete them.

To change the label content, simply type the new label text into the Text box. The other controls in this dialog box work the same way as in the Label Options dialog box.

Moving a selected label is the same as moving other objects; simply drag them with the mouse. If you move a label that has a callout, the line will reappear automatically after you move the label.

You can also rotate the label manually about its anchor point. When you select the label, use the rotation edit handle that appears to the lower right of the label.

Creating Labels with the Label Tool

Use the Label tool to create individual labels. First, make sure that the layer containing the objects you want to label is selectable. Click the Label tool to activate it, and click a map object. MapInfo Professional labels the object with the column or expression you specified for that layer in the **MAP** menu, point to **LAYER CONTROL** and click **LABEL OPTIONS** dialog box. Remember that InfoTips are active for the Label tool, so you can view the object's label before you actually label the object.

Using Text Objects as Labels

While labels in MapInfo Professional are attributes of the map layer, text objects look like labels but behave like other annotations you draw on the map. They are stored in the Cosmetic layer, and you can save them to a table.

The Labeler tool in the MapInfo Professional Tool Manager helps you use text objects to perform several common labeling tasks:

- Convert labels into text objects, so that they can be saved in a permanent table.
- Create labels for only the currently-selected objects.
- Draw text objects one at a time using the Text Label button. This allows you to create multiple annotations for a single map feature, which is something you cannot do using labels.

Saving Labels as Text Objects

If you have a Map window with labels, you may want to convert those labels into text objects, so that you can save the labels in a permanent table. You will also want to convert labels into text objects if you want your labels to grow larger as you zoom in. Text objects grow larger as you zoom in; labels do not.

To add the Labeler tool to your Tool Manager:

1. On the **TOOLS** menu, click **TOOL MANAGER**.
2. Locate the Labeler tool in the list and check the **LOAD** box.
To have the Labeler tool load automatically every time you open MapInfo Professional, check the **AUTOLOAD** box. The next time you run MapInfo Professional, the Labeler tool will be on the Tools menu.
3. Click **OK**. The Labeler tool is added to Tools menu.

The Labeler tool also adds a custom toolbar button, Text Label, to the Tools toolbar.

To convert the labels on your map to text, do the following:

1. Run the Labeler tool.
2. Make the Map window the active window.
3. On the **TOOLS** menu, point to **LABEL FUNCTIONS** and click **TRANSFER CURRENT LABELS**.
MapInfo Professional displays the Transfer Labels dialog box, which gives you the following options:
 - **FROM LAYER** - Lets you choose which layer's labels are converted.
 - **TO LAYER** - Lets you choose where to store the labels after they are converted into text objects. If you choose <New> from the list, MapInfo Professional creates a new table to store the text objects. (MapInfo Professional prompts you to type in the table's name after you click **OK**.)
 - **INCLUDE HIDDEN LABELS** - When you create autolabels and manually delete some of those labels, MapInfo Professional considers each of the deleted labels to be hidden. If you want to create a text object for each of the hidden labels, check the box; otherwise, clear the box.
 - **TRANSFER LABELS FROM: Map View or Layout View**
This option is available if the Map window appears in a Layout. If you are using autolabels, the Layout window might display different labels than the Map window, because MapInfo Professional tries to fit as many autolabels as will fit in the view.
Click **MAP VIEW** or **LAYOUT VIEW** to choose whether MapInfo Professional creates text objects that match the Map window or the Layout window labels.
4. When you click **OK**, MapInfo Professional converts the labels for the selected layer into text objects.

If you display the Layer Control dialog box, you will notice that the layer's Auto Label check box is no longer checked. The Labeler tool automatically clears the box to prevent map features from looking like they are labeled twice. If the Auto Label check box remained selected, MapInfo Professional would display both a label and a text annotation for each map feature, causing the map to appear to be labeled twice.

Labeling the Current Selection

At times, you may want to label only the rows that are currently selected.

To label the selected rows, do the following:

1. Run the Labeler tool.
2. Make the Map window the active window.
3. On the **TOOLS** menu, point to **LABEL FUNCTIONS** and click **LABEL SELECTION**.

MapInfo Professional draws a text annotation for each of the selected map objects. Note that these annotations are text objects, not labels.

Creating Manual Text Labels

Although the Labeler tool lets you convert labels into text, you might find that it is easier to simply create text objects from the beginning. If you annotate your map using text objects (not labels), then you will never have to worry about converting your labels to text.

The Labeler tool creates a custom button, Text Label, on the Tools toolbar.

To use the **TEXT LABEL** button, do the following:

1. Run the Labeler tool.
2. Make the Map window the active window.
3. On the Tools toolbar, choose the **TEXT LABEL** button.
4. Click an object in the map.

When you click the map object, MapInfo Professional draws a text object for it. Because the annotation is a text object, you can edit it in ways that you cannot edit labels.

For example, suppose you are labeling a highway map. If you use the standard Label button, you will find that you can only label a highway polyline once, because each polyline can have only one label. However, if you use the **TEXT LABEL** button, you can create multiple text annotations for a single highway.

Removing Labels

The easiest way to remove all labels in a layer is to use the Visibility controls in the Label Options dialog box. To remove all the labels from a layer:

- Click the **OFF** button to turn the display of the labels off. It will disable the display of all the labels in that layer, both automatic and interactive.

To display only edited labels or those you have created with the Label tool:

1. On the **MAP** menu, click **CLEAR CUSTOM LABELS** to remove the labels. You will be prompted to discard the custom labels and revert back to the default settings.
2. Click **DISCARD**. Your labels will revert back to the automatic labels. If you do not want any labels to display, turn Visibility off.

To delete individual labels from a Map window:

- Use the **DELETE** key or on the **EDIT** menu, click **CLEAR** command. This is useful if you have a number of edited labels and you want to delete one and still keep the rest.

Note: Do not use the **DELETE** key or on the **EDIT** menu, click **CLEAR** options to delete more than a few labels from the map.

To replace labels already displaying with new ones, do not delete the old ones first. You will get unexpected results if you do this. For example, if you create labels with an expression and want to change the expression, do not delete the labels first. Simply change the expression in the Label Options dialog box. If you delete the labels first, you are deleting the label for the object, not a piece of text. So, if you create labels with a different expression, they will not display because by deleting the old labels, you have edited the table so that it does not display labels for these objects. On the **MAP** menu, click **CLEAR CUSTOM LABELS** to revert back to the default settings.

Saving Labels

Whenever you manually edit automatic labels (including deleting using the **EDIT** menu, and click **CLEAR** or press the **DELETE** key), change the settings on automatic labels, or create labels with the Label tool, you will need to save your map to a workspace to have them display in your next session.

For example, label settings are deactivated by default. You check the Auto label attribute in Layer Control to display automatic labels on your map and do not save the change when you close the table. The next time you display your map, the labels do not display because the settings go back to the defaults. As with the other Layer Control options, label settings are temporary unless you save the table to a workspace.

Manually edited labels and labels created with the Label tool behave differently. These are edits to the table, not temporary settings. If you close a window or a table and you have label edits pending, MapInfo Professional will specifically prompt you to save the session to a workspace.

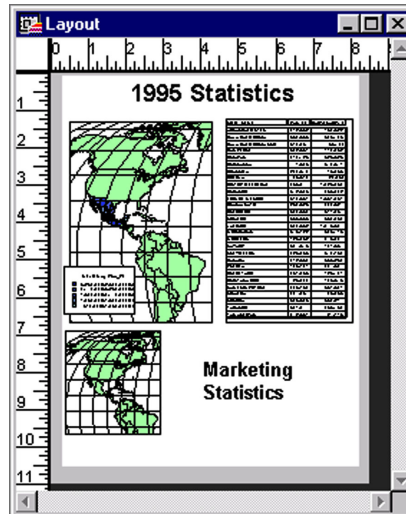
This also applies to labels you have deleted using the **EDIT** menu, click **CLEAR** or press the **DELETE** key. You may not have any labels visible on your map, but because deleting a label is an editing operation, MapInfo Professional will ask you if you want to save the edits to a workspace.

Working with Layouts

Once you have created the perfect map, MapInfo Professional® gives you the tools you need to create high-quality presentations or output. Using the Layout window, you can create and customize a page layout that shows off your maps, browsers and graphs. Display improvements in the Layout and printed output ensure that your Map, Browser, and Legend have been made in the way Map, Browser, and Legend windows display in the Layout and in your printed output so that your results are better than ever.

What is a Layout Window?

MapInfo Professional's Layout window is a page layout feature that allows you to combine your Map, Browser and Graph windows on a page and arrange them for output. You can add any currently open window to the layout and move and resize it to find the best look to show off your work. Add text such as titles and labels to pull the entire presentation together.



While you can print individual Map, Browser, and Graph windows directly without the Layout window (on the **FILE** menu, click **PRINT**), you can only print a thematic legend by first adding it to a Layout window. You can also print the data contained in the Info tool, statistics and message windows from the Layout Window.

The Layout window is available as soon as you open MapInfo Professional. On the **WINDOW** menu, click **NEW LAYOUT** window to access it. When the Layout window is active, MapInfo Professional puts a Layout menu on the menu bar, allowing access to a number of layout features.

When you add your windows to the Layout window, MapInfo Professional places them inside layout frames. Using frames to hold your maps and browsers allows you to resize and reposition your windows with ease. The contents of the frame match the contents of the corresponding Map, Browser or Graph window.

The Layout window provides dynamic linking between it and a parent window. For instance, if you change the zoom in a Map window, that map will be updated in the Layout window once you make the Layout window active again.

The rest of this chapter is devoted to learning how best to create a layout, move around in the Layout window, and customize your layout using a variety of options.

Working in the Layout Window

The Layout window functionality includes a number of options to help make it easier to design and create your layouts.

Getting Around in the Layout Window

The Layout window includes a rule along the top and left side of the window to assist you when resizing and positioning frames. To hide the rule, on the **LAYOUT** menu, click **OPTIONS**. The Layout Display Options dialog box displays. Clear the **SHOW RULES** check box.

If you are creating a multi-page layout, MapInfo Professional displays the page breaks by default. If you wish to turn off the page breaks, clear the **SHOW PAGE BREAKS** box in the Options dialog box.

Controlling Zoom Level

MapInfo Professional displays the Layout window at a zoom level that is a fraction of the actual size of the printed layout. The zoom level is represented as a percent of actual size in the lower left corner of the status bar.

In order to better position or resize layout objects, you may want to change the zoom level of the Layout window to see more detail. Keep in mind that you are changing the overall zoom of the Layout window, not the zoom of individual windows in frames. (If you want to change the zoom level on a frame containing a Map window, change the zoom for the Map window itself.)

There are four ways to change the zoom level of the Layout window:

- Use the Zoom-in and Zoom-out tools. These tools work exactly as they do in the Map window. You can click the Layout window with the tools or draw a marquee box around the areas of the Layout window.
- On the **LAYOUT** menu, click **CHANGE ZOOM** to set the zoom. You can set the zoom anywhere between 6.3% and 800%.
- Use the number keys (1–8) on your keyboard to set the zoom level. As the numbers increase, the zoom increases geometrically. For example, press 1 to get a zoom of 6.3%, press 2 to get a zoom of 12.5%, and press 3 to get a zoom of 25%. (Remember to use the number keypad, and make sure **NUM LOCK** is on.)
- Use the View commands in the Layout menu: View Actual Size, View Entire Layout, Previous View.

Ordering Overlapping Objects

You may add enough windows to the Layout window to cause objects to overlap one another. In the Layout window all objects are ordered from front to back. Think of them as being stacked in the Layout. When you draw a new object, it is automatically the front most object, even if it is not overlapping any other objects in the layout.

In order to display your objects properly, you may need to bring an object forward in front of other objects.

You can use the Bring to Front and Send to Back commands to change the order of objects. Click an object with the Select tool. Choose the Bring to Front option to move the object into the foreground. Choose the Send to Back object to move the object into the background.

When you select an object using the Control key along with the Select tool, MapInfo Professional selects the object one layer down. Selecting again chooses the next layer.

Before You Create a Layout

The first step in generating quality output is creating good Map windows. MapInfo Professional is set up to do a great deal of on-screen data entry, object editing, geocoding, and geographic analysis. There are many windows available to work with that can be easily arranged on the screen. When you prepare any MapInfo Professional window for output through a Layout window, you must change the way you think of using MapInfo Professional. For example, in a MapInfo Professional session, if you want two views of a map, you may simply use the Grabber tool and

shift to a different location, and then return via **MAP** menu (click **PREVIOUS VIEW**). To get two views of the same map for a Layout, you must have two separate Map windows. There are many techniques that can be used to prepare the windows to make output easier.

Creating Multiple Views of the Same Map

One very popular way to display maps is to have a detailed map with an inset of an overview map representing the general area. For example, government planners have a detailed flood plain map thematically shaded for an area around a major city. They want to include an inset map showing the location of that city in relation to the entire region. We can simulate this exercise with the **WORLD.tab** table included with MapInfo Professional.

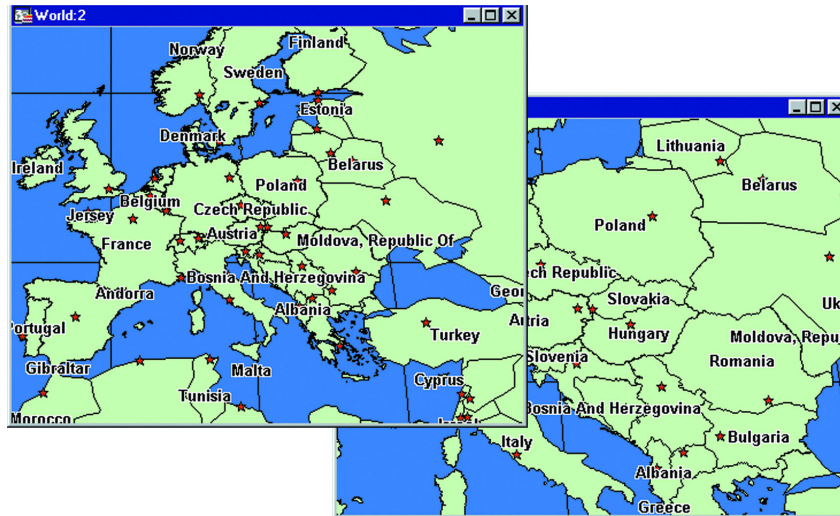
Note: Some of the files described in this example may refer to MapInfo Professional Tutorial data, which is available on the MapInfo web site, www.mapinfo.com/miprotutorial.

To create multiple views of the same map:

1. Open the **WORLD.tab** and **WORLDCAP.tab** tables from the **MapInfo/Data/World** directory. The tables display in a Map window.
2. Choose the area you want to show in detail and zoom in on it. The Map window now contains the detailed view.



3. As stated previously, there must be a separate Map window for each view you want to include in a layout. Instead of re-opening the tables to re-create the Map window, on the **MAP** menu, click **CLONE VIEW** to create a duplicate Map window.
4. A new Map window displays. Zoom out on this map to create the overview map.



Note: The new Map window is independent of the original Map window. You may add or remove layers without changing the original map.

Getting Labels Right for your Layout Window

There are many considerations in getting labels to look good on your maps. As with changing views of the map, there is a significant difference between using labels in a MapInfo Professional session and using them in a layout. Labeling in a MapInfo Professional session is best handled using the Auto Label check box in Layer Control.

When you create a map to place in a Layout window, you usually need to spend more time making your labels look aesthetically pleasing. It is also more likely that you will want to save these labels to a separate layer. With the default labeling, label styles can be changed; however, customized labels are not saved in their own layer for future use or editing. To create labels that can be easily saved, use *Autolabel.mbx* or *Labeler.mbx*. These MapBasic applications allow you to create labels that can be saved to a separate layer for future use.

Using the Autolabeler Tool in your Layout Window

This application gives you the same labeling functionality as in MapInfo 3.0. This MapBasic application lets the user determine what layer to autolabel. The labels are drawn in the Cosmetic layer where they can then be edited and saved.

Using the Labeler Tool in your Layout Window

While labels in MapInfo Professional are attributes of the map layer, text objects look like labels but behave like other annotations you draw on the map. The text objects are stored in the Cosmetic layer, and you can save them to a table.

The Labeler tool available from the Tool Manager (on the **TOOLS** menu, click **TOOL MANAGER**) helps you use text objects to perform several common labeling tasks:

- Convert labels into text objects, so that they can be saved in a permanent table.
- Create labels for only the currently-selected objects.

- Draw text objects one at a time using the Text Label button. This allows you to create multiple annotations for a single map feature, which is something you cannot do using labels.

Rotating Labels in your Layout Window

The RotateLabel tool contains support for labels in Layouts. Load the tool through the Tool Manager, make the Map window active, and on the **TOOLS** menu, click **ROTATE LABELS**. Make sure that you select the Prepare labels for use in Layout window check box when you are setting your Rotate Label options.

Creating a Layout

Creating a layout involves adding your Map, Legend, Graph, and Browser windows to the Layout window, positioning these items where you want them, and adding any annotations such as text and titles so that your final layout presents the message you want to send.

Adding Open Windows to a Layout

First, decide what you want to put in the Layout window. You can choose whether you want to display all, some, or none of your open windows. Choose the **WINDOW** menu and click **NEW LAYOUT WINDOW** to display a dialog box, prompting you to choose which windows to add to the layout.

You bring your windows into the Layout window by adding them to placeholders, or frames. A frame is a graphic object through which you can view a window. Each frame may contain the contents of one Map, Graph, Browser, or Legend window.

At the New Layout Window dialog box, you have three options. You can add one frame to the layout, add frames for all currently open windows, or create a blank Layout window (no frames).

Each situation is described in the next table.

Situation	Description
One Frame for Window	MapInfo Professional places a single open frame in the center of the layout. You select the contents of this frame through the drop-down menu that lists all open windows. If you choose a Map or Graph window from this list and there is an active map legend, MapInfo Professional automatically places the legend in the layout. You can reposition or delete this legend from the layout. Legends are positioned in the same way as Map, Browser, and Graph windows. Their relative locations are preserved on the screen.
Frames for all Currently open Windows	This option tells MapInfo Professional to place all open windows in the layout. Since MapInfo Professional places windows in the approximate location and size as they appear in the MapInfo Professional window, you should arrange and size the windows before you bring them into the layout.
No Frames	If you prefer, you can create a blank layout by choosing the No Frames option. If you do not have any windows open, choosing New Layout Window automatically creates a blank layout. The New Layout Window dialog box does not display.

Since a frame is a graphic object, you can:

- Reposition it using the Select tool.
- Change its fill, and the line style of its border.
- Copy or cut the frame and paste it into another Layout window.

You can also position frames so that they overlap one another or overlap other graphic objects.

To change which window is displayed in a frame, double-click the frame with the Select tool. Use the drop-down list in the Frame Object dialog box to change the frame's contents.

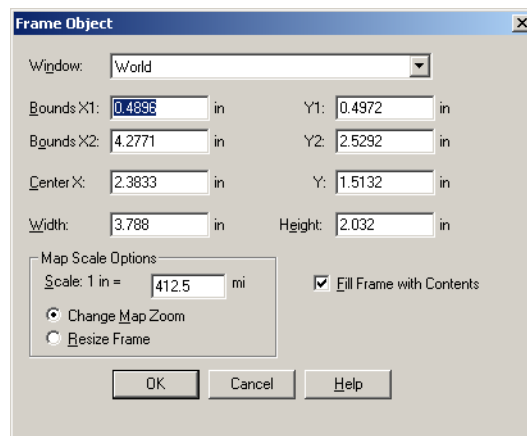
Adding Windows to Current Layout – Using the Frame Tool

After you have created a layout, you may decide that you want to add other maps to it. You do not have to create a new layout to do this. You can create frames by hand to contain other windows. Use the Frame tool to draw window frames where you want them. The Frame tool is available whenever the Layout window is active.

Note: If you draw a frame when no windows are open, MapInfo Professional places a blank frame in the Layout window.

To add a window to a layout you are already working with:

1. Make the Layout window active and click the **FRAME** button. The Frame tool is activated.
2. In the Layout window, click and drag to draw the frame for the new window. When you release the mouse, the Frame Object dialog box displays.



Note: This dialog is slightly different for each type of frame. The Map Scale options are only available when you select a Map window in the frame. The **FILL FRAME** check box does not display for Browser, Cartographic Legend, and Graph windows.

3. In the **WINDOW** drop-down list, select the window you want to add and review the options for creating this frame.
 - **BOUNDS X1 AND 2, BOUNDS Y1 AND Y2** — Use these fields to define the x and y boundaries for the new frame. When you change bounds entries, the Center, Width, and Height entries change accordingly. When you change the bounds entries, the **MAP SCALE** changes as well.
 - **CENTER X, Y** — Use these fields to define and adjust the center point of your new frame.

Note: When you make a change to the **CENTER X** or **Y** entries, the **WIDTH** and **HEIGHT** bounds do not change.

- **WIDTH, HEIGHT** — Use these fields to define and adjust the width and height of the new frame.
- **CHANGE MAP ZOOM** — Click this radio button to implement the correct map scale without changing the size of the frame. This option changes the zoom of the actual Map window so that the Layout frame is in the correct scale. This option is selected by default. Type the scale you want within this frame in the Scale. The units are set by the Paper Unit setting in the System Preferences dialog box. For example:
Map Scale = Scale field entry x (Frame width / Map window width)

Note: Changing the map scale with this option will not change the values in the Bounds fields or the Width and Height fields because there is no change to the size of the frame, only the look of the map within the frame. To undo the change to the map zoom, return to the Map window and click **PREVIOUS VIEW**.

4. Select one of these options:
 - **RESIZE FRAME** — Click this radio button to change the size of the frame based on the data you enter into the Scale field. When you change this entry, the bounds, Center, Width, and Height entries change accordingly.
 - **FILL FRAME WITH CONTENTS** — Click this check box to display as much of the Map window as fits in the frame. When you do not select this button, the frame may be only partially filled but it will have the same contents as the window it contains.
5. Click **OK** to display the new frame in the Layout frame.

Note: When you click the **CHANGE MAP ZOOM** or **RESIZE FRAME** radio button, you set your selection as the default for the rest of the session. If you change it during the session, the change becomes the default.

Adding a Maximized Map Window to a Layout

You can place a maximized Map window into a frame in a Layout. The frame object's dimensions are created according to the Map window's size instead of the page layout size. MapInfo Professional also allows the map's image to completely fill the frame, preserving the map's center and zoom settings. If you double-click the frame, you will notice that the Fill Frame with Map check box in the Frame Object dialog box is checked. This allows the map image to fill the entire frame. The box is checked by default for all Map windows in frames.

Using Legends in a Layout

You can use both cartographic and theme legends in your layout. Both types of windows display in the layout at the same size as they do on the MapInfo Professional desktop.

When you resize a legend frame to make it smaller, it crops the legend rather than shrinking it to fit. The text styles (e.g., font, size) used in the cartographic and theme legend windows are preserved in the layout.

Adding a legend to the Layout window is a different process, depending on the type of legend. You can add a theme legend to a layout even when no theme legend displays in the MapInfo Professional desktop.

To do this, make sure the Layout window is active and click the **FRAME** button.

In the Layout window, click and drag to draw the frame for your theme legend. When you release the mouse, the Frame Object dialog box displays.

In the Window drop-down list, select the theme legend and click **OK**. The theme legend displays in the layout frame. This is also how you add other types of windows on your desktop to the current layout.

In cartographic legends, you must create the legend on your desktop (on the **MAP** menu, click **CREATE LEGEND**) before you can add it to the Layout window.

Moving Frames in a Layout Window

Once you have brought in the windows you wish to include in the layout, you can reposition or resize them to create a professional looking product.

To move a frame:

1. Click the frame with the Select tool and hold down the mouse button.
2. When the cursor becomes a four-headed arrow (after about one second), drag the frame to the new location and release the mouse button.

Aligning Objects in a Layout Window

MapInfo Professional includes a command to help you perfectly align objects in the Layout window. You can align objects to each other horizontally and vertically or to the Layout window itself.

Choose the objects you want to align and on the **LAYOUT** menu, click **ALIGN OBJECTS**. The Align Object dialog box displays.

Specify the appropriate vertical and horizontal alignment. Choose from the following options:

Horizontal Alignment	Vertical Alignment
Don't change alignment	Don't change alignment
Align left edges of	Align top edges of
Align center of	Align center of
Align right edges of	Align bottom edges of
Distribute	Distribute

Each alignment can be performed with respect to each object or to the entire layout. When you choose the entire layout, the objects are aligned with respect to the top, bottom, left, and right edges or margins of the layout.

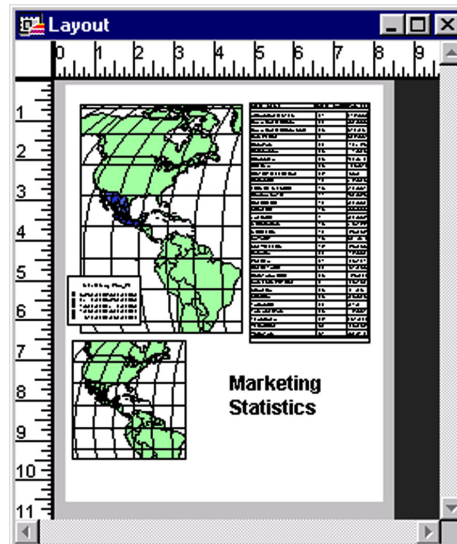
If you want to align objects with respect to each other, the objects are aligned with respect to an imaginary rectangle, called the bounding rectangle, that completely encloses the objects. The horizontal and vertical settings you choose position the objects at the top, bottom, left, right, and horizontal or vertical center lines of the bounding rectangle, rather than at the edges of the layout.

The Distribute option tells MapInfo Professional to distribute the vertical and horizontal space between objects evenly.

You can perform multiple alignments in one layout.

Examples of Aligning Objects in a Layout Window

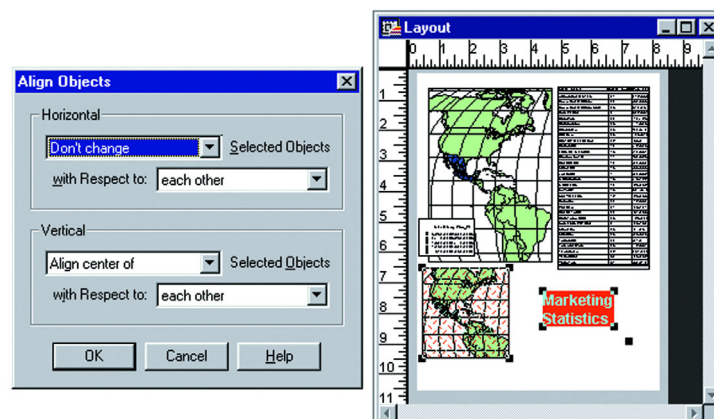
Consider this example. You have several elements in the Layout window: one large map, one small map showing a different view, a browser, and some text. You have them in the general position you want, but you want to line them up precisely to make a professional looking layout. In this case you want to align the objects with respect to each other:



To align the small map and text that are located side by side below the large map:

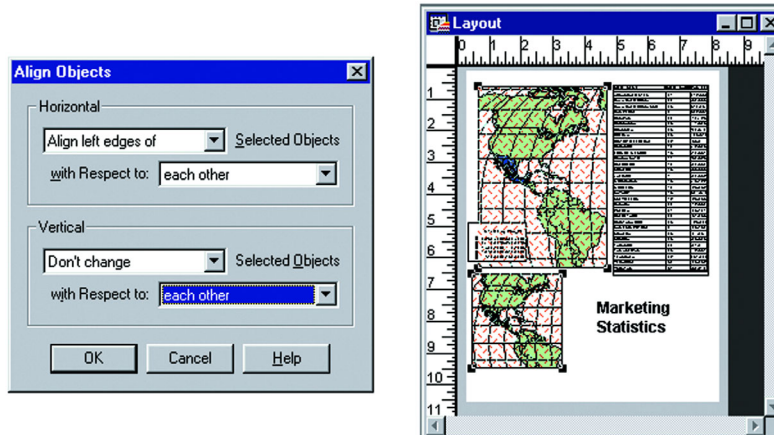
1. Select the small map first.
2. Shift-click to select the text without cancelling the selection of the small map. (You can also use the Marquee Select tool to select both at once.)
3. On the **LAYOUT** menu, click **ALIGN OBJECTS**.
4. Align the two objects so that they are vertically centered with respect to each other. In the Align Objects dialog box, disregard the horizontal component for the moment (make sure it says **DON'T CHANGE**).
5. Choose **ALIGN CENTER** of from the drop-down list in the vertical component.
6. Choose with respect to each other and click **OK**.

The layout readjusts by moving the objects vertically to show the centers of the map and text lined up with each other.



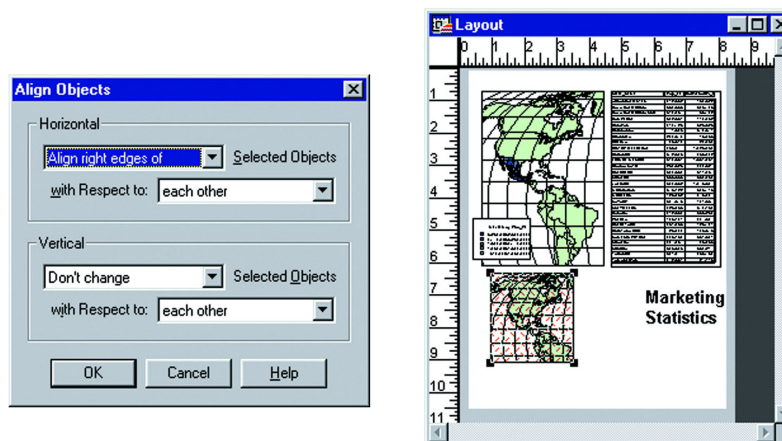
Now you want to align the large and small maps so that their left edges are horizontally aligned with respect to each other. Select the two objects and on the **LAYOUT** menu, click **ALIGN OBJECTS**. In the Align Objects dialog box choose Align left edges of and with respect to each other in the horizontal component. In the vertical component choose **DON'T CHANGE**. Click **OK**.

The map now shows the left edges of the two maps in alignment.



As a final alignment, you want to align the right edges of the large map and the browser. Select the objects and specify Align right edges of the selected objects with respect to each other.

Your layout now looks like this:



Setting the Map Scale for a Layout Window

One of the most difficult tasks in generating good output is setting the scale of the map. There are two ways to set the map scale. The first method is to choose **MAP** menu and click **CHANGE VIEW**. This scale setting affects the on-screen scale of your map according to your monitor size. This scale setting isn't used as often, because generally the scale on screen does not need to be exact. Use the on-screen scale when you are making a presentation that will be viewed directly in MapInfo Professional.

Accurate scale is more important on the printed map. To get the correct scale for output, you must coordinate the Map window with the Layout window. You must also decide on the desired end result. For example, you may want a map that has a 1:25000 scale and fits in a nine inch Layout frame. If this is the case, you will have to alter the zoom level of your map to fit these conditions. Or, in the case where you must show a set distance across the map, you may have to allow for a larger page size. The following two formulas will help you set the right map zoom, scale, and frame width.

Limiting Frame Size When Setting the Layout Scale

The following formula calculates the zoom that must be set in your Map window in order to have a map meet set scale and frame width criteria.

$$((\text{Frame Width in Inches} * \text{Scale}) / 12) / 5280 = \text{Map Zoom in Miles}$$

For example, you need to make a map that will be in a scale of 1:24000 and fit in an eight inch frame. You need to determine the zoom level that will accommodate the map scale and frame width. Calculate the following:

$$((8 * 24000) / 12) / 5280 = 3.03$$

On the **MAP** menu, click **CHANGE VIEW** and enter **3.03** miles as your new zoom level.

Limiting Map Zoom when Setting the Layout Scale

The following formula calculates the number of inches to make the frame for a map in order to meet set scale and zoom level criteria.

$$(\text{Map Zoom in Miles} * 5280 * 12) / \text{Scale} = \text{Necessary Frame Width}$$

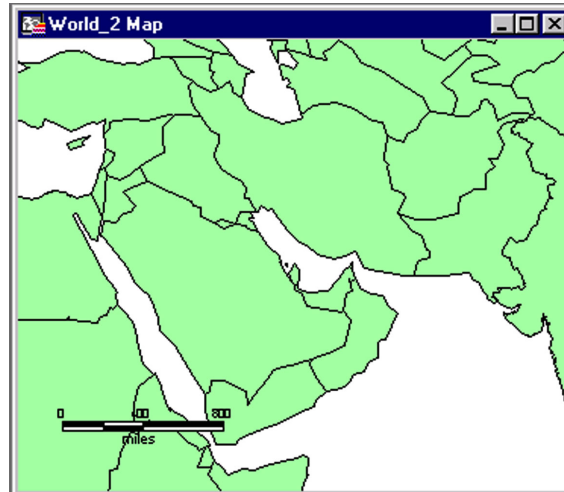
For example, you need to make a map that will be in a scale of 1:100000, and you must view a twenty mile zoom level. You need to determine the frame size that will accommodate the scale and zoom. Calculate the following:

$$(20 * 5280 * 12) / 100000 = 12.67$$

Your frame needs to be 12.67 inches wide. If your printer is not large enough to handle this, change your layout size to spread over two pages.

Creating a Simple Scalebar

If you want to include scale on your map or layout for a general reference of distances, use the Scalebar tool. The Scalebar tool includes the ability to draw a scale bar in the Layout window.



To load the ScaleBar tool:

1. On the **TOOLS** menu, click **TOOL MANAGER**.
2. Scroll down the Tools list and check the box that will load the ScaleBar program. The program is added to the Tools menu.

A ScaleBar tool  is also added to the Tools menu.

Now you are ready to draw the ScaleBar. When you create a ScaleBar in a layout, the Adjust font size to match scale check box is only available in the Set up ScaleBar options. On the **TOOLS** menu, point to **SCALE BAR** and click **SET UP SCALEBAR** to select this option before you proceed.

To draw the scalebar:

1. On the **TOOLS** menu, point to **SCALEBAR** and click **DRAW SCALEBAR**. This option automatically positions the ScaleBar in the lower left corner of the Layout window. A Warning dialog box displays, telling you that the Layout frame and the associated Map window are not currently set up to print to scale.
2. You can adjust the Layout frame or the Map window, or ignore the message. Select the check box if you do not want to receive warnings about the scale again. The Draw Distance Scale in Mapper dialog box displays.
3. Choose the width of the ScaleBar and the aspect ratio.
4. Set the text style and fill colors.
5. Click **OK**. The scalebar is drawn to your Layout window in the lower left corner.
 - If you select the Curve ScaleBar with latitude lines check box, the scalebar is accurate only along its curve and only if the Spherical calculation method is used.
 - If you do not select the check box, the ScaleBar is accurate straight across, but only if the Cartesian calculation method is used.

Check the Map Options dialog box (on the **MAP** menu, click **OPTIONS**) to see which distance calculation method is in use for your Map window.

The Scale Bar tool that is placed on the Tools toolbar when the Scale Bar tool is loaded enables you to create a Scale Bar and position the left edge of it anywhere on your layout. Click the **SCALE BAR** tool, and click the Layout where you want to position the left edge of the Scale Bar. Follow **step 2** to **step 5** above to complete the Scale Bar.

Note: The objects that make up the scalebar are drawn to the Cosmetic layer. To move the scalebar, make sure that all of the objects are selected, and click and drag the ScaleBar to a new location.

Cloning a Map View

You can create a second view of your map with the Clone View command. Clone View creates a duplicate Map window that you can then alter to create a different view of your map, e.g., a street map of a city and a zoomed in view of a major intersection, or use a different kind of thematic analysis for each view. It is particularly useful when you are creating a Layout and you want to present side-by-side views of the same location.

Note: Cloned windows in a workspace are written as MapBasic commands to the .WOR file. These command statements cannot exceed 32,000 bytes.

Now that you have completed your professional looking layout, printing is a simple matter.

Creating a Cartographic Legend

You can utilize the cartographic legend feature in a variety of ways. This feature enables you to create a legend for any map layer(s) in your Map window. Many of the elements in the cartographic legend and legend window can be customized, allowing you to enhance your map presentation. You have the added proficiency of being able to use the table metadata in your cartographic legend text as well as save legend attributes to the metadata. You are also able to align all of the legend frames in your Map window. Furthermore, the cartographic legend feature has the ability to join tables “on-the-fly”, thus allowing you to obtain legend feature descriptions from another table while you are creating the legend.

What is a Cartographic Legend?

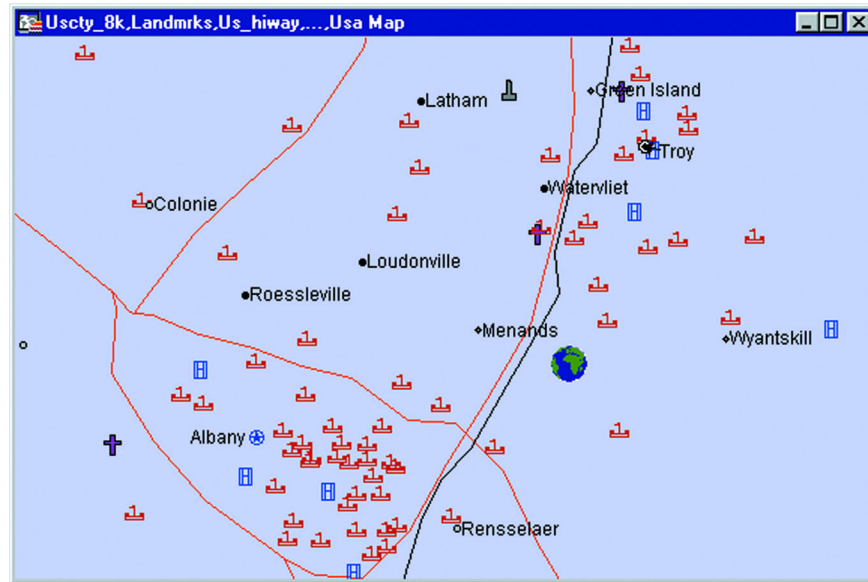
Cartographic legends are based on the map layers in your Map window. Each legend in the legend window corresponds to a layer on the map, and each legend is enclosed in a legend frame within the legend window. The attributes for each legend frame, such as the title and label styles can now be derived from several sources. These are:

- Map table metadata
- Map table attributes
- Joined tables
- Manual creation

A legend frame is another way to refer to a particular layer’s legend. You can create an individual legend window for each layer in your map, or you can have several legend frames in one legend window. The properties for each legend frame can be edited individually.

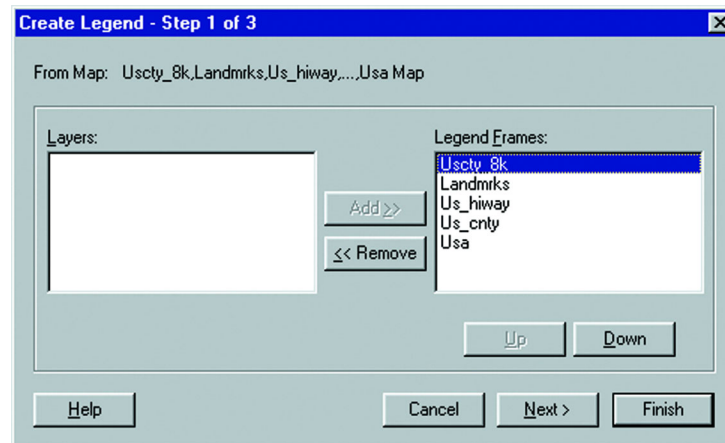
Creating a Cartographic Legend

It is easy to create a cartographic legend using the Create Legend wizard. This section runs through the procedure of creating a legend quickly, and is followed by more detailed information about the options in the Create Legend dialog boxes. In this example, we'll create a cartographic legend for a landmark map of upstate New York, shown in the next figure.



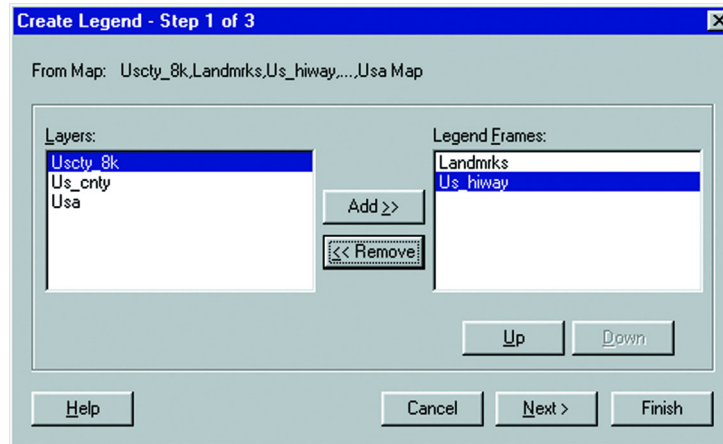
To create a cartographic legend:

1. Make sure your Map window is active and on the **MAP** menu, click **CREATE LEGEND**. The Create Legend – Step 1 of 3 dialog box displays.

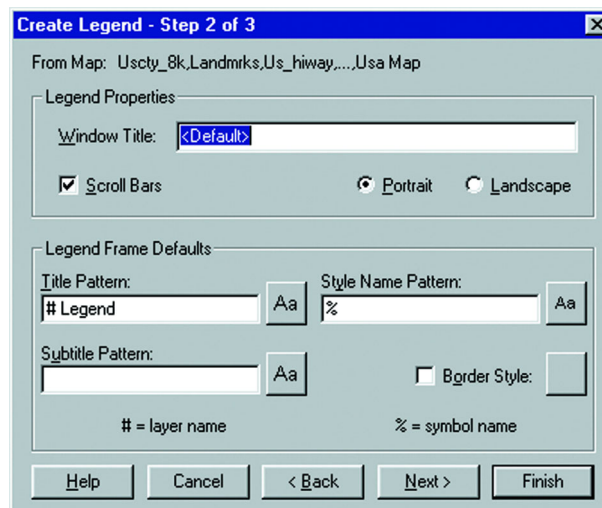


2. Select the layers you want to include in the legend using the **ADD** and **REMOVE** buttons. Each layer corresponds to one frame in the legend.

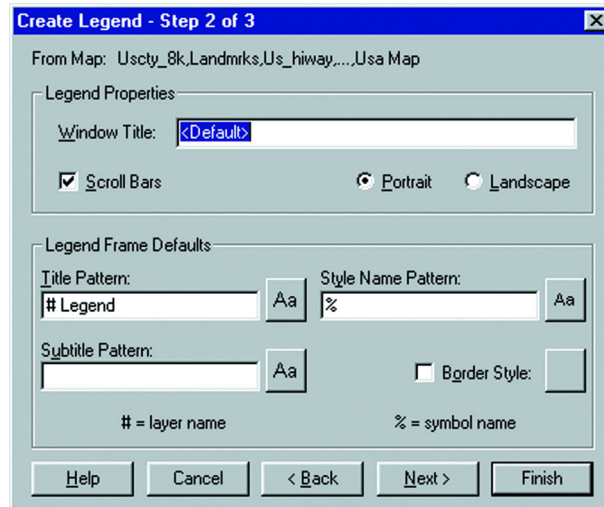
To remove a layer, click the layer in the Legend Frames group to select it and click the **REMOVE** button. In our example, we'll remove the USA, US_CNTY, and US_CTY 8K layers. That leaves only the landmarks and highways layers in the legend.



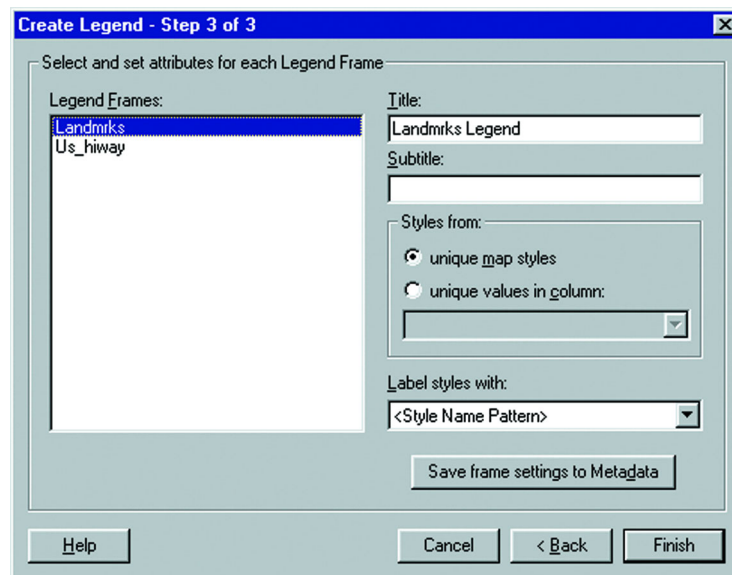
3. The frames appear in the legend in the order in which they appear in the Legend Frames group. You can change the order of the legend frames using the **UP** and **DOWN** buttons.
4. Click **NEXT**. The Create Legend – Step 2 of 3 dialog box displays.



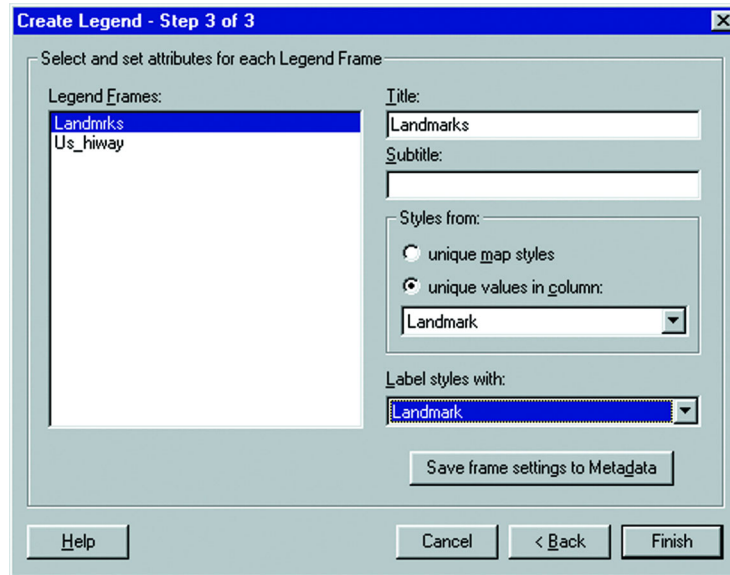
5. Use this dialog box to set default options across all frames in the legend. Change the legend properties and legend frame defaults as you wish. In our example, we'll change the Legend window title to New York Legend, and leave the other default options as is.



- Click **NEXT**. The Create Legend – Step 3 of 3 dialog box displays.

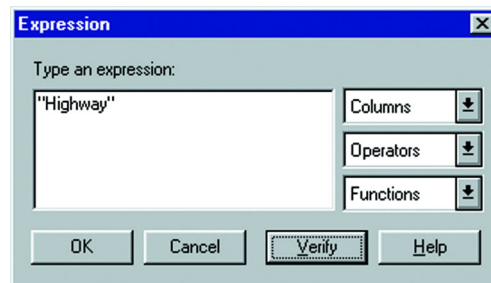


- The Legend Frames group on the left displays all the frames selected in Step 1. Each frame corresponds to a map layer. Select a frame from the list (you can only select one frame at a time). Select the Landmarks layer first.
The frame's default attribute settings display in the boxes on the right. Notice that the defaults used are the settings in Step 2. The '#' character from the default settings is replaced with the name of the layer.
- Select attributes for each legend frame, or use the default values. The default values are based on legend metadata keys in the underlying table, or, if no metadata keys exist, on the Legend Frame Defaults from Step 2 of the wizard. In our example, we'll specify Landmarks for the frame title, obtain the legend styles from unique values in the Landmark column, and label the legend styles with the text information in the Landmark column.

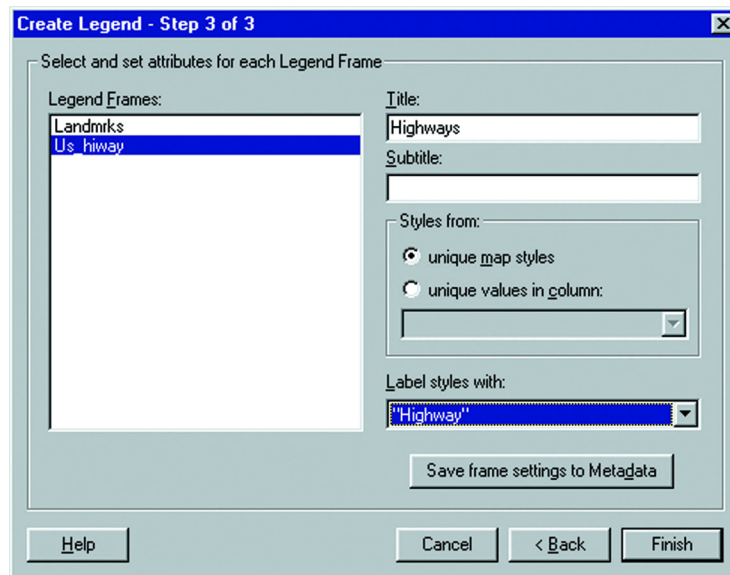


9. Continue in the same manner for the Us_hiway legend frame.

For the Us_hiway layer, enter Highways as the title, click the **UNIQUE MAP STYLES** button, and choose **EXPRESSION** in the Label styles with box. The Expression dialog box displays.

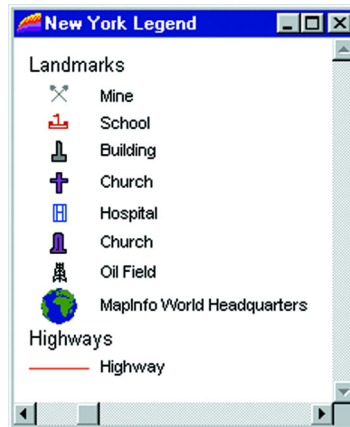


10. Type "Highway" in the text box, and click **OK**. It displays in the Label Style with box.



11. If you want to save your settings for the title, subtitle, the styles column, and the styles label for the selected frame to the table metadata, click the **SAVE FRAME SETTINGS TO METADATA** button.
12. Click **FINISH** when you have selected the desired attributes for each legend frame.

The cartographic legend displays on your screen.

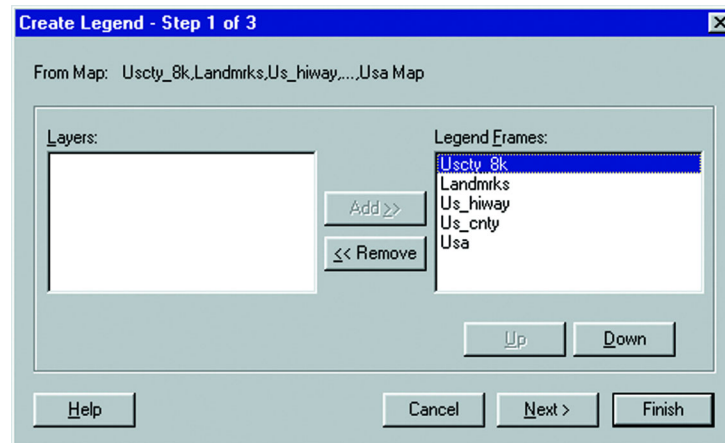


Using the Legend Wizard

To use the Legend Wizard follow these steps:

Step 1 - Selecting Layers

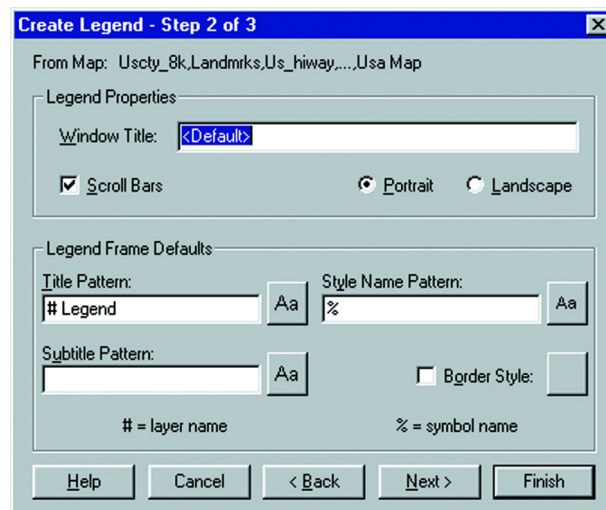
The layers listed in the Legend Frames group of the Create Legend – Step 1 of 3 dialog box are all the layers that will be included in your legend. All the layers in your Map window are included by default.



Use the Up and Down buttons to reorder the layers in this list. To exclude a layer from the legend, click the layer in the Legend Frames group and click the **REMOVE** button. The layer is added to the Layers group and will not be included in the legend. If you change your mind, select the layer in the Layers group, and click **ADD**. The layer goes back to the Legend Frames group for inclusion in the legend.

Step 2 - Defining Window Properties and Frame Defaults

In Step 2 of the Create Legend wizard, you specify the settings for your Legend window and the default settings for the legend frames.



Legend Window Properties

The legend properties pertain to the legend window. You can change the default window title, specify whether the legend window contains scrollbars, and specify the orientation of the legend window.

The default window title is based on the layers in the Map window. The default will be: “Legend of <layer1>, <layer2>, <layer3>... .” To change the window title, enter the title you want into the Window Title box. Scrollbars for the legend window are displayed by default. To deactivate their display, clear the Scroll Bars check box. To specify the orientation of legend frames in the window, click the button next to the orientation you desire: portrait or landscape.

Legend Frame Defaults

The Legend Frame defaults are used when there are no metadata keys in the underlying table. These settings show the default values for the legend text, style, and the border style of the legend frame. You can change the default values for any legend you are currently working with. Unlike metadata defaults, which can be different for each legend frame, these settings apply to all the frames in the legend.

Creating a Legend Frame Title

Use the Title Pattern box to specify a title for the legend frame and its text style. Notice the # character in the Title box. It is a placeholder for the name of the layer on which the frame is based. For instance, if you are creating a legend for the Austria layer, “# Legend” in the Title box will display as “Austria Legend” in the legend, where # is the name of the layer. The name of the layer will display in whatever position you put the # character.

To create a title with the # character in it, precede it with the \ character. For example, “Northeast \#” displays as “Northeast #.” Click the Style button next to the Title Pattern box to display the Text Style dialog box. Here, specify the font, color, size, and type of emphasis of the text in your legend title.

Creating a Legend Frame Subtitle

Specify a subtitle for the legend frame in the Subtitle Pattern box. Use the # and \ characters in the same manner as you did in the Title Pattern box. Click the Style button next to the Subtitle Pattern box to specify the style of the text in the subtitle.

Creating Text for Legend Symbols

Use the Style Name Pattern box to specify the text that displays next to each symbol in a legend frame. Use the % character to include the symbol type: point, line, or region in the style name text. It acts as a placeholder for the type of symbol displayed and is used the same way as the # character. The # character can also be used in this box. Again, to create text with these characters in it, precede the characters with the \ character. Click the **STYLE** button next to the Style Name Pattern to change the style of the text.

Note: Although the # character can be used in all three text boxes in the legend frame properties, the % character can only be used in the Style Name Pattern box.

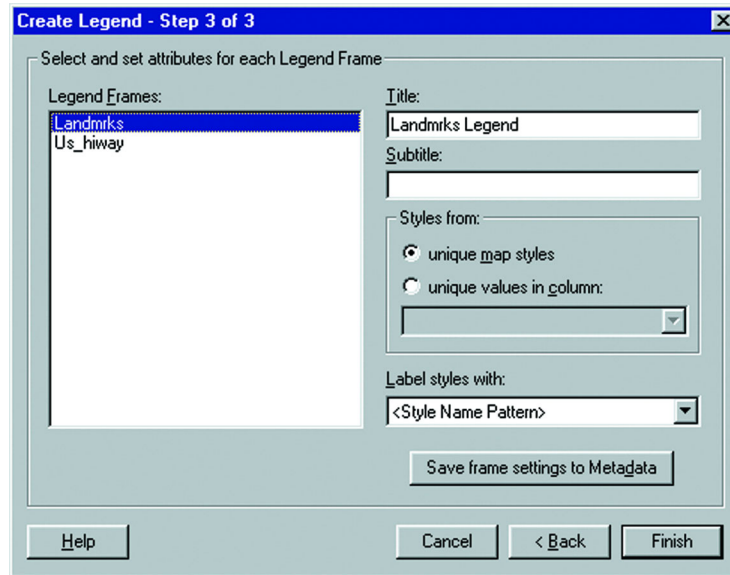
Designating Border Style

Check the Border Style box to place a border around your legend frames. To change the border style, click the Style button next to the check box to display the Line Style dialog box. Here you can specify the line type, color, and width for the frame border.

To change the Legend Frame defaults for all subsequent mapping sessions, use the Legend window preferences (on the **OPTIONS** menu, point to **PREFERENCES** and click **LEGEND WINDOW**).

Step 3 - Legend Attributes

The Create Legend wizard allows you to create attribute-driven legends. This makes creating text descriptions easier because they can be automatically generated from values in an attribute column. In addition, the process by which the legend is generated can be saved to the map table metadata in the underlying map layer, or from a joined table. The metadata is then used as the default attribute settings for the selected legend frame. These settings can be different for each frame. The metadata defaults override the Legend Frame defaults in Step 2 of the wizard. If no metadata keys exist in the table, the Legend Frame defaults from Step 2 are used as the default values.



Selecting Attributes

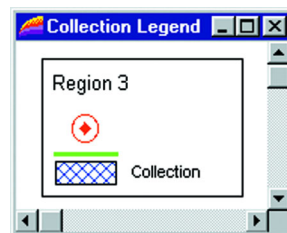
Select attributes for one legend frame at a time. Click a legend frame in the Legend Frames list to select it. The default settings for the selected frame display on the right side of the Step 3 dialog box.

The title and subtitle text is derived either from the table's metadata, or if there are no metadata keys for the table, from the defaults indicated in Step 2 of the Create Legend wizard. You can type in a new title or subtitle or use the default settings.

Legend Styles

The legend styles are the symbols used in the legend to identify the map features. Each type of object: point, line, or region displays its own symbol in the legend. Point objects are represented by point symbols, line objects by lines, and region objects by boxes. In addition, support for the new multipoint and collection objects has been added to the cartographic legend feature. Multipoint objects will display as a point symbol in the legend. A collection object will display a combination of symbols indicating the different object types it contains.

Example of a Cartographic Legend for a collection of points, polylines and regions.



Displaying Legend Symbols

You can display your legend symbols according to unique map styles or from unique values in a column. When you select unique map styles, one legend symbol for each unique map style is displayed in the legend frame. When you select unique values in column, a legend symbol displays for each unique value in the selected column. This creates multiple symbols of the same type. If you are creating a legend based on the AUS_CAPS cities using the setups table and you select the column PLACE_NAME, a symbol for each capital city will display. You can then label each symbol according to PLACE_NAME, or any other column, to have the column value display next to each symbol.

Labeling Legend Symbols

You can label your legend symbols in several ways. You can use the Style Name pattern indicated in Step 2 of the Create Legend wizard. You can also provide more description using column values from your table, as noted above. The column can be any column in the table, or it can be one that you create specifically for this purpose. You can then write your own feature descriptions for each item in the table.

To create a label based on a value derived from your table, use an expression. You can also perform a join, enabling you to add a temporary column from another table that you can use for your feature descriptions.

To create an expression, choose **EXPRESSION** from the Label Styles with drop-down list. Write your expression in the Expression dialog box, and click **OK**. When you click **FINISH** in the Step 3 dialog box. The results of the expression are the labels for your legend symbols. Note that an expression can be multi-line.

To join tables, choose Join from the Label styles with drop-down list, select Join. (Note that the Join option is only available when there are at least two tables open.) The Update Column dialog box displays. Choose the table you want to join to, specify the matching columns, choose the temporary column you want to add to the table, and click OK. You can now use this column for your feature descriptions. Again, this column can be any column value, or one that you create. This column is saved automatically in the workspace.

Note: If the temporary column name is saved to legend metadata, but the temporary column isn't saved in the workspace (e.g. you close tables and the join), you'll get an error when you re-create the legend from metadata. You must either redo the join to get the temporary column, or choose a different label expression for the legend text.

Saving Legend Attributes to Metadata

To save your current attribute settings to the table's metadata, click the Save frame settings to Metadata button. This overrides the metadata defaults. Your settings become the new metadata defaults for the selected legend frame.

Other Legend Attribute Considerations

If you select a theme layer, the title and subtitle currently set for the thematic legend will display. You can change the title and subtitle text, but the other controls are not available. Changing the theme legend's title and subtitle affects all occurrences of the thematic legend. In addition, fonts specified in Step 2 of the Create Legend wizard are not applied to thematic legends.

If you have Display Style Override activated in a layer, (on the **MAP** menu, point to **LAYER CONTROL** click the **DISPLAY** button and click **DISPLAY OPTIONS**), the column and label fields will be ignored when the legend is created. Step 3 of the Create Legend wizard will indicate whether Display Style Override has been activated for the selected legend frame. If the Style Overrides are turned off for a map layer and the legend is refreshed, it will be refreshed according to the column and label originally set.

MapInfo Professional® contains metadata keys for labels for layers that have Display Style Override activated, but they must be put in manually.

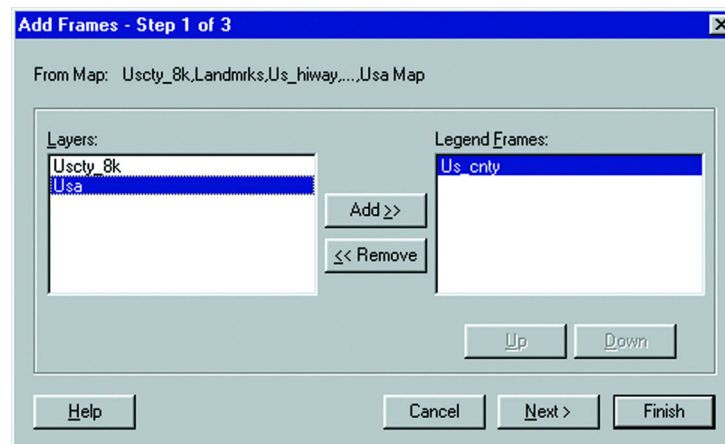
Changing a Cartographic Legend

Creating a cartographic legend places a Legend menu on the menu bar. Use the commands in the Legend menu to add frames and modify the legend window properties. The Legend menu behaves the same way as menus for other types of windows. The active window determines what type of window menu is available, so when the legend window is active the Legend menu appears in the menu bar.

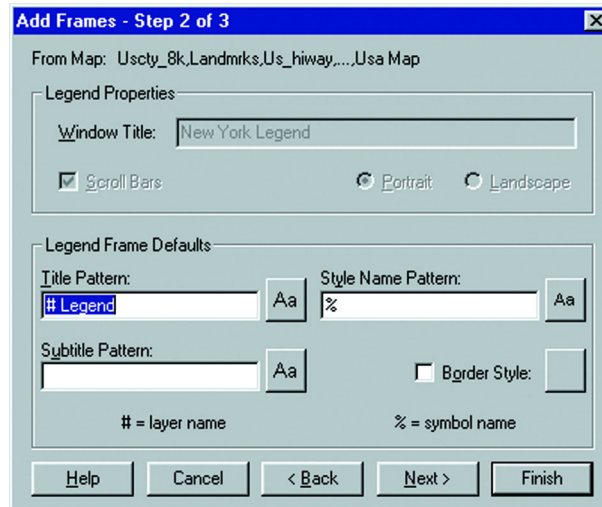
Adding Frames to a Cartographic Legend

Adding frames to a cartographic legend you have already created is easy. The procedure is the same as for creating the legend, except that you are just adding frames to it. Do the following:

1. On the **LEGEND** menu, click **ADD FRAMES** or right-click to display the shortcut menu and click **ADD FRAMES**. The Add Frames – Step 1 of 3 dialog box displays.

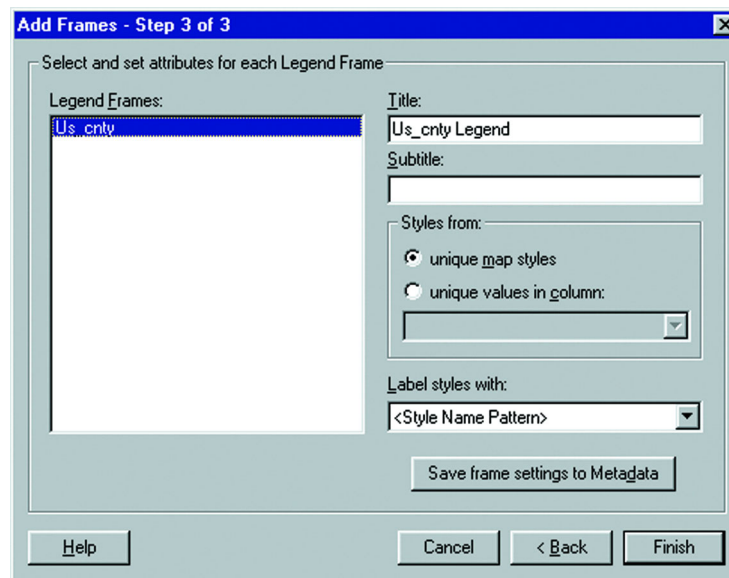


2. The Legend Frames list displays the map layers in your Map window that are not currently included in your legend. The US_CNTY, USA, and US_CTY 8K layers display in the box. To remove the USA and US_CTY 8K layers, click the layer you want to remove and click the **REMOVE** button.
3. Click **NEXT**. The Add Frames – Step 2 of 3 dialog box displays.



Here, specify the legend window properties and legend frame defaults as you did in the Create Legend wizard. The legend frame defaults you specify here are used if there are no metadata keys in the table.

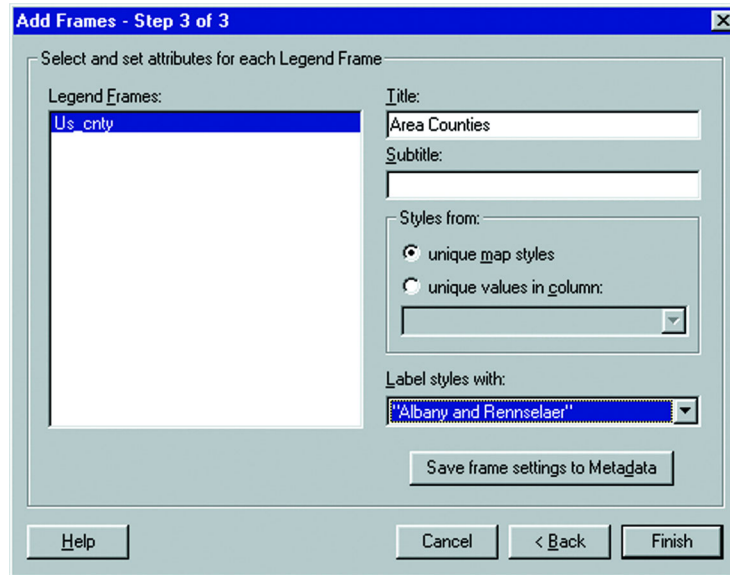
4. Click **NEXT**. The Add Frames – Step 3 of 3 dialog box displays.



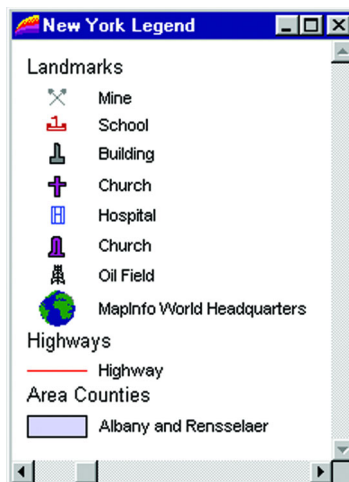
The default values that display for the frame title and subtitle are taken either from the defaults you specified in Step 2, or the table's metadata. As in the Create Legend wizard, you specify attributes for one frame at a time.

This dialog box works exactly the same way as choosing styles for the initial creation of the legend. You can select either a column, the Style Name Pattern (the default settings in Step 2), **EXPRESSION**, or **JOIN**.

5. Type `Area Counties` as the title for the Legend frame.
6. Click the unique map styles button.
7. In the Label styles with box, choose **EXPRESSION**. In the Expression dialog box, type: "Albany and Rensselaer" and click **OK**.

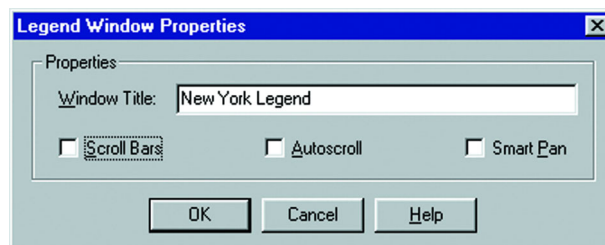


8. To save your frame settings to the table's metadata, click the **SAVE FRAME SETTINGS TO METADATA** button. These settings become the new legend frame defaults.
9. Click **FINISH**. Your legend redisplay with the added frame(s).



Modifying Legend Window Properties

To modify the Legend window properties, on the **LEGEND** menu, click **WINDOW PROPERTIES**. You can also double-click in the legend window, outside of a legend frame to display the dialog box. The Legend window properties are for the entire Legend window. You can change the window title, include scrollbars, or activate Autoscroll and Smart Pan.

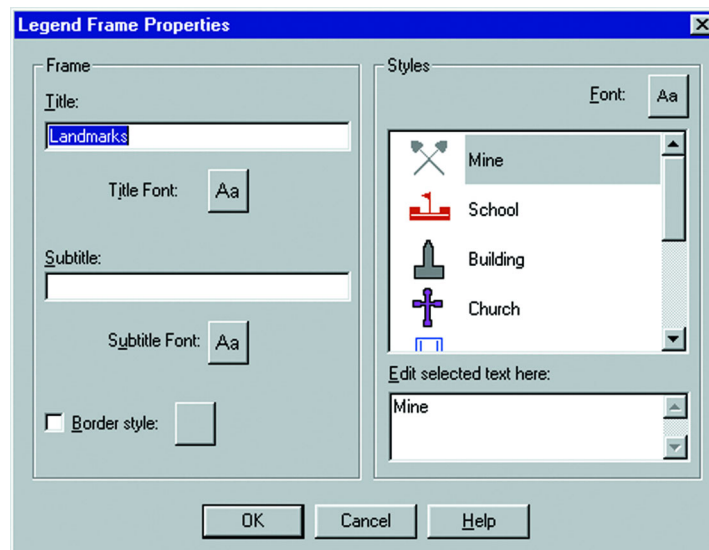


For the New York Legend, clear the **SCROLL BARS** check box to remove the scroll bars.

Modifying a Legend Frame

To modify a particular legend frame, right click the frame you want to change. The frame is selected and a shortcut menu displays. Click **PROPERTIES** to display the Legend Frame Properties dialog box. You can also double-click the legend frame to display the Legend Frame Properties.

This example shows the frame properties for the Landmarks layer.



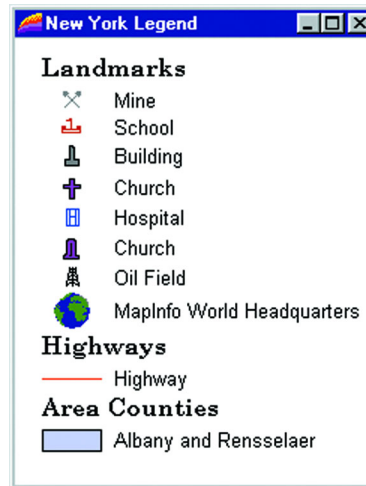
You can edit the title, subtitle, legend symbol text, as well as the title and subtitle text styles, the border style, and the styles of the legend symbol text. When you edit legend symbol text, you can add multi-line text in the Edit selected text box.

Let's choose a different font for the frame title. Click the font style button for the Title to display the Text Style dialog box. Choose a different font, a larger font size, and check the bold box. Click **OK** when you are finished with the modifications.



Go into the legend frame properties for each of the other frames and make the same modifications to the title font.

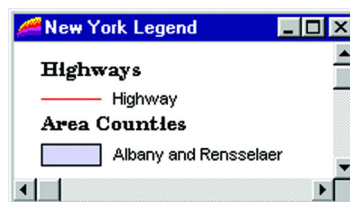
This is what the legend now looks like. The scrollbars have been removed and the frame title text has been modified.



Note: If you modify a legend for a thematic map (a theme legend), clicking the Properties option in the shortcut menu displays the Modify Thematic Map dialog box. Click the Legend button to modify the theme legend. See [Using Thematic Mapping to Analyze Information in Chapter 9 on page 313](#) for details on thematic mapping and theme legends.

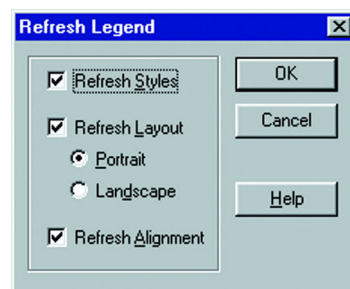
Deleting Frames

You might decide that you want to remove one or more of your legend frames from the legend. To delete a frame, right-click inside the frame you want to remove to display the shortcut menu. Click **DELETE**. Here is the updated legend.



Refreshing Frames

If any edits you make in the legend cause changes to the formatting in the window, on the **LEGEND** menu, click **REFRESH** (or right-click to display the short cut menu and click **REFRESH**).



The Refresh Legend dialog box displays. You can refresh the legend styles, the layout, and the alignment.

When you refresh the legend styles, MapInfo Professional adds new styles associated with the legend and removes obsolete styles.

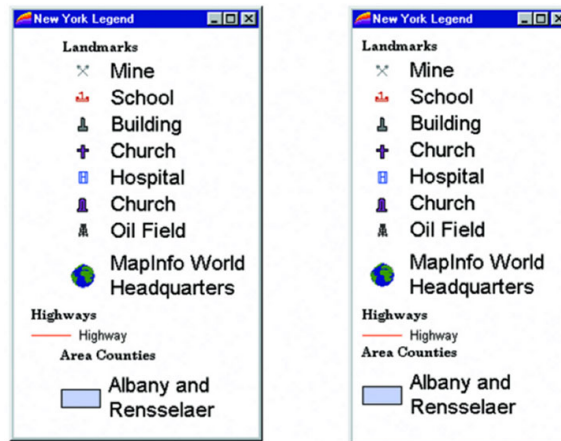
If the layout mode is changed from Portrait to Landscape, or vice versa, or from Custom to Portrait or Landscape, MapInfo Professional resizes the window to a default size that's based on the layout mode (similar to the initial window you get when you first create a Portrait or Landscape legend).

When you refresh the alignment, your legend styles and text are aligned across all frames in the legend, regardless of the orientation of the window. For new legend windows, this means style centroids across all frames will be lined up and style labels across all frames will be lined up. When new frames are added, the style centroid and label offset are remembered.

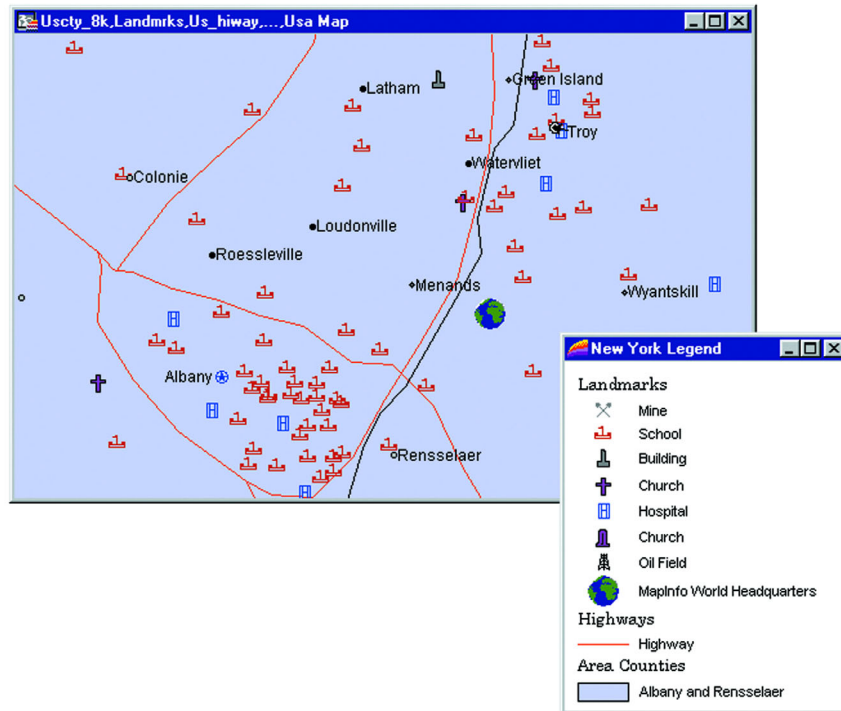
If editing or adding frames to an existing legend causes frame(s) to be formatted differently than other frames in the same window, users can use the Refresh dialog box to re-align styles and text across all frames.

To demonstrate how frame alignment works, go back to the Legend Frame properties and make some changes to the size of the symbol text in each frame. The legend now looks like the legend on the left, in the illustrations.

On the **LEGEND** menu, click **REFRESH** and make sure Refresh alignment is checked. The legend is re-aligned across all of the frames. The legend now looks like the legend on the right in the illustration.



You can easily revert the legend symbol text back to its original size through the Frame properties. Here is how the legend looks with the map.



Printing and Exporting Your Results

This section covers the printing and exporting options in MapInfo Professional.

Printing Your Project

When you need to create presentation materials, you can print out the MapInfo Professional layouts you have created.

Page Setup

First check that your page setup is what you want. Any changes to the page setup will likely affect the layout, so it is a good idea to view the effect of the changes on your layout before printing. On the **FILE** menu, click **PAGE SETUP**. Here, you can specify the page orientation (portrait or landscape) and margins. You can also specify the paper size and its source.

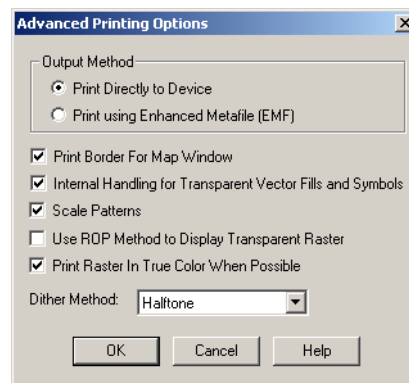
In addition, you can override your default printer setting and choose a different printer for this print job. Click the **PRINTER** button to display the Page Setup dialog box for your printer. The printer that initially displays is the default printer that you set in the Printer preferences (on the **OPTIONS** menu, point to **PREFERENCES** and click **PRINTER**). This will either be the Windows default printer, or the MapInfo Professional preferred printer that you selected. Make any changes you want to the printer and its properties, and click **OK**. The settings available in the Printer Properties dialog box will vary according to the printer you are using.

Printing Options

Changes you make to these settings override the default settings in the Output preferences for this printing job.

When you are ready to print:

1. Make sure the Layout window is active. On the **FILE** menu, click **PRINT**. The Print dialog box displays.
2. Choose the number of copies you want to print and whether you want all pages or a specific range of pages to print. As in the Page Setup dialog box, the Print dialog box also allows you to override the default printer settings.
3. Click the **NAME** drop-down list in the Print dialog box to select a printer. All of the printers available on your system display in the list. You can specify printer properties here as well, plus specify whether to print to a file.
4. To use the advanced print settings to take advantage of additional output options that help you control transparency and color, particularly for raster images, click the **ADVANCED** button. The Advanced Printing Options dialog box displays.



- a. Indicate whether you want to print your Layout using the new Enhanced Metafile format, or with the method used in previous versions of MapInfo Professional (Print Directly to Device).
- b. Next, indicate how you want to handle transparency. If you have transparent vector fill patterns and symbols, check the Internal Handling for Transparent Vector Fills and Symbols box to have MapInfo Professional handle the transparency internally.

Note: Windows 95/98 users: you cannot use the larger fill patterns as they display as solid fill, however smooth scrolling is supported. The Windows 95/98 operating systems do not support brush patterns larger than 8 x 8 pixels.

If you are using transparency in a raster image, clear the **USE ROP METHOD TO DISPLAY TRANSPARENT RASTER** box to have MapInfo Professional handle the transparency internally. The image will be broken down into small rectangular regions that do not contain transparency. It is recommended that you check this option because printers do not always handle transparent raster images correctly.

Note: This method may produce large plot files.

- c. If you are using 24-bit, true color raster images, check the Print Raster in True Color When Possible box, and select a dither method from the Dither Method drop-down list. The Print Border for Map Window check box is not available for Layout windows.

You can control the border for each frame by selecting the frame and setting by selecting the **OPTIONS** menu, clicking **REGION STYLE**.

- d. Click **OK** to return to the Print dialog box.
5. Click **OK** to print.

More and more often, users want to save their maps electronically to files rather than print them on paper. MapInfo Professional offers many choices for electronic map output.

Exporting a Layout

The easiest way to make electronic copies of maps and layouts from MapInfo Professional is to use the Save Window As command. You can export to Windows Bitmap, Windows Metafile, Windows Enhanced Metafile, JPEG File Interchange Format, JPEG 2000, Portable Network Graphics Format, Tagged Image file Format (TIFF), CMYK, and Photoshop 3.0.

When using the Save Window As command, keep in mind that all additions and edits must be made in the Map window. When you have the Map window the way you want it, then create the Layout window.

You can use the new advanced export options to produce better quality output. The same transparency and raster options available when you print your Layout are also available when you export the Layout. Click the Advanced button in the Save Window As dialog box to display the Advanced Exporting Options dialog box. The same check box settings are available.



As with the advanced print options, changes you make to the advanced export settings override the default settings in the Output preferences for this export operation. See [Setting your Output Setting Preferences in Chapter 2 on page 92](#) for more complete information.

Creating an Encapsulated Postscript File

If the available Save Window As formats are not appropriate for your needs, or you want to use the options in the Layout window, you may want to send your output to an encapsulated postscript (EPS) file. This file type is widely used by service bureaus and print shops.

There is not a set export or save command for EPS files. You must set up a postscript printer driver and print the map or layout to a file. Do the following:

1. From the Windows Control Panel, select **PRINTERS**.
2. In Printer Setup choose **ADD PRINTER**. The Add Printer Wizard displays.
3. Follow the wizard for the setup. Choose a postscript printer from the printer list, and select FILE as the available port. The print driver may have an option to specify EPS that should be enabled.

4. Once the postscript driver is installed on your system, you will use that printer to print the map or layout to a file from MapInfo Professional.
5. In MapInfo Professional, once you have created your map, on the **FILE** menu, click **PRINT**. The Print dialog box displays.
6. Under printer name, select the postscript printer. Click **OK**.
7. The Print to File dialog box displays. Give your file a name and choose **SAVE**. You will now have an encapsulated postscript file.

Registering Raster Images

Raster images can provide context to your maps by giving them detail and definition. This chapter reviews the details of registering and working with raster image files.

In this Appendix:

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- ♦ **Opening a Raster Image** 457
- ♦ **Printing/Exporting Translucent Images** 466

Working with Raster Images

There are a number of ways you can obtain raster image files. If you have a scanner and scanner software, you can use the scanner to create raster image files. MapInfo Professional can read and display the raster image files created with the scanner software.

Some graphics software packages let you save or export images into raster file formats, such as TIFF (Tagged Image File Format). So if you can create a TIFF file with your draw or paint package, you can display it in MapInfo Professional.

You can also purchase raster images from MapInfo Professional or other commercial vendors. Some vendors also offer scanning services.

Understanding Raster Images in MapInfo Professional

Using raster image files, you can bring paper maps, photographs, and other graphic images into MapInfo Professional. For example, if you work with paper maps, you probably want to use those paper maps as the foundation for the maps you create in MapInfo Professional. Once you scan your paper map into a raster image file, you then can display it in a Map window.

Using Raster Images As a Backdrop for MapInfo Professional Maps

Using a raster image as the base layer of your map gives you a detailed backdrop for your other map layers. You can easily change the size, scale, or center point of the displayed image. For example, if you want to enlarge part of the image, use the Zoom-in tool. Keep in mind, however, that as you increase the image's size, the display will become grainier if you exceed a 1-1 pixel ratio. Each pixel in the image becomes more distinct, causing the image to look more like a series of blocks instead of the intended picture.

Using Raster Images As a Stand-Alone Image

You may have a satellite image of topography that would be impossible to duplicate as a vector image that you want to use for a presentation. You can display the image in MapInfo Professional and then incorporate it into a page layout.

Map Editing with Raster Images

Once you have superimposed map layers on top of your raster image, you can use the raster image as a reference while you edit your map layers. The process of editing based on a screen image is known as *heads-up digitizing*. (To minimize image distortion, only digitize from map images with known projections or rectified aerial photographs.)

Placing a Logo on a Page Layout with Raster Images

Most raster images displayed in MapInfo Professional are images of paper maps or aerial photographs, but almost any image can be scanned and made into a raster image. For example, with an image like your company logo, you can open and display the raster file in MapInfo Professional without registering it because control point coordinates are irrelevant. You can then place it in a frame in a Layout window and incorporate the logo into your page layout.

Raster Image Details

There are many different raster image file formats. MapInfo Professional can read the following types of raster files:

- *filename.GIF* (Graphics Interchange Format)
- *filename.JPG* (JPEG format)
- *filename.JP2* (JPEG 2000 format)
- *filename.TIF* (Tagged Image File Format)
- *filename.PCX* (ZSoft Paintbrush)
- *filename.BMP* (Windows bitmap)
- *filename.TGA* (Targa)
- *filename.BIL* (SPOT satellite images)
- *filename.SID* (MrSID format)
- *filename.WMF* (Windows Metafile format)
- *filename.EMF* (Enhanced Metafile) format
- *filename.PNG* (Portable Network Graphics format)
- *filename.PSD* (Photoshop 3.0)
- *filename.ECW* (ECW 2.0 format handler)
- *filename.GEN* (ADRG format)
- *filename.GEN* (ASRP format)
- *filename.** (CADRG format)
- *filename.** (CIB format)
- *filename.NTF* (NITF format)

Color Options for Raster Images

MapInfo Professional can read the following types of raster images:

- **Monochrome images:** Each pixel in a monochrome image can be displayed using two colors, usually black and white. These images take up the least amount of space and will display the fastest. In MapInfo Professional monochrome images can also display as two different shades of gray.
- **Gray-scale images:** Each pixel in a gray-scale image can be black, white, or a shade of gray.
- **Color images:** Each pixel in a color image can be any color from a palette of available colors. The set of available colors depends in part on the image file format and the source of the image. An 8-bit image contains eight bits, or one byte, of information for each pixel; this means that the image has a palette of 256 different colors. A 24-bit image contains twenty-four bits, or three bytes, of information per pixel, which means that the image has a palette of over 16 million colors. MapInfo Professional now supports 24-bit, True Color display, with transparency.

For best results when viewing a raster image, we recommend using a high resolution video display.

Opening a Raster Image

When you open a raster file, you need to know about a process called raster image registration. Using a vector map as a reference, you identify the coordinates of control points on the vector map and match them with equivalent points on the raster image. This coordinate information allows MapInfo Professional to determine the position, scale and rotation of the image so that you can overlay vector data on top of the image. The coordinate information is stored in a TAB file created during the registration process. The TAB file enables you to re-open the raster file in MapInfo Professional format. The registration process is explained in more detail in the next section.

You usually register the image the first time you open it. However, you do not need to register the image if you do not plan to use vector data with it, or if it already contains georegistration information.

Raster images usually fall into one of three categories:

- A fully registered image, containing control points and a projection (e.g., GeoTIFF file).
- A partially registered image containing control points, but missing a projection (e.g., an image with an associated World file).
- An unregistered image missing control points and a projection.

Once the image is registered, opening it again requires a slightly different procedure. Opening both unregistered and registered images is explained in the next section.

Opening Unregistered Raster Images

In MapInfo Professional, you can open an unregistered raster image and display it directly in a Map window without manually registering the image. This is useful whenever accurate control point coordinates are unnecessary, such as when the image is not a map (e.g., a logo) or when you are using a stand-alone image.

To open an unregistered raster image without manually registering it:

1. On the **FILE** menu, click **OPEN**. The Open dialog box displays.
2. In the List Files of Type drop-down list, choose **RASTER IMAGE**.
3. Select the file you want to open, and choose **OPEN**. A dialog box displays asking you if you want to display the unregistered image.
4. Choose **DISPLAY**. The image displays in a Map window.

A TAB file is created for the image using non-earth coordinates. MapInfo Professional will use dummy registration points to position the image.

If you decide later that you want to use the image with a vector map, you can re-register the image. Follow steps 1 and 2 above. Since a TAB file has already been created for the image, MapInfo Professional will tell you that a table definition already exists and ask you if you want to overwrite it. Choose Register to proceed to the Image Registration dialog box and register the image.

Opening Georeferenced Raster Images

MapInfo Professional includes support for the direct opening of georeferenced raster images. Georegistration information consists of three or more control points and a projection. Any raster image that contains complete georegistration information can be opened directly in MapInfo Professional using the Open command.

If the raster handler for the image can return all the georegistration information, a .tab file can automatically be created. For example, MapInfo Professional's tiff.rhl raster handler can return georegistration information for GeoTIFF files.

To open a georeferenced image:

1. On the **FILE** menu, click **OPEN**. The Open dialog box displays.
2. In the List Files of Type drop-down list, choose **RASTER IMAGE**.
3. Select the file you want to open, and choose **OPEN**. Your image displays in a Map window.

Additional support has also been included for World files (*.TFW). World files contain control point information, but no projection. When you open a raster image that does not contain registration information, the raster engine will search for a World file associated with it to obtain control points for the image. MapInfo Professional will then display the Choose Projection dialog box, where you can specify a projection and open the image.

If there is no registration information and no World file associated with the image, the Display/Register dialog box displays. You can either display the unregistered image, or register it. As explained above, when opening unregistered images, the Display option creates a .tab file for the image using a non-earth projection and dummy control points. The Register option displays the Image Registration dialog box, where you register the image.

Opening Registered Raster Images

You only have to register a raster image once. Once a .tab file has been created for it, you can open the image like any other MapInfo Professional table each subsequent time you open the file.

The sample raster image files included with MapInfo Professional have already been registered (contain a TAB file). If you purchased a raster image from another source, it may already have a TAB file attached. You will not need to register these images either.

To open a registered raster image:

1. On the **FILE** menu, click **OPEN**.
2. Leave the File Format as it is (MapInfo). The registration process already created a MapInfo Professional readable file (TAB file).
3. Choose the table file from the list in the dialog box. (The TAB file contains the control point information supplied during the registration process.)
4. Choose **OPEN**. MapInfo Professional opens the raster image table and displays the image in a Map window.

Raster File Search When Opening Tables

When you open a MapInfo Professional table that contains a raster or grid file, MapInfo Professional searches for the file if it cannot find it immediately. For example, the search capability can simplify opening tables if your .tab file refers to an image that resides on a CD-ROM drive, and different letters are used to designate the CD-ROM drive on different systems.

MapInfo Professional uses the following search order:

1. Search for the file where specified by the FILE tag in the .tab file.
2. Search for the file in the same directory as the .tab file.
3. Search for the file in the Table Search path specified in the Directories preferences (in the **OPTIONS** menu, point to **PREFERENCES** and click **DIRECTORIES** and select **SEARCH DIRECTORIES FOR TABLES**).

MapInfo Professional either opens the table as though it found the file in the specified location, or it will report an error because the file could not be found in any location.

Registering the Coordinates of a Raster Image

Before you can overlay vector data on top of a raster image, you must first register the raster image so that MapInfo Professional can position it properly in a Map window. In the Image Registration dialog box, you can identify control point coordinates and specify the appropriate projection for the raster image.

Control points are the coordinates you identify on the raster image that MapInfo Professional can use later to match up to other layers. It is very important to provide accurate control point information when registering a raster image, so MapInfo Professional can display raster images without distorting or rotating them. Later, when you overlay vector data, MapInfo Professional distorts and rotates the vector data so both layers can line up properly. Identifying significant control points makes this match up process easier. We suggest you use highway/street intersections and prominent landmarks as control points, as they rarely move.

Specifying the correct projection of the raster image is also important for accurate display. Images that do not have known projections, such as unrectified aerial photographs, are less suitable for use with vector data.

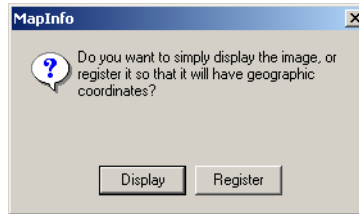
There are two ways to register a raster image in MapInfo Professional. Each involves specifying the map coordinates of control points on a reference map and matching them with equivalent points on the raster image. To determine map coordinates, you can:

- Identify a point's coordinates from the paper map.
- Determine a raster images control point coordinates on screen and automatically transfer the information to the Image Registration dialog box.

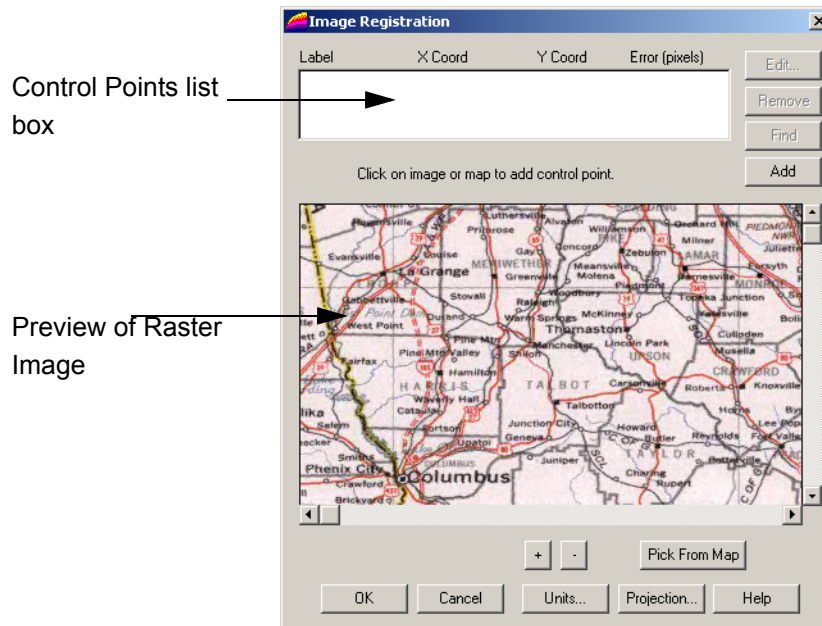
Note: If you scanned in the image from a paper map, the map most likely contains a graticule (latitude and longitude grid). You can choose those coordinates for prominent features and enter them in the Image Registration dialog box.

To register the coordinates of a raster image and create a .tab file from the raster image:

1. On the **FILE** menu, click **OPEN** and specify the Raster Image file format in the Files of type drop-down list.
2. Choose a raster image file and choose **OPEN**. The Display/Register dialog box displays.

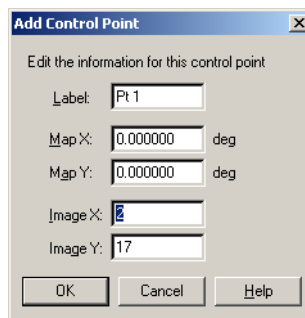


3. Click **REGISTER** to display the Image Registration dialog box.



4. Choose the **PROJECTION** button to specify the raster image's projection. It is easier to match up the maps if you select the same projection for the raster image as the vector images (layers) you want to use. Choosing the same projection minimizes image distortion when overlaying the vector map layers. You cannot change the projection from the Map window.

Note: If you do not set the projection, MapInfo Professional defaults to Longitude/Latitude or to the default table projection set by using the map window preferences you set.
5. You can set the units for the control point entries by clicking the **UNITS** button.
6. To select the actual coordinates to register in the raster image, click the **ADD** button to add a new entry into the **CONTROL POINTS** list box. The Add Control Point dialog box displays.



7. Specify the coordinates from the paper map in the dialog box. The location of each point is marked on the preview image with a "+" symbol. You can change the Label to something

more meaningful to you, such as US85/LA132, to describe an intersection in the raster map. You might also select a prominent building or other very specific address that is easily identifiable in both maps.

8. Repeat this process (**step 6** and **step 7**) until you have registered at least three or four points on the raster image. Try to vary the position of these control points to better define the map. If too many points are in a straight line, an error displays.

If you are working with an image for which you do not know the projection (such as an aerial photograph), enter at least three control points to improve accuracy.

9. When you have completed your control point entries, click **OK**. The raster image displays as a .tab file.

Use the **+** and **-** buttons to zoom in and out of the raster image. Zooming in on the image may help you obtain greater accuracy in control point location. If you are having difficulty finding a control point in the Image Registration image, click the control point entry in the Image Registration list and click the **FIND** button to display the point in the image.

Transferring Vector Map Coordinates Directly to a Raster Map

To transfer the coordinates automatically from a vector map to a raster image, you need a vector map of the same image. Then, you display the vector map side by side with the Image Registration dialog box, which shows a preview of the raster image. Click a prominent feature in the vector map to determine its coordinates and transfer this control point to the Image Registration dialog box.

To transfer a vector map's coordinates to a raster image:

1. On the **FILE** menu, click **OPEN** and Raster Image file format.
2. Choose the raster image file and click **OPEN**. The Display/Register dialog box displays.
3. Click **REGISTER**. The Image Registration dialog box displays. A preview of the raster image appears in the lower half of the dialog box.
4. Choose the **PROJECTION** button to specify the image's projection. If you do not set the projection, MapInfo Professional defaults to Longitude/Latitude or to the default table projection set in the Map Window Preferences.
5. To add control points, click the **ADD** button to add a control point entry to the Control Points list.
6. Click the **PICK FROM MAP** button and select a location in the Map window that matches a location in your raster image. MapInfo Professional updates the Map X and Map Y fields in the Edit Control dialog box with the new coordinates. Click **OK** to save this entry and close the dialog box.
7. Highlight the entry in the **CONTROL POINTS** list and click the matching control point location in the image pane. The Edit Control Point dialog box displays showing the control point's location in pixels in the Image X and Image Y fields. Click **OK** to save these entries.

Note: Remember to type a meaningful description of this location in the **LABEL** field.

8. Repeat this process until you have identified three or four non-linear points in the preview pane of the Image Registration dialog box.
9. After you have defined all of the control points, click **OK** in the Image Registration dialog box. The raster image displays in the Map window under the vector layer.

Use the Layer Control feature to position the raster map appropriately with your vector layers.

Converting D/M/S Coordinates to Decimal Degrees

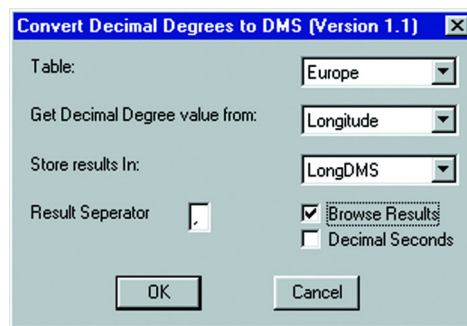
If you are entering map coordinates in degrees, you must enter decimal degrees as opposed to degree/minute/second (d/m/s) coordinates. For example, to specify the coordinates 40 degrees, 30 minutes, enter 40.5 degrees. Be sure to use negative numbers when specifying west longitude and south latitude coordinates.

MapInfo Professional includes the Degree Converter program in its tool set, which easily converts coordinates from d/m/s to decimal degrees, and vice versa. You can also use the Degree Converter to convert a single Latitude/Longitude coordinate to either decimal degrees or d/m/s.

To run the Degree Converter and convert columns to decimal degrees:

1. On the **TOOLS** menu, click **TOOL MANAGER** and check the **LOADED** check box next to the name of the program. MapInfo Professional adds the Degree Converter to the Tools menu for your current session of MapInfo Professional.

Note: To have the tool load automatically each time you open MapInfo Professional, check the Autoload box.
2. On the **TOOLS** menu, point to **CONVERTER** and click **CONVERT COLUMN TO DECIMAL DEGREES**.



3. Select the table that contains the degree, minute, second information in the Table drop-down list.
4. Select the **LATITUDE** or **LONGITUDE** option in the Get Decimal Degree value from list and select the column in which you want to store the results.

If you are registering a raster image that does not use longitude and latitude coordinates, specify the appropriate projection in the Image Registration dialog box and enter your coordinates in the native units of that coordinate system. For instance, if you are registering a UTM map image, enter the coordinates in meters.

5. Click **OK** to convert the coordinates.

Raster Image Registration Error Value

After you register the image, the Image Registration dialog box may display an error value in pixels for a control point. This value is the difference between the control point location on the image and the X and Y coordinates you specified in the Add Control Point dialog box. It is important to keep the error value as small as possible. A large error value will cause the raster image to line up improperly with the vector overlays. Make sure that you are as precise as possible with your control point choices. You should display your image using a high resolution for best results. You can add more control points to improve the registration.

To add more control points to improve the registration:

1. On the **TABLE** menu, point to **RASTER** and click **MODIFY IMAGE REGISTRATION**.
2. Choose the **ADD** button from the Image Registration dialog box and choose another point.
3. Click **PICK FROM MAP** to select an equivalent point in the Map window and to transfer the coordinates to the Registration dialog box. We recommend adding points near the center of the raster image and in areas where the match is the poorest.
4. Click **OK** to save the new control points.

Modifying Control Points for Raster Images

If you must adjust the coordinates of a control point because the error is unacceptable, highlight the point in the Image Registration dialog box and choose another location for it in the Map window. To delete control points, click the point and choose the **DELETE** button.

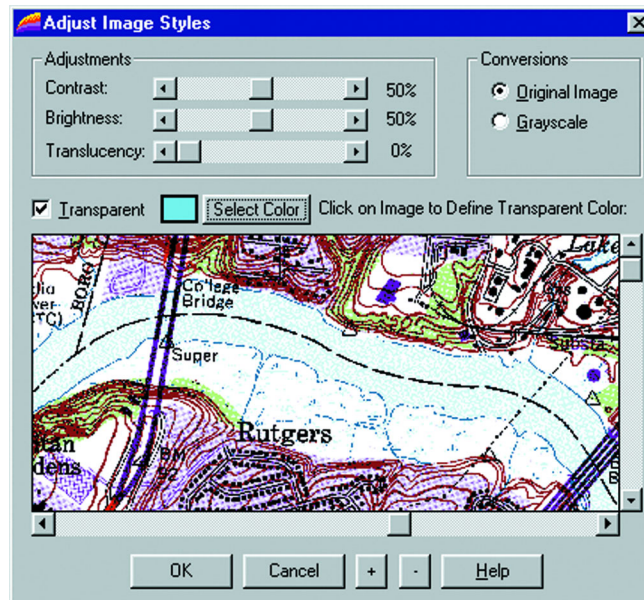
Raster Image Display Options

You can display more than one raster image in a window at a time. This is limited only by your computer's memory. However, if you want to digitize from the raster image, it is best to use only one image in a Map window. This is because two raster images will probably have slightly different rotations.

When using two raster images with different projections, keep in mind that MapInfo Professional will use the projection of the image that takes up the larger portion of the Map window. This means that the second image is only positioned approximately.

Color (Raster Images)

Once you have displayed a raster image file in a Map window, you can make adjustments to the colors in the image. On the **TABLE** menu, point to **RASTER** and click **ADJUST IMAGE STYLES** to change the settings for that .tab file. On the **MAP** menu, point to **LAYER CONTROL** and click **DISPLAY** and select **STYLE OVERRIDE** to adjust the raster style only in this Map window. The Adjust Image Styles dialog box lets you set the contrast and brightness of the image, set translucency, display color raster images in shades of gray, and make one color in the image transparent.



Using the Adjust Image Styles dialog box does not modify the raster image file; instead, it changes the way MapInfo Professional *displays* the raster image file. If you change an image's display style, MapInfo Professional records the new display style in the table file (e.g. PARCELS.tab) or in the workspace for per layer styles, but MapInfo Professional does not alter the contents of the raster image file (PARCELS.GIF) in any way.

If you change an image's display style and choose **OK**, the new display style is applied immediately. It will also affect all Map windows in which the image is displayed if you select the **TABLE** menu, and point to **RASTER** and click **ADJUST IMAGE STYLES**. You do not need to choose **SAVE** to save the changes.

Contrast and Brightness (Raster Images)

Adjusting a raster image's contrast and brightness can help make your map more readable. When you overlay additional map layers on top of your raster image, you may find it hard to tell which lines are part of the raster image and which lines are part of the additional layers. Changing the contrast and brightness can make it easier to differentiate the separate layers.

To soften the appearance of a raster image:

1. On the **TABLE** menu, point to **RASTER** and click **ADJUST IMAGE STYLES**. The Adjust Image Styles dialog box displays.
2. Set the **CONTRAST** scroll bar to a low setting, such as 30%. (The default Contrast setting is 50%.)
3. Set the **BRIGHTNESS** scroll bar to a high setting, such as 70%. (The default Brightness setting is 50%.)
4. Examine the image preview in the lower half of the dialog box. If the new display style suits your needs, choose **OK**. If you want to go back to the previous display style, choose **CANCEL**.

Color to Gray-scale (Raster Image)

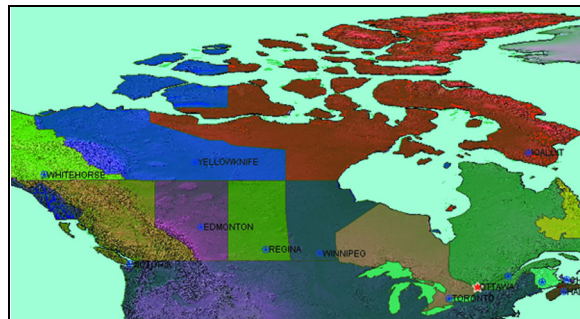
To change a color raster image to gray-scale, click the **GRAYSCALE** button in the Conversions group of the Adjust Image Styles dialog box. To change it back, click the **ORIGINAL IMAGE** button.

Transparent Color (Raster Image)

You can also make one color in the image transparent. Making a color transparent will make the parts of the map displayed under that color visible. In the Adjust Image Styles dialog box, check the Transparent box to activate the Select Color button. Click **SELECT COLOR**. To select the color you want to be transparent, click the color in the preview image. The color you selected appears in a box next to the left of the Select Color button. The transparent color will display as white in the preview image. When you redisplay the image in the Map window, the selected color will be transparent.

Translucent Color (Raster Image)

MapInfo Professional provides the ability to display a translucent raster image. Translucent images allow you to partially see through them, enabling you to lay translucent raster images over other layers so that details of the layers below are partially visible. An image set to 0% translucency is completely opaque; an image set to 100% translucency is completely transparent.



Style Override for Raster Images

MapInfo Professional provides the ability to change the display style for raster and grid images on a per-layer basis through the Layer Control dialog box. The Style override option for raster images works the same way as it does for other map layers. Just choose the **MAP** menu, and click **LAYER CONTROL**, and select a raster layer in the Layer list. Click the **DISPLAY** button. The Display Options dialog box for the image displays. Select the Style Override check box and click the **STYLE** button. The Adjust Image Styles dialog box displays. You can change any of the raster image style settings.

Zoom Layering for Raster Images

Zoom layering for raster images controlled from preferences (in the **OPTIONS** menu, point to **PREFERENCES** and click **MAP WINDOWS** and select **AUTOMATIC RASTER ZOOM LAYERING**). To change the zoom layering setting for a raster layer that you are currently working with, go to the Display Options dialog box (in the **MAP** menu, and point to **LAYER CONTROL** and click **DISPLAY**) and to either activate or turn off zoom layering. The setting is turned on by default.

Limitations in Using Raster Images

Many of MapInfo Professional's features cannot be applied to raster image tables. As a general rule, you cannot use MapInfo Professional to modify a raster image file. Specific limitations of raster tables include:

No Data Saved with Raster Images

A raster table does not have columns, therefore, you cannot attach text or numeric data directly to a raster table, and you cannot perform queries, such as Find, on a raster table. You can, however, overlay a conventional (vector-based) MapInfo Professional table on top of the raster image, and attach data to the conventional table.

Map Projections Limitation with Raster Images

When a raster image file is displayed in a Map window, the Map window automatically adopts the map projection used by the raster image. You cannot reset the projection of the Map window.

If two raster images in a Map window use different map projections, MapInfo Professional will use the projection of the map that takes up the larger portion of the Map window.

The Map window will redraw slowly when you overlay other map layers on top of a raster image. The map redraws slowly because MapInfo Professional is re-calculating map coordinates so that the vector map objects conform to the projection of the raster image.

Printing/Exporting Translucent Images

When printing or exporting a translucent raster image, you'll want to take advantage of Advanced options.

To print a translucent raster image:

1. Do one of the following:
 - On the **FILE** menu, click **PRINT**
 - On the **FILE** menu, click **SAVE WINDOW AS**
2. Click **ADVANCED** and choose from the following settings according to your printing and exporting requirements.
 - **PRINT/EXPORT BORDER** — Select to include the black rectangle border when exporting.
 - **INTERNAL HANDLING FOR TRANSPARENT VECTOR FILLS AND SYMBOLS** — Select to allow MapInfo Professional to perform special handling when exporting transparent fill patterns or transparent bitmap symbols. If unchecked, the process is handled by Windows.
 - **USE ROP METHOD TO DISPLAY TRANSPARENT RASTER** — Use this option to print the raster image as a metafile (EMF or WMF). Using the ROP method allows any underlying data to be rendered in the original form. Select this check box to allow the internal ROP (Raster Overlay by Pixel) to manage the transparent pixels for the raster. Since the ROP Method is largely a display method, not all printers and plotters can use it. We recommend that you experiment with this setting until you get the results you want when printing raster images. This check box is cleared by default.
 - **PRINT/EXPORT RASTER IN TRUE COLOR WHEN POSSIBLE** — Select this check box to print your 24-bit raster images in true color. Make sure your printer settings are greater than 256 colors. This check box is selected by default.
3. When you have completed these selections and returned to the **PRINT** dialog box, click **OK** to begin printing.

Working with Coordinate Systems and Projections

Maps at their base are a visual representation in two dimensions of a section of the three-dimensional Earth. Being able to use maps in an electronic format in many ways frees us from the constrictions of the two-dimensional map because we can use mathematical formulas to compensate for the curvature of the Earth. In this chapter, we cover the coordinate systems and projections that are standard in MapInfo Professional and provide the tools with which you can create a custom projections to meet your organization's needs. Whether you are a local government trying to establish new tax rolls or a large company trying to define your sales territory more precisely, creating a custom projection may be a solution you want to explore.

Sections in this Chapter:

- ◆ **Working with MapInfo Professional Coordinate Systems . . . 469**
- ◆ **Building Blocks of a Coordinate System 474**
- ◆ **Adding Projections to the MAPINFOW.PRJ File 490**
- ◆ **Understanding Affine Transformations 493**
- ◆ **Frequently Asked Questions 496**
- ◆ **Using Earth and Non-Earth Maps 497**
- ◆ **Using the Ocean and Grid Tables 499**

Working with MapInfo Professional Coordinate Systems

The terms “projection” and “coordinate system” are often used interchangeably, however they do not mean the same thing.

Projection - An equation or set of equations that contain mathematical parameters for a map. The exact number and nature of the parameters depends upon the type of projection.

A projection is a method of reducing a map’s distortion caused by the curvature of the Earth, or more precisely, a projection compensates for the shortcomings of depicting maps in two dimensions when the coordinates exist in three dimensions.

Coordinate System - When parameters of a projection are assigned specific values, they become a coordinate system. A coordinate system is a collection of parameters that describe coordinates, one of which is a projection.

Elements of a Coordinate System

A coordinate system in MapInfo Professional is made up of many elements which need to be specified in advance. Once these elements are in place, you can be sure that your maps are as accurate as possible. These are the projection elements you need to set in the MAPINFOW.PRJ file:

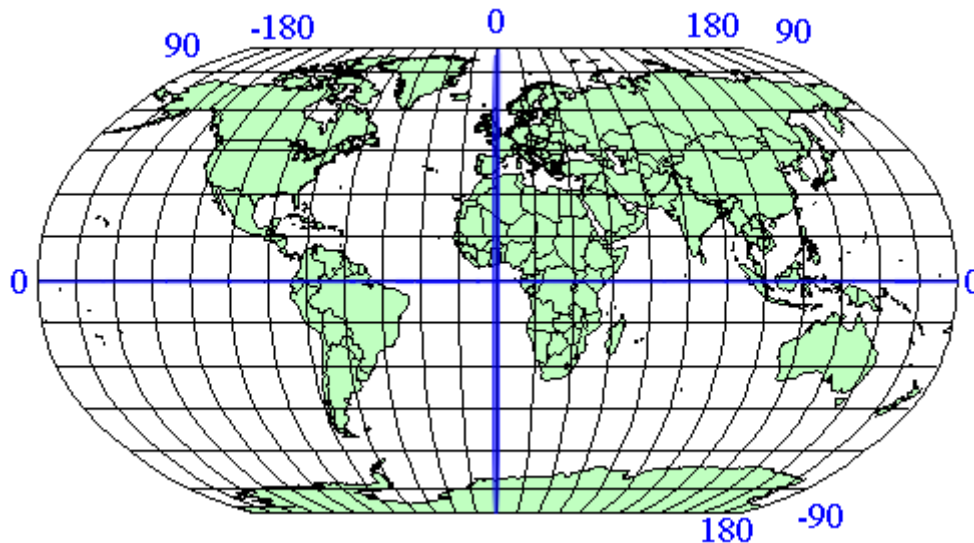
- **Projection Types**
- **Datums**
- **Units**
- **Coordinate System Origin**
- **Standard Parallels (Conic Projections)**
- **Oblique Azimuth (Hotine Oblique Mercator)**
- **Scale Factor (Transverse Mercator)**
- **False Easting and False Northing**
- **Range (Azimuthal Projections)**

Understanding Coordinate Systems

You can make a map out of any globe without distorting the points on the surface by placing the globe into an imaginary cylinder.

Figure: Globe with Longitude/Latitude Projection

If you transfer the touch points from the globe surface onto the cylinder and roll out the cylinder onto graph paper, the result is a map as in the figure below. In the map that would be created from this cylinder, the Equator is 0 degrees all the way around the globe and the points on that line are completely accurate.

Figure: Longitude/Latitude Projection Map

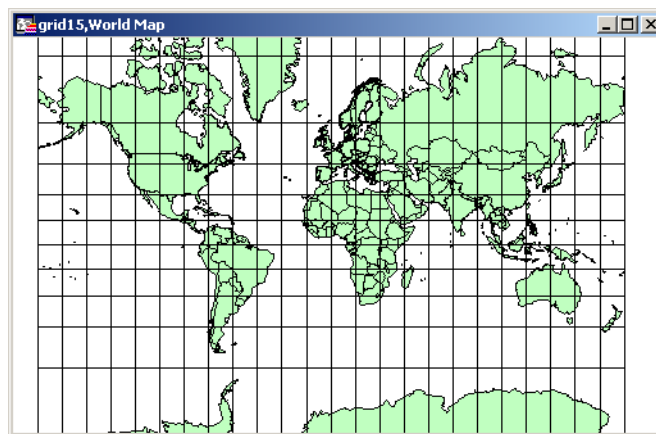
When you add longitude and latitude lines at 15 degree increments to each side of the Equator and the Prime Meridian you create a reference grid. The lines furthest from the Prime Meridian are +180 degrees toward the right and -180 degrees to the left. This map projection is commonly called the Longitude/Latitude projection.

This is often considered the default projection. It is the most effective map for areas nearest the Equator but measurements further away tend to increase in distortion.

Because many people do not live near the Equator, other projections came into use to create more accurate local maps. Accuracy depends upon how you project the globe onto the cylinder. If you turn the cylinder so that it touches the Prime Meridian instead (or any line of longitude, 90 degrees away from the Equator) you have a Transverse Projection. The closer you are to the place the cylinder touches the globe, the more accurate the measurements are.

Figure: Globe Demonstrating the Transverse Projection

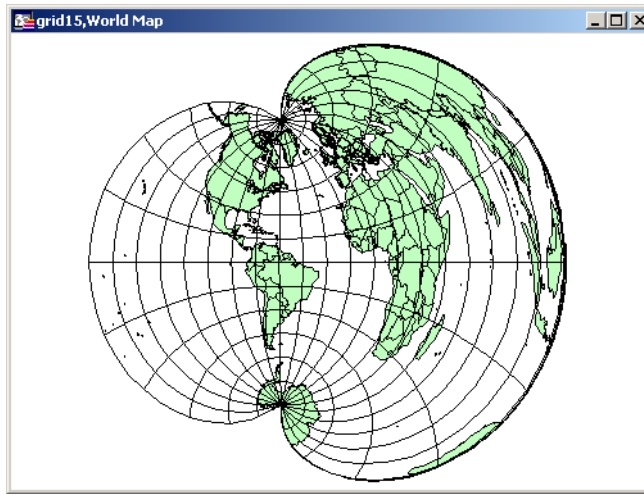
Transverse projections allow us to make maps that are more North-South line accurate, as long as you compensate for the distance from the new “Equator” which in this case is the Prime Meridian.

Figure: Transverse Mercator Projection Map

A third type of projection attempts to resolve the distortion problem in another way. Conic projections use a cone shape instead of a cylinder to create the “touch points” .

Figure: Globe with Conic Projection

This type of projection is much more accurate for large regions or countries that wider in the East-West direction than in the North-South direction. There is much less distortion regionally because the touch points of a cone are closer to the map surface than those of a cylinder.

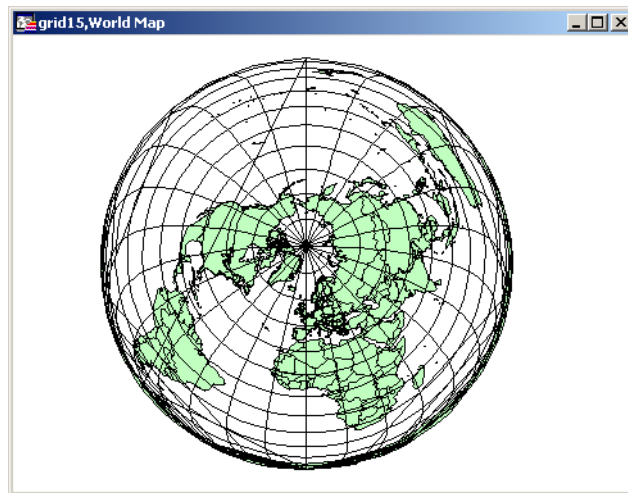
Figure: Brazilian Polyconic Projection Map

As you can see from the previous figure, the conic maps are best for small regional areas. The larger-scale map has too much distortion to be useful.

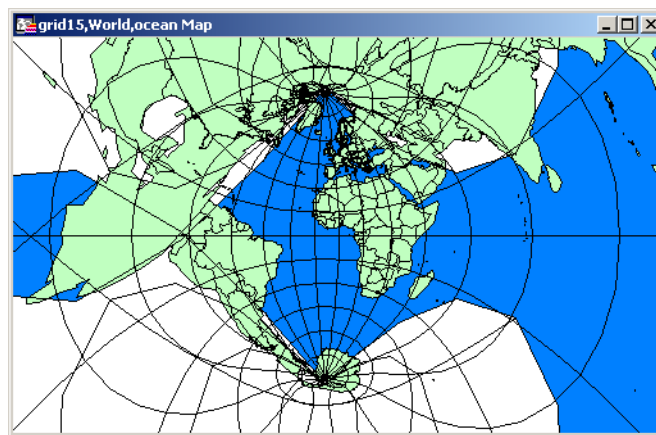
A fourth type of projection, the Azimuthal projection, does not use cones or cylinders but a simple circle that goes all the way around the globe over a particular point. This projection provides a “view from space” over a particular point.

Figure: Globe with Azimuthal Projection

This type of projection is most useful when you need to work with a particular hemisphere. A hemisphere need not be North-South or East-West based. The next figure uses the North Pole as the center point for the Azimuthal Projection.

Figure: Lambert Azimuthal Projection Map

You can use more than one projection that rotates a cylinder slightly along the Equator. This style is used in the Universal Transverse Mercator (UTM) projection. UTM maps the Earth with a transverse cylinder projection to create standard "UTM Zones". By rotating the cylinder around the globe in six degree increments, the UTM assures that all spots on the Earth are within 3 degrees of the center line. (The Gauss-Kruger system is a European system akin to UTM that also uses a transverse cylinder rotated in six degree steps).

Figure: Universal Transverse Mercator Projection Map (UTM Zone 29)

Almost all projections you will use are one of these types. They are either cylindrical (regular or transverse), conic, or azimuthal projections and are customized by slightly different projection parameters. Projection parameters are options that describe how the projection is arranged.

You can further customize projections by specifying different parameters for the projection you want to use. For example, you can specify the longitude and latitude of any point on the Earth to create your own Azimuthal projection of that point. You can customize conic projections by specifying the parallel of latitude at which the cone should be tangent.

Building Blocks of a Coordinate System

In this section, we provide the tables required to create your own coordinate systems using map projections, datums, units, Origins, Standard Parallels, Azimuths, Scale Factors, False Eastings, False Northings, and Ranges. You might want to create your own coordinate system if accuracy is crucial to understanding your data or if your data is specified in relation to a non-standard point, and you would prefer to keep your data in that custom coordinate system.

Understanding Coordinate Systems, Projections, and their Parameters

By specifying a projection type and various required parameters, you create a mathematical algorithm for producing equivalent coordinates in degrees for the projected coordinate system. Each projection has specific parameters you can customize to make your maps more geographically accurate. The following table details each major coordinate system type and the parameters you can use to customize that system. The parameters are listed in the order they appear in the relevant projection entries in the MAPINFOW.PRJ file. To create your own coordinate system using a particular projection, you must add an entry into the MAPINFOW.PRJ file.

Common Coordinate Systems and their Parameters

Coordinate System	Projection Type	Datum	Units	Origin, Longitude	Origin, Latitude	Standard Parallel 1	Standard Parallel 2	Azimuth	Scale Factor	False Easting	False Northing	Range
Albers Equal-Area Conic	9	X	X	X	X	X	X			X	X	
Azimuthal Equidistant	28	X	X	X	X*							X
Cassini-Soldner	30	X	X	X	X					X	X	
Cylindrical Equal Area	2	X	X	X		X						
Eckert IV	14	X	X	X								
Eckert VI	15	X	X	X								
Equidistant Conic	6	X	X	X	X	X	X			X	X	
Gall	17	X	X	X								
Hotine Oblique Mercator	7	X	X	X	X			X	X	X	X	
Lambert Azimuthal Equal-Area	4	X	X	X	X*							X
Lambert Conformal Conic	3	X	X	X	X	X	X			X	X	
Longitude/Latitude	1	X										

Common Coordinate Systems and their Parameters (*continued*)

Coordinate System	Projection Type	Datum	Units	Origin, Longitude	Origin, Latitude	Standard Parallel 1	Standard Parallel 2	Azimuth	Scale Factor	False Easting	False Northing	Range
Mercator	10	X	X	X								
Miller	11	X	X	X								
Mollweide	13	X	X	X								
New Zealand Map Grid	18	X	X	X	X					X	X	
Polyconic	27	X	X	X	X					X	X	
P.E.I. Double Stereographic	31	X	X	X					X	X	X	
Regional Mercator	26	X	X	X		X						
Robinson	12	X	X	X								
Sinusoidal	16	X	X	X								
Stereographic	20	X	X	X	X				X	X	X	
Swiss Oblique Mercator	25	X	X	X	X					X	X	
Transverse Mercator	8	X	X	X	X				X	X	X	

* In MapInfo Professional 6.0, we introduced an Oblique Azimuthal Equidistant projection that supports all Origin Latitudes, including the poles. In MapInfo Professional 6.5, we added a new Lambert Azimuthal Equal-Area projection that also supports all Origin Latitudes, including the poles.

Note: Each of these headings is described in detail in the next few pages.

Projection Types

The following list names the projection types used in the MAPINFOW.PRJ file.

MapInfo Professional Projection Types Table

Number	Projection
9	Albers Equal-Area Conic
28	Azimuthal Equidistant (all origin latitudes)
5	Azimuthal Equidistant (polar aspect only)
30	Cassini-Soldner
2	Cylindrical Equal-Area

MapInfo Professional Projection Types Table (continued)

Number	Projection
14	Eckert IV
15	Eckert VI
6	Equidistant Conic, also known as Simple Conic
17	Gall
7	Hotine Oblique Mercator
4	Lambert Azimuthal Equal-Area (polar aspect only)
29	Lambert Azimuthal Equal-Area
3	Lambert Conformal Conic
19	Lambert Conformal Conic (modified for Belgium 1972)
1	Longitude/Latitude
10	Mercator
11	Miller Cylindrical
13	Mollweide
18	New Zealand Map Grid
31	Prince Edward Island Double Stereographic
27	Polyconic
26	Regional Mercator
12	Robinson
16	Sinusoidal
20	Stereographic
25	Swiss Oblique Mercator
8	Transverse Mercator (also known as Gauss-Kruger)
21	Transverse Mercator (modified for Danish System 34 Jylland-Fyn)
22	Transverse Mercator (modified for Danish System 34 Sjaelland)
23	Transverse Mercator (modified for Danish System 34/45 Bornholm)
24	Transverse Mercator (modified for Finnish KKJ)

Accounting for Affine Transformations and Explicit Bounds in Projection Types

You can modify projection type entries in the MAPINFOW.PRJ to add a constant value to account for affine transformations and explicit bounds. Valid values and their meanings are listed below:

Constant Values for Use with Projection Type Numbers Table

Constant	Meaning	Parameters
1000	System has affine transformations	Affine units specifier and coefficients appear after the regular parameters for the system.
2000	System has explicit bounds	Bounds appear after the regular parameters for the system.
3000	System with both affine and bounds	Affine parameters follow system's parameters; bounds follow affine parameters.

Example:

In this example we use the Transverse Mercator coordinate system with the NAD 1983 datum. You might have this line in your MAPINFOW.PRJ file:

```
"UTM Zone 1 (NAD 83)", 8, 74, 7, -177, 0, 0.9996, 500000, 0
```

If you want to account for an affine transformation for this system, you would add the constant to the projection type and append the parameters of the affine transformation as listed below:

```
Units=meters; A=0.5; B=-0.866; C=0; D=0.866; E=0.5; and F=0
```

Therefore, the new entry to append the parameters of the affine transformation would be:

```
"UTM Zone 1 (NAD 83) - rotated 60 degrees", 1008, 74, 7, -177, 0, 0.9996, 500000, 0, 7, 0.5, -0.866, 0, 0.866, 0.5, 0
```

where:

Entry	Description
1008	Achieved by adding the constant (1000) to the projection type (8)
7	Units for the affine transformation (7 = meters)
0.5, -0.866, 0, 0.866, 0.5, 0	Affine parameters (See Description of an Affine Transformation on page 493.)

To supply explicit bounds to the coordinate system (x1, y1, x2, y2)=(-500000, 0, 500000, 1000000), the required line entries would be:

```
"UTM Zone 1 (NAD 83) - bounded", 2008, 74, 7, -177, 0, 0.9996, 500000, 0, -500000, 0, 500000, 1000000
```

where:

Entry	Description
2008	Produced by adding the constant (2000) to the projection type (8)
-500000, 0, 500000, 1000000	Explicit bounds parameters

To customize the coordinate system using both the affine transformation and explicit bounds, the entry in the MAPINFOW.PRJ would be:

```
"UTM Zone 1 (NAD 83) - rotated and bounded", 3008, 74, 7, -177, 0, 0.9996,
500000, 0, 7, 0.5, -0.866, 0, 0.866, 0.5, 0, -500000, 0, 500000, 1000000
```

where:

Entry	Description
3008	Produced by adding the constant (3000) to the projection type (8)
7	Units for the affine transformation (7 = meters)
0.5, -0.866, 0, 0.866, 0.5, 0	Affine parameters
-500000, 0, 500000, 1000000	Explicit bounds parameters (See Accounting for Affine Transformations and Explicit Bounds in Projection Types on page 476.)

Note: For more about affine transformations, see [Understanding Affine Transformations on page 493.](#)

Datums

A datum is established by tying a reference ellipsoid to a particular point on the earth. The following table lists these details for each datum:

- The number used to identify the datum in the MAPINFOW.PRJ file.
- The datum's name
- The maps for which the datum is typically used
- The datum's reference ellipsoid

Datums Table

Number	Datum Name	Area of Coverage	Ellipsoid
1	Adindan	Ethiopia, Mali, Senegal, Sudan	Clarke 1880
2	Afgooye	Somalia	Krassovsky
1007	AGD 66, 7 parameter	Australia, A.C.T.	Australian National
1008	AGD 66, 7 parameter	Australia, Tasmania	Australian National
1009	AGD 66, 7 parameter	Australia, Victoria/NSW	Australian National
1006	AGD 84, 7 parameter	Australia	Australian National
3	Ain el Abd 1970	Bahrain Island	International
118	American Samoa	American Samoa Islands	Clarke 1866
4	Anna 1 Astro 1965	Cocos Islands	Australian National

Datums Table (*continued*)

Number	Datum Name	Area of Coverage	Ellipsoid
119	Antigua Island Astro 1943	Antigua, Leeward Islands	Clarke 1880
5	Arc 1950	Botswana, Lesotho, Malawi, Swaziland, Zaire, Zambia, Zimbabwe	Clarke 1880
6	Arc 1960	Kenya, Tanzania	Clarke 1880
7	Ascension Island 1958	Ascension Island	International
9	Astro B4 Sorol Atoll	Tern Island	International
8	Astro Beacon "E"	Iwo Jima Island	International
10	Astro DOS 71/4	St. Helena Island	International
11	Astronomic Station 1952	Marcus Island	International
12	Australian Geodetic 1966 (AGD 66)	Australia and Tasmania Island	Australian National
13	Australian Geodetic 1984 (AGD 84)	Australia and Tasmania Island	Australian National
120	Ayabelle Lighthouse	Djibouti	Clarke 1880
110	Belgium	Belgium	International
14	Bellevue (IGN)	Efate and Erromango Islands	International
15	Bermuda 1957	Bermuda Islands	Clarke 1866
16	Bogota Observatory	Colombia	International
121	Bukit Rimpah	Bangka and Belitung Islands (Indonesia)	Bessel 1841
17	Campo Inchauspe	Argentina	International
18	Canton Astro 1966	Phoenix Islands	International
19	Cape	South Africa	Clarke 1880
20	Cape Canaveral	Florida and Bahama Islands	Clarke 1866
1005	Cape, 7 parameter	South Africa	WGS 84
21	Carthage	Tunisia	Clarke 1880
22	Chatham 1971	Chatham Island (New Zealand)	International
23	Chua Astro	Paraguay	International

Datums Table (*continued*)

Number	Datum Name	Area of Coverage	Ellipsoid
122	Co-Ordinate System 1937 of Estonia	Estonia	Bessel 1841
24	Corrego Alegre	Brazil	International
123	Dabola	Guinea	Clarke 1880
124	Deception Island	Deception Island, Antarctica	Clarke 1880
1000	Deutsches Hauptdreiecksnetz (DHDN)	Germany	Bessel
25	Djakarta (Batavia)	Sumatra Island (Indonesia)	Bessel 1841
26	DOS 1968	Gizo Island (New Georgia Islands)	International
27	Easter Island 1967	Easter Island	International
115	EUREF 89	Europe	GRS 80
28	European 1950 (ED 50)	Austria, Belgium, Denmark, Finland, France, Germany, Gibraltar, Greece, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland	International
29	European 1979 (ED 79)	Austria, Finland, Netherlands, Norway, Spain, Sweden, Switzerland	International
108	European 1987 (ED 87)	Europe	International
125	Fort Thomas 1955	Nevis, St. Kitts, Leeward Islands	Clarke 1880
30	Gandajika Base	Republic of Maldives	International
116	GDA 94	Australia	GRS 80
32	Geodetic Reference System 1967 (GRS 67)	Worldwide	GRS 67
33	Geodetic Reference System 1980 (GRS 80)	Worldwide	GRS 80
126	Graciosa Base SW 1948	Faial, Graciosa, Pico, Sao Jorge, and Terceira Islands (Azores)	International 1924
34	Guam 1963	Guam Island	Clarke 1866
35	GUX 1 Astro	Guadalcanal Island	International
150	Hartbeesthoek 94	South Africa	WGS 84

Datums Table (*continued*)

Number	Datum Name	Area of Coverage	Ellipsoid
127	Herat North	Afghanistan	International 1924
128	Hermannskogel	Yugoslavia (Prior to 1990), Slovenia, Croatia, Bosnia and Herzegovina, Serbia	Bessel 1841
36	Hito XVIII 1963	South Chile (near 53°S)	International
37	Hjorsey 1955	Iceland	International
38	Hong Kong 1963	Hong Kong	International
1004	Hungarian Datum (HD 72)	Hungary	GRS 67
39	Hu-Tzu-Shan	Taiwan	International
40	Indian	Thailand and Vietnam	Everest (India 1830)
41	Indian	Bangladesh, India, Nepal	Everest (India 1830)
129	Indian	Pakistan	Everest (Pakistan)
130	Indian 1954	Thailand	Everest (India 1830)
131	Indian 1960	Vietnam	Everest (India 1830)
132	Indian 1975	Thailand	Everest (India 1830)
133	Indonesian 1974	Indonesia	Indonesian 1974
42	Ireland 1965	Ireland	Modified Airy
134	ISTS 061 Astro 1968	South Georgia Island	International 1924
43	ISTS 073 Astro 1969	Diego Garcia	International
44	Johnston Island 1961	Johnston Island	International
45	Kandawala	Sri Lanka	Everest (India 1830)
46	Kerguelen Island	Kerguelen Island	International
47	Kertau 1948	West Malaysia and Singapore	Everest (W. Malaysia and Singapore 1948)
1016	KKJ	Finland	International
135	Kusaie Astro 1951	Caroline Islands, Federated States of Micronesia	International 1924
48	L.C. 5 Astro	Cayman Brac Island	Clarke 1866
136	Leigon	Ghana	Clarke 1880
49	Liberia 1964	Liberia	Clarke 1880

Datums Table (*continued*)

Number	Datum Name	Area of Coverage	Ellipsoid
113	Lisboa (DLx)	Portugal	International
50	Luzon	Philippines (excluding Mindanao Island)	Clarke 1866
51	Luzon	Mindanao Island	Clarke 1866
52	Mahe 1971	Mahe Island	Clarke 1880
53	Marco Astro	Salvage Islands	International
54	Massawa	Eritrea (Ethiopia)	Bessel 1841
114	Melrica 1973 (D73)	Portugal	International
55	Merchich	Morocco	Clarke 1880
56	Midway Astro 1961	Midway Island	International
57	Minna	Nigeria	Clarke 1880
137	Montserrat Island Astro 1958	Montserrat, Leeward Islands	Clarke 1880
138	M'Poraloko	Gabon	Clarke 1880
58	Nahrwan	Masirah Island (Oman)	Clarke 1880
59	Nahrwan	United Arab Emirates	Clarke 1880
60	Nahrwan	Saudi Arabia	Clarke 1880
61	Naparima, BWI	Trinidad and Tobago	International
109	Netherlands	Netherlands	Bessel
31	New Zealand Geodetic Datum 1949 (NZGD 49)	New Zealand	International
62	North American 1927 (NAD 27)	Continental US	Clarke 1866
63	North American 1927 (NAD 27)	Alaska	Clarke 1866
64	North American 1927 (NAD 27)	Bahamas (excluding San Salvador Island)	Clarke 1866
65	North American 1927 (NAD 27)	San Salvador Island	Clarke 1866
66	North American 1927 (NAD 27)	Canada (including Newfoundland Island)	Clarke 1866
67	North American 1927 (NAD 27)	Canal Zone	Clarke 1866

Datums Table (continued)

Number	Datum Name	Area of Coverage	Ellipsoid
68	North American 1927 (NAD 27)	Caribbean (Turks and Caicos Islands)	Clarke 1866
69	North American 1927 (NAD 27)	Central America (Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua)	Clarke 1866
70	North American 1927 (NAD 27)	Cuba	Clarke 1866
71	North American 1927 (NAD 27)	Greenland (Hayes Peninsula)	Clarke 1866
72	North American 1927 (NAD 27)	Mexico	Clarke 1866
73	North American 1927 (NAD 27)	Michigan (used only for State Plane Coordinate System 1927)	Modified Clarke 1866
74	North American 1983 (NAD 83)	Alaska, Canada, Central America, Continental US, Mexico	GRS 80
139	North Sahara 1959	Algeria	Clarke 1880
107	Nouvelle Triangulation Francaise (NTF) Greenwich Prime Meridian	France	Modified Clarke 1880
1002	Nouvelle Triangulation Francaise (NTF) Paris Prime Meridian	France	Modified Clarke 1880
111	NWGL 10	Worldwide	WGS 72
117	NZGD 2000	New Zealand	GRS 80
1010	NZGD 49, 7 parameter	New Zealand	International
75	Observatorio 1966	Corvo and Flores Islands (Azores)	International
140	Observatorio Meteorologico 1939	Corvo and Flores Islands (Azores)	International 1924
76	Old Egyptian	Egypt	Helmert 1906
77	Old Hawaiian	Hawaii	Clarke 1866
78	Oman	Oman	Clarke 1880
79	Ordnance Survey of Great Britain 1936	England, Isle of Man, Scotland, Shetland Islands, Wales	Airy

Datums Table (*continued*)

Number	Datum Name	Area of Coverage	Ellipsoid
1012	Russia PZ90	Russia	PZ90
80	Pico de las Nieves	Canary Islands	International
81	Pitcairn Astro 1967	Pitcairn Island	International
141	Point 58	Burkina Faso and Niger	Clarke 1880
142	Pointe Noire 1948	Congo	Clarke 1880
143	Porto Santo 1936	Porto Santo and Madeiras Islands	International 1924
1000	Potsdam	Germany	Bessel
82	Provisional South American 1956	Bolivia, Chile, Colombia, Ecuador, Guyana, Peru, Venezuela	International
36	Provisional South Chilean 1963	South Chile (near 53°S)	International
83	Puerto Rico	Puerto Rico and Virgin Islands	Clarke 1866
1001	Pulkovo 1942	Germany	Krassovsky
84	Qatar National	Qatar	International
85	Qornoq	South Greenland	International
1000	Rauenberg	Germany	Bessel
86	Reunion	Mascarene Island	International
112	Rikets Triangulering 1990 (RT 90)	Sweden	Bessel
1011	Rikets Triangulering 1990 (RT 90), 7 parameter	Sweden	Bessel
87	Rome 1940	Sardinia Island	International
88	Santo (DOS)	Espirito Santo Island	International
89	São Braz	São Miguel, Santa Maria Islands (Azores)	International
90	Sapper Hill 1943	East Falkland Island	International
91	Schwarzeck	Namibia	Modified Bessel 1841
144	Selvagem Grande 1938	Salvage Islands	International 1924
145	Sierra Leone 1960	Sierra Leone	Clarke 1880

Datums Table (*continued*)

Number	Datum Name	Area of Coverage	Ellipsoid
146	S-JTSK	Czech Republic	Bessel 1841
1012	Russia SK42	Russia	PZ90
1013	Russia SK95	Russia	PZ90
92	South American 1969	Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Venezuela, Trinidad, and Tobago	South American 1969
93	South Asia	Singapore	Modified Fischer 1960
94	Southeast Base	Porto Santo and Madeira Islands	International
95	Southwest Base	Faial, Graciosa, Pico, Sao Jorge, Terceira Islands (Azores)	International
1003	Switzerland (CH 1903)	Switzerland	Bessel
147	Tananarive Observatory 1925	Madagascar	International 1924
96	Timbalai 1948	Brunei and East Malaysia (Sarawak and Sabah)	Everest (India 1830)
97	Tokyo	Japan, Korea, Okinawa	Bessel 1841
98	Tristan Astro 1968	Tristan da Cunha	International
99	Viti Levu 1916	Viti Levu Island (Fiji Islands)	Clarke 1880
148	Voirol 1874	Tunisia/Algeria	Clarke 1880
149	Voirol 1960	Algeria	Clarke 1880
100	Wake-Eniwetok 1960	Marshall Islands	Hough
101	World Geodetic System 1960 (WGS 60)	Worldwide	WGS 60
102	World Geodetic System 1966 (WGS 66)	Worldwide	WGS 66
103	World Geodetic System 1972 (WGS 72)	Worldwide	WGS 72
104	World Geodetic System 1984 (WGS 84)	Worldwide	WGS 84
105	Yacare	Uruguay	International
106	Zanderij	Surinam	International

Units

The following table lists the available measurement units and the number used to identify the unit in the MAPINFOW.PRJ file:

Units Table

Entry	Units
6	Centimeters
31	Chains
3	Feet (also called International Feet)*
2	Inches
1	Kilometers
30	Links
7	Meters
0	Miles
5	Millimeters
9	Nautical Miles**
32	Rods
8	US Survey Feet (used for 1927 State Plane)***
4	Yards

*One International Foot equals exactly 30.48 cm.

**One Nautical Mile equals exactly 1852 meters.

***One US Survey Foot equals exactly 12/39.37 meters, or approximately 30.48006 cm.

Coordinate System Origin

The coordinate system origin is the point on the Earth (specified as longitude and latitude degrees) from which all coordinate distances are to be measured. $X = 0$ and $Y = 0$ at the origin point, unless a false easting and/or false northing is used (see below). It is chosen to optimize the accuracy of a particular coordinate system. As we move north from the origin, Y increases; X increases as we move east. These coordinate values are generally called northings and eastings.

For the Transverse Mercator projection, the origin's longitude defines the central meridian. In constructing the Transverse Mercator projection a cylinder is positioned tangent to the earth. The central meridian is the line of tangency. The scale of the projected map is true along the central meridian.

In creating a Hotine Oblique Mercator projection it is necessary to specify a great circle that is not the equator nor a meridian. MapInfo Professional does this by specifying one point on the ellipsoid and an azimuth from that point. That point is the origin of the coordinate system.

Standard Parallels (Conic Projections)

In conic projections a cone is passed through the earth intersecting it along two parallels of latitude. These are the standard parallels. One is to the north and one is to the south of the projection zone. To use a single standard parallel specify that latitude twice. Both are expressed in degrees of latitude.

Oblique Azimuth (Hotine Oblique Mercator)

When specifying a great circle (such as the Hotine Oblique Mercator) using a point and an azimuth (arc), the azimuth is called the Oblique Azimuth and is expressed in degrees.

Scale Factor (Transverse Mercator)

A scale factor is applied to cylindrical coordinates to average scale error over the central area of the map while reducing the error along the east and west boundaries. The scale factor has the effect of recessing the cylinder into the earth so that it has two lines of intersection. Scale is true along these lines of intersection.

You may see the scale factor expressed as a ratio, such as 1:25000. In this case it is generally called the scale reduction. The relationship between scale factor and scale reduction is:

$$\text{scale factor} = 1 - \text{scale reduction}$$

In this case the scale factor would be $1 - (1/25000)$ or 0.99996.

False Easting and False Northing

As you can see in the [Longitude/Latitude Projection Map on page 470](#), X and Y coordinate parameters are commonly designated in relationship to a single point. Points to the left of that center point are negative and points to the right are positive. Points above that center point are positive and points below that point are negative.

In the days of the tall ships, these calculations and computations were done by hand. Using positive and negative signs made these calculations more complicated. The terms “false easting” and “false northing” were used to remove these signs and refer to the absolute value of the X and Y coordinates. Now, MapInfo Professional handles these computations, but these parameters still have to be accounted for in the projections that use them.

Range (Azimuthal Projections)

The range specifies, in degrees, how much of the Earth is visible. The range can be between 1 and 180. When you specify 90, you see a hemisphere. When you specify 180 you see the whole earth, though much of it is very distorted.

About Polyconic Coordinate Systems

The following description has been copied from “Map Projections – A Working Manual”, USGS Professional Paper 1395, by John P. Snyder.

The Polyconic projection, usually called the American Polyconic in Europe, achieved its name because the curvature of the circular arc for each parallel on the map is the same as it would be following the unrolling of a cone which had been wrapped around the globe tangent to the particular parallel of latitude, with the parallel traced onto the cone. Thus, there are many ("poly-") cones involved, rather than the single cone of each regular conic projection.

The Polyconic projection is neither equal-area nor conformal. Along the central meridian, however, it is both distortion free and true to scale. Each parallel is true to scale, but the meridians are lengthened by various amounts to cross each parallel at the correct position along the parallel, so that no parallel is standard in the sense of having conformality (or correct angles), except at the central meridian. Near the central meridian, distortion is extremely small.

This projection is not intended for mapping large areas. The conversion algorithms used break down when mapping wide longitude ranges. For example, World.tab, from the sample data shipped with MapInfo Professional, may exhibit anomalies if reprojected using Polyconic.

Examples of Projection Entries in the MAPINFOW.PRJ File

The MAPINFOW.PRJ file lists the parameters for each coordinate system on a separate line, as in the following examples:

```
"Mollweide (Equal Area)", 13, 62, 7, 0
"Albers Equal-Area Conic (Alaska)", 9, 63, 7, -154, 50, 55, 65, 0, 0
"UTM Zone 9 (NAD 27 for Canada)", 8, 66, 7, -129, 0, 0.9996, 500000, 0
```

This is a basic list of the elements of a coordinate system, for review. Following this list, you can see some entries from the .PRJ file.

1. The first element in each list is the name of the projection in quotes.
2. The second element in each list is the number that identifies the projection type as indicated in [Datums Table on page 478](#).
3. The remaining elements in the list are the parameter values for that particular projection. The elements follow the order as outlined in the table [Common Coordinate Systems and their Parameters on page 474](#). Each element is separated by a comma.

Let's look at some specific coordinate systems to prepare you to create your own projection. It is important to remember that the elements of a projection are different for each projection. Here are some examples we have already seen:

Example: "Mollweide (Equal Area)", 13, 62, 7, 0

where:

Where	Refers to:	For More Information, See:
"Mollweide (Equal Area)",	Name of Coordinate System	Common Coordinate Systems and their Parameters on page 474
13,	Projection type used	MapInfo Professional Projection Types Table on page 475

Where	Refers to:	For More Information, See:
62,	Datum used	Datums Table on page 478
7,	Units used	Units Table on page 486
0	Origin Longitude used	Coordinate System Origin on page 486

Example: "Albers Equal-Area Conic (Alaska)", 9, 63, 7, -154, 50, 55, 65, 0, 0

where:

Where	Refers to:	For More Information, See:
"Albers Equal-Area Conic (Alaska)",	Name of Coordinate System	Common Coordinate Systems and their Parameters on page 474
9,	Projection type used	MapInfo Professional Projection Types Table on page 475
63,	Datum used	Datums Table on page 478
7,	Units used	Units Table on page 486
-154, 50	Origin Longitude and Origin Latitude used	Coordinate System Origin on page 486
55, 65,	Standard Parallels used	Standard Parallels (Conic Projections) on page 487
0, 0	False Easting, False Northing	False Easting and False Northing on page 487

Note: If a projection is not in the list in [Common Coordinate Systems and their Parameters on page 474](#), this coordinate system is a variation of one of the systems in the list.

"UTM Zone 9 (NAD 27 for Canada)", 8, 66, 7, -129, 0, 0.9996, 500000, 0

where:

Where	Refers to:	For More Information, See:
"UTM Zone 9 (NAD 27 for Canada)",	Name of Coordinate System	Common Coordinate Systems and their Parameters on page 474
8,	Projection type used	MapInfo Professional Projection Types Table on page 475
66,	Datum used	Datums Table on page 478

Figure: Adding a Line in the MAPINFOW.PRJ File

```

--- Longitude / Latitude (v 6.0 and later projections) ---
"Longitude / Latitude (Hungarian HD 72)", 1, 1004
"Longitude / Latitude (Hartbeesthoek 94)", 1, 150
"Longitude / Latitude (Australia-National-AGD84 7 param)", 1, 1006
"Longitude / Latitude (Australia (A.C.T. AGD66 7-param)", 1, 1007
"Longitude / Latitude (Australia (Tasmania AGD66 7-param)", 1, 1008
"Longitude / Latitude (Australia (Victoria/NSW AGD66 7-param)", 1, 1009
"Longitude / Latitude (New Zealand (NZGD49 7-parameter)", 1, 1010
"Longitude / Latitude (EUREF89)", 1, 115
"Longitude / Latitude (Australia GDA94)", 1, 116
"Longitude / Latitude (New Zealand NZGD2000)", 1, 117
"Longitude / Latitude (American Samoa)", 1, 118

```

4. On a new line, type the new parameter entries based on the required parameters described for that projection type in the table **Common Coordinate Systems and their Parameters on page 474**.
 - If the name of your projection does not appear in the Common Map Projections list, consider the kind of projection you are creating (Latitude/Longitude, Conic, Transverse, etc.) and follow the table entries for the type of projection you want.
 - Remember to include constant values (**Accounting for Affine Transformations and Explicit Bounds in Projection Types on page 476**) to indicate an affine transformation, specific bounds, or both if appropriate or necessary.

Note: The order of parameters is vitally important. Remember to separate each parameter with a comma.

5. Save your edited MAPINFOW.PRJ file in the directory in your user directory.

Note: In the past the MAPINFOW.PRJ file was saved in your installation directory but this did not allow different users to have different PRJ files. This new file placement permits this.

Things to keep in mind when editing the MAPINFOW.PRJ file:

- When specifying projection, datum and units, use the *number* that represents the parameter. These numbers are listed in the table for each parameter earlier in this appendix. In our example, 6 represents Equidistant Conic projection; 74 represents NAD 83 datum, and 7 represents meters.
- You must record the X and Y coordinates of the origin point in decimal degrees.
- Remember to include a negative sign for west longitudes and south latitudes.
- You must list the origin longitude first in the MAPINFOW.PRJ file entry.
- Carry out decimals to at least five (5) places for greater accuracy.
- Do not use commas to represent thousands or millions in large numbers. Only use commas to separate parameters from one another.

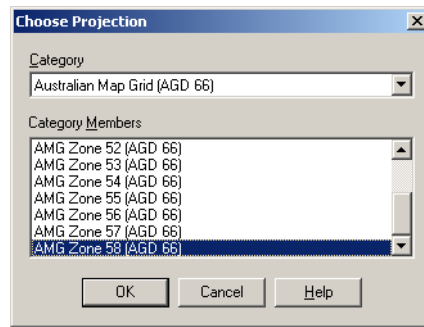
Using the New Projection in a Coordinate System

Once you have created this new projection, you can use it in a Map window to replace the coordinate system you are using.

1. Open the map for which you want to change projections.
2. From the **MAP** menu, select **OPTIONS** to display the **MAP OPTIONS** dialog box.
3. Click the **PROJECTIONS** button to display the **CHOOSE PROJECTION** dialog box.

Note: To change the projection of a tab file and all of the map objects in it, use the **FILE > SAVE COPY AS** command and select the new projection.

Figure: Choose Projection



4. Select the new projection from the list and click **OK** to confirm. The Map Options dialog redisplays.
5. Click **OK** to implement the new projection in the Map window.

Entering a New Coordinate System (Example)

To illustrate this process in another way, create the following coordinate system using these parameters by adding a new entry to the MAPINFOW.PRJ file:

Parameter Type	Entry	Description
Name	"Equidistant Conic Plus"	Name of the new coordinate system
Projection Type	6,	Equidistant Conic
Datum	74,	(NAD 83)
Units	7,	meters
Origin Longitude	-90.5,	90°30'W
Origin Latitude	30,	30°N,
Standard Parallel 1	10.333333,	10°20'N
Standard Parallel 2	50,	50°N
False Easting	10000000,	10,000,000 m
False Northing	500000	500,000 m

1. Open MAPINFOW.PRJ in a text editor or word processor.
2. Go to the Equidistant Conic section and add a new line.
3. Type the name of your new coordinate system in quotes, followed by a comma.
4. Enter the following information to represent your coordinate system:
6, 74, 7, -90.5, 30, 10.333333, 50, 10000000, 500000
5. Save your edited MAPINFOW.PRJ file.

You can now use your custom coordinate system just as you would use any of the coordinate systems that come with MapInfo.

There are other ways you can edit this file. To shorten the list, remove coordinate systems from the file. You can also change the names, change group headings and reorder the file to suit your needs.

Note: Group headings are distinguished by the hyphen at the beginning of the name. Names of coordinate systems cannot begin with a hyphen or a space.

Understanding Affine Transformations

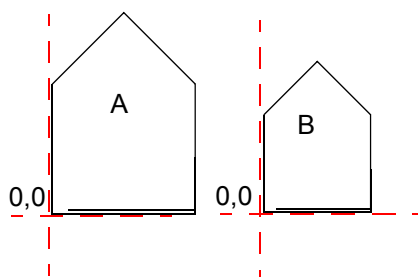
An affine transformation allows you to match the points on two vector maps that use different coordinate systems so they can be used together. The base map stays the same while the derived map is transformed mathematically to match up coordinates to the base map.

MapInfo Professional provides the definitions for scale, translation, rotation, reflection, and shearing necessary to support an optional affine transformation for any coordinate system definition. You can also define a coordinate system with bounds and/or with an affine transformation. This is described in detail in [Accounting for Affine Transformations and Explicit Bounds in Projection Types on page 476](#).

Description of an Affine Transformation

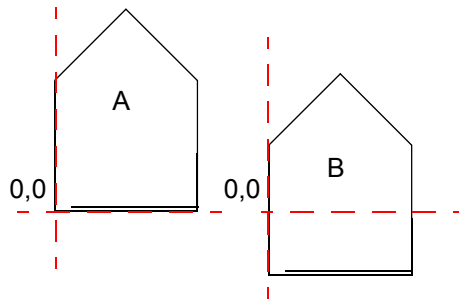
There are several basic types of transformation that can be applied to the base map using an affine transformation. These include scaling, translation, rotation, shearing, and reflection.

The *scale* factor of a transformation indicates the distance between the fixed points of one map versus the fixed points of the second map. If the only difference between two maps is the scale, the affine transformation of the derived map is only the same map zoomed in or out around a fixed point. The orientations of the lines connecting the points, and the angles between these lines, remain the same. The scaling in the case of the figure below is around the 0,0 point.



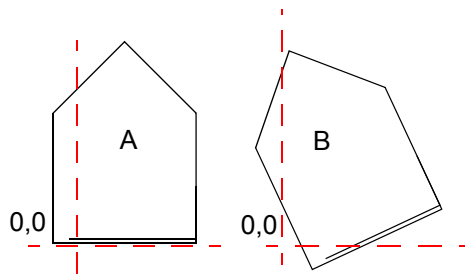
The difference between these two images is the scale. To create an affine transformation that maps the base image (A) to the derived image (B), you need change only the scale.

The *translation* factor of a transformation is when every point on an image follows a parallel path and no rotation takes place.



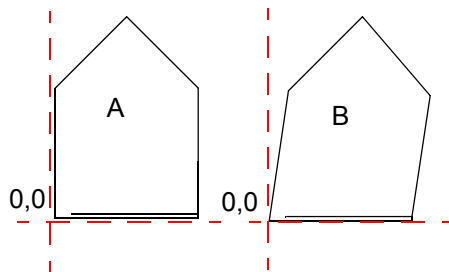
The difference between these two images is the translation.

The *rotation* factor of a transformation indicates that the image turns on a particular point. The next figure shows a 25-degree rotation of the map around the 0,0 point.



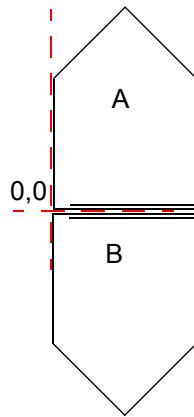
The difference between these two images is not the scale, because the size of each image is the same. The difference is the rotation of the derived image (B).

The *shearing* factor of a transformation indicates that one of the coordinates of one image should change proportionally to the other. You can apply a shear transformation either on the x-axis as shown in the next figure or on the y-axis. As you can see the vertical scale of the image has not changed, and the corner of the figure at 0,0 has not moved -- but points higher up on the figure are shifted progressively further to the right.



The difference is the shearing of the derived image (B).

The *reflection* factor of a transformation indicates that the derived image is the mirror image of the base image, that is, all the points in the base image should be reflected across some straight line, such as the x-axis or y-axis. In the figure below, the derived image (B) is the reflection of the base image (A).



The difference between these two images is that the derived image (B) is a reflection of the base image (A) along the x-axis.

Mathematically, an affine transformation in MapInfo Professional has the following form:

$$x' = Ax + By + C$$

$$y' = Dx + Ey + F$$

In these equations, the **base** coordinates (x, y) are transformed to produce the **derived** coordinates (x', y'). The six constants A through F determine the effect of the transformation. We can use the post multiply method for homogenous 2D coordinate systems, which can be considered a matrix operation as follows:

$$\begin{array}{ccccccc} A & B & C & & X & & X' \\ D & E & F & * & Y & = & Y' \\ 0 & 0 & 1 & & 1 & & 1 \end{array}$$

where (X,Y) and (X',Y') are as defined above.

To do various types of affine transformations the values of A, B, C, D, E, and F need to be determined. To define the basic transformations that can be done using an affine transformation, determine the translations, rotations, reflections, scaling and shearing in the X and Y directions.

Translation: C and F are the values you want (0, 0) to go to, A=E=1 and B=D=0. To move the coordinate system so the origin is at (5, 2) the values would be: A=1, B=0, C=5, D=0, E=1, and F=2.

Rotation about the origin: A=E=cos(angle to rotate), -B=D=sin(angle to rotate), C=F=0. To rotate 60 degree counterclockwise around the origin, A=.5, B=-.866, C=0, D=.866, E=.5, and F=0.

To scale in the X direction: A is the scale you want to use. E =1 and the rest are 0. So to scale to 3 times the size in the X direction the values would be A=3, B=0, C=0, D=0, E=1, F=0.

To scale in the Y direction: E is the scale you want to use. A =1 and the rest are 0. So to scale to 5 times the size in the Y direction the values would be A=1, B=0, C=0, D=0, E=5, F=0.

To scale overall just make sure that A and E are equal.

To shear in the X direction: $A = E = 1$, B is the shear factor and the rest are 0. So for a shear factor of 5 in the X direction (that is, to move a derived point 5 units in the X direction for each Y unit in the base point) use $A=1, B=5, C=0, D=0, E=1, F=0$.

To shear in the Y direction: $A = E = 1$, D is the shear factor and the rest are 0. So for a shear factor of 4 in the Y direction, use $A=1, B=0, C=0, D=4, E=1, F=0$.

To reflect an image across the X axis: $A = 1, E = -1$ and the rest are 0. More generally, to reflect across the line $y = k$, use $A=1, B=0, C=0, D=0, E=-1, F=2*k$.

To reflect an image across the Y axis: $A = -1, E = 1$ and the rest are 0. More generally, to reflect across the line $x = j$, use $A=-1, B=0, C=2*j, D=0, E=1, F=0$.

Now to get a general affine transformation, do a pre-matrix multiplication of the basic pieces of the transformation. Make sure that you put the first operation on the right. So to Translate to (5,2), rotate 60 degrees and then shear 5 units in Y, set up and multiply the following matrices:

1	0	0		0.5	-0.866	0		1	0	5
5	1	0	*	.0866	0.5	0	*	0	1	2
0	0	1		0	0	1		0	0	1

Multiplying these out gives the following matrix:

0.5	-0.866	0.768
3.366	-3.83	9.17
0	0	1

Therefore, the required values are: $A=.5, B=-.866, C=0.768, D=3.366, E=-3.83, F=9.17$.

Note: When using affine transformation values in projection definitions or .MIF file COORDSYS settings, you may need to calculate the *inverse* of an affine transformation. This is because if a table displays in a projection that includes an affine transformation, MapInfo Professional transforms the coordinate system, not the objects in the table!

Frequently Asked Questions

What do the \p#### codes mean in the MAPINFOW.PRJ file?

e.g.: "— Australian Map Grid (AGD 66) —"

"AMG Zone 47 (AGD 66)", 8, 12, 7, 99, 0, 0.9996, 500000, 10000000

"AMG Zone 48 (AGD 66)\p20248", 8, 12, 7, 105, 0, 0.9996, 500000, 10000000

Answer: MapInfo Professional uses the \p#### or Projected Coordinate System (PCS) codes shown in the above example when registering GeoTIFF images or other georeferenced raster images. GeoTIFF files often identify their coordinate system with a single code number instead of listing the coordinate system parameters, so MapInfo Professional scans the MAPINFOW.PRJ file

to find a matching supported code. MapInfo Professional supports a subset of PCS codes, depending on the projection they use, in values between 20000 and 32760). Codes cannot be used more than once in the MAPINFOW.PRJ file. For more information about GeoTIFF files and PCS codes, see this web page:

<http://www.remotesensing.org/geotiff/geotiff.html>

How do I convert a coordinate system with units in meters to feet?

Answer: You will need to edit the MAPINFOW.PRJ file to modify the same projection in a different measurement system and adjust the False Eastings and Northings used for the difference.

For example below, the first line is the original projection expressed in meters. The second line is a copied modification of the first, where the units were changed from "7" (meters) to "8" (feet) indicating this coordinate system is now using feet, and the False Easting (2000000) and Northing (500000) components were *divided* by .3048 to convert them from meters to feet.

Example:

```
"California, Zone I (1983)\p26941", 3, 74, 7, -122, 39.3333333333, 40,  
41.6666666667, 2000000, 500000
```

```
"California, Zone I FT (1983)\p26941", 3, 74, 8, -122, 39.3333333333, 40,  
41.6666666667, 6561679.7, 164041.99
```

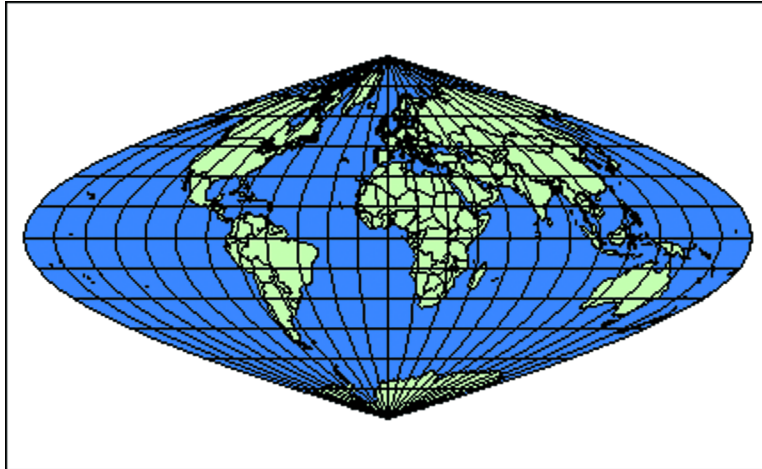
I chose Longitude/Latitude (NAD 83) as my projection; however, whenever I look at the Choose Projection dialog, it keeps saying Longitude/Latitude (GRS 80). Why won't my projection change?

Answer: The GRS 80 datum is identical to NAD 83 datum. MapInfo Professional uses the numeric parameters, not the name, to decide which coordinate system to highlight in the Choose Projection dialog. Since GRS 80 has the same numeric parameters as NAD 83, and GRS 80 datum comes earlier in the list, MapInfo Professional chooses GRS 80 instead of NAD 83.

Using Earth and Non-Earth Maps

Earth maps and non-earth maps generally require different treatment. The following section on projections apply only to earth maps. An *earth map* contains objects that have a particular location on the earth's surface. All maps that MapInfo Professional sells are earth maps. Coordinates typically represent an object's location in longitude and latitude, although other coordinate systems (using various projections) may be used instead.

Sinusoidal (Equal-Area)



Use earth maps to:

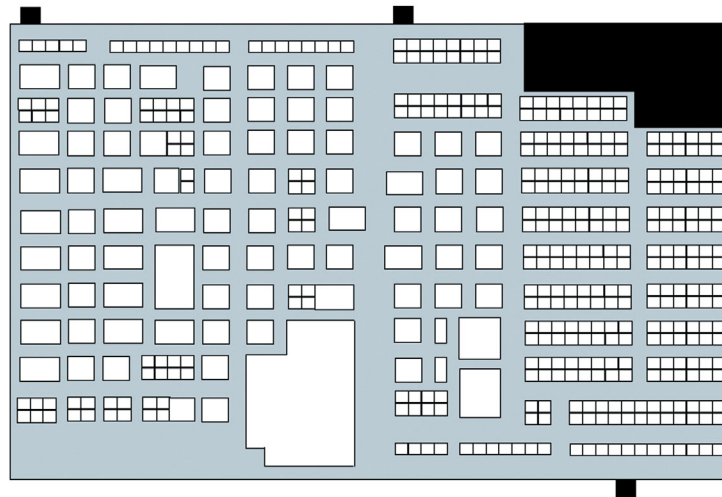
- Overlay your map onto any maps that MapInfo Professional supplies.
- Use or change projections.
- Specify objects on the map in terms of longitude and latitude.

A *non-earth map* contains objects that have no specific location on the earth's surface. Floor plans are typical examples of non-earth maps.

Even though the floor plan describes a building that may be located somewhere on the Earth, the coordinates of objects in the floor plan are generally not referenced to positions on the Earth. Rather, the object's coordinates are referenced to the floor plan itself, generally representing distance from the lower left corner of the floor plan.

A non-earth map has a coordinate system, but since its map points are not referenced to locations on earth, the coordinate system does not contain a projection.

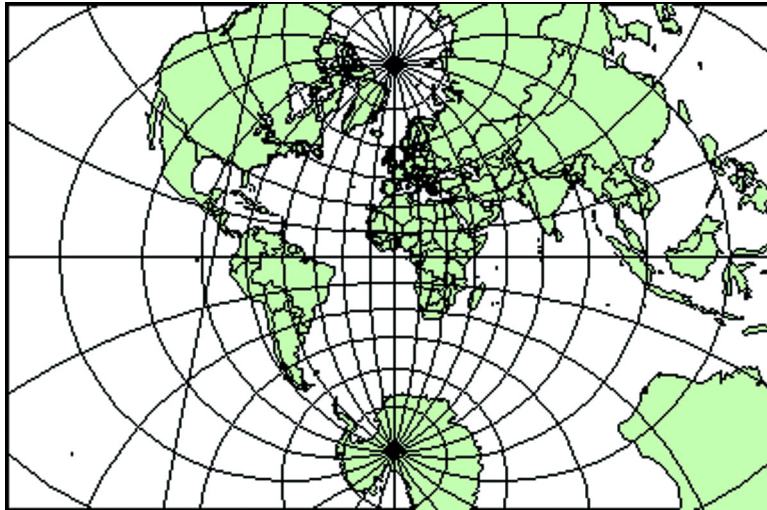
Floor Plan: example of a non-earth map



Using the Ocean and Grid Tables

MapInfo Professional supplies tables that you can use in conjunction with projections. You can use the Ocean table as a background layer when using world projections. You can use the grid15 table to put a coordinate grid on your map (this grid is often called the graticule). The number in the table's name specifies the grid spacing, i.e., 15 degrees.

Stereographic



Specialized Topics in MapInfo Professional

The topics in this chapter cover the advanced use of MapInfo Professional®.

Sections in this Chapter:

- ◆ **Embedding MapInfo Professional Maps. 501**
- ◆ **Internet Connectivity and MapInfo 511**
- ◆ **Redistricting — Grouping Map Objects into Districts. 518**
- ◆ **Creating Expressions. 525**
- ◆ **Working with the MapBasic Window 553**
- ◆ **Digitizing Maps with MapInfo Professional 559**

Embedding MapInfo Professional Maps

MapInfo Professional® brings its power of map display, creation and editing right into your favorite application so that you may build a map where you need it. This chapter covers the basics of OLE and the MapInfo Professional features that you may use in other applications to create dynamic maps.

MapInfo Professional's OLE embedding capability turns your applications such as word processors and spreadsheets into "mini-MapInfo" programs where you can create, display and edit a map for presentation, reporting or publishing. OLE is a process known as Object Linking and Embedding whereby a server application (such as MapInfo Professional) provides information that is stored in a client application that can accept OLE information (such as a word processor). MapInfo Professional's OLE embedding functionality allows you to embed a Map window in any application that accepts OLE objects and use some of MapInfo Professional's features to create, display and edit the map directly in that application.

With MapInfo Professional OLE Embedding you can build the map directly in your OLE container application, or you can create it in MapInfo Professional and drag the Map window into your application for additional editing or output. Because the MapInfo Map Object is a live OLE object, you are in fact running MapInfo Professional in the background. When the Map window is active in the container, the menu and toolbar of your application change to reflect the MapInfo Professional features that become available. This subset of features is called MapInfo Map. (Some OLE containers will create a separate window for the object.) With the click of a button or by choosing a menu command, you have MapInfo Professional functionality in your application where you need it.

What You Should Know First

Before you get started, it is good to review the system requirements and the registration statement to ensure that you understand where to look for your MapInfo Map Objects.

System Requirements

MapInfo Map is an OLE server application that runs under 32-bit MapInfo Professional. You must install MapInfo Professional 32-bit to engage MapInfo Map. On the client side, only container applications that support OLE embedded objects can run MapInfo Map.

Registering OLE Objects with Containers

Once MapInfo Professional has been installed on your system, the MapInfo Map Object will be registered automatically and listed as a choice in the Object dialog box of any container application that accepts OLE objects.

OLE Terms

This section contains some definitions of common OLE terms.

Activation: An embedded object must be activated to allow editing. This means that the server program from which it was created must be running in the background while you are working in the container application. To activate an object, double-click it. Depending on the program, the menu bar of the application will change to reflect the available features of the server, or the application will open a separate window.

Container or Client: The application that accepts (contains) the embedded OLE object. Examples of containers include word processors, spreadsheet programs, databases, and presentation packages.

Embedding: Inserting an OLE object from a server (e.g., MapInfo Professional) into a container application (e.g., Microsoft Word) to allow editing and output in the context of other information. An embedded object is a copy of the object from the server. Once in the container, the object is no longer linked to the source object from which it came.

Embedding vs. Linking: An embedded item is stored as part of the document that contains it. A linked item stores its data in a separate file. MapInfo Professional only supports the embedding aspect of OLE.

Live object vs. static image of object: Embedding an object in a container using OLE means the object is “live;” that is, you can edit the object in some manner using the features of the server from which the object came. The container must accept the object as a live object. If it cannot, only a static picture (bitmap or metafile) will be embedded.

MapInfo Map Object: You may find you want to include a map in your presentation or report that lets you convey statistical information geographically. MapInfo Professional OLE Embedding enables you to embed a map window, known as the MapInfo Map Object, that shows all your data layers alongside other information such as charts and graphs, tabular data and text.

Object: Any information that is embedded through OLE, whether it is a map, chart, spreadsheet data, sound effect, or text. With MapInfo Professional’s OLE embedding, you embed a Map window as the object.

Server: The source application that creates OLE objects for use by a container. MapInfo Professional is the server that creates the MapInfo Map object that can be embedded in OLE containers such as Microsoft Word or Excel.

MapInfo Map Tools and Menu Commands

MapInfo Map provides a variety of map display, viewing and editing capabilities, including:

- Opening multiple tables at once
- Controlling individual layer properties such as display and labeling
- Creating and modifying thematic maps
- Manipulating the Map window view
- Finding information associated with a map layer
- Controlling map projection and units

Because MapInfo Map is a subset of MapInfo Professional features, using them in your container application is the same as using them in MapInfo Professional. So, Layer Control and Thematic Mapping work the same way whether you are creating a map in MapInfo Professional or in your word processor.

Let's look in more detail about what you can do with MapInfo Map.

MapInfo Map allows you to create, display and edit map layers in a Map window directly in your OLE container application such as Microsoft Word or Corel Draw. You can also bring over an existing Map window from MapInfo Professional to your container via Drag and Drop or by pasting from the clipboard. When the Map window is embedded in the container and is active, MapInfo Map is running and replaces much of your application's menu bar with its own menu and toolbar. From there you can access the power and flexibility of MapInfo Professional.

OLE Tools

MapInfo Map's Toolbar consists of seven tools to help you change the view of your Map window, get information associated with a layer, and access MapInfo Map help topics. These tools include: the Grabber, Zoom In, Zoom Out, Info Tool, Change View, Drag Map Window, and Help. When you activate the map, these tools replace any tools the container application displays.

When MapInfo Map is active, the following tools are available on the application's menu bar:



Grabber tool: Use this to reposition the map contents within the active Map window by clicking and dragging the map in the appropriate direction. This is the default tool.



Zoom-in/out tools: Use the Zoom-in tool to get a closer view of the map contents. Use the Zoom-out tool to get a wider view. Click the map with either tool or draw a marquee box to change the zoom.



Info tool: Use this to view the tabular data associated with map objects. Click the map. The Info tool window displays on your screen showing the objects and the associated data at that point.

Note: The Info tool window is not embedded in your container like the Map window. You cannot incorporate the Info tool window into your document. It is a temporary window only available when the map object is active.



Change View tool: Use this to access the Change View dialog box and change the zoom, map scale, and center settings to change your view of the map.



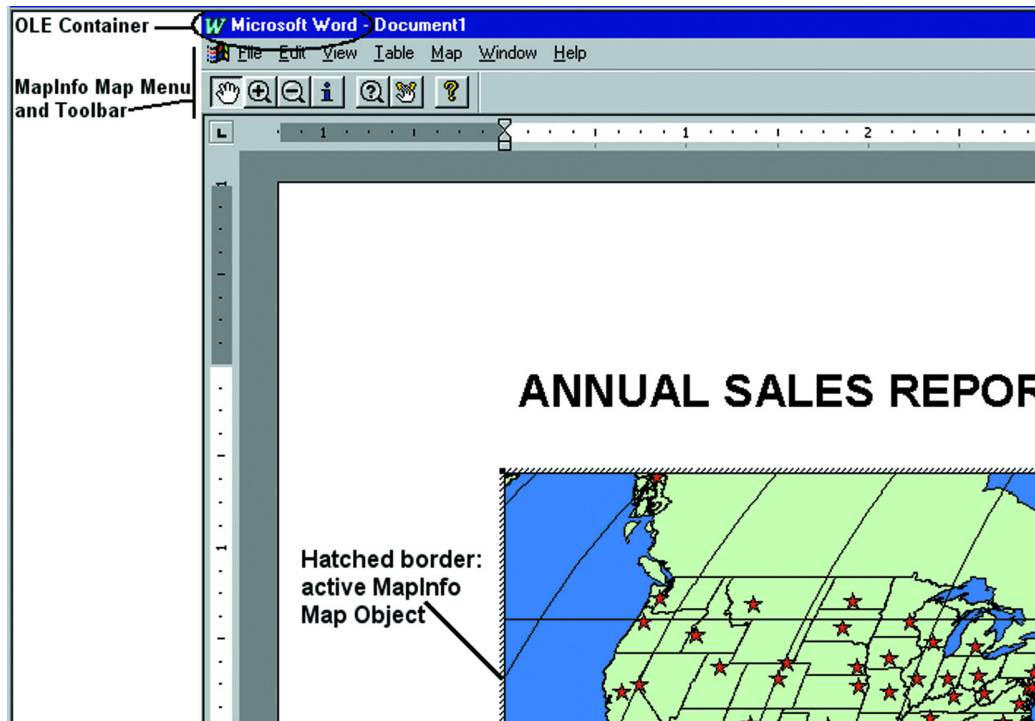
Drag Map Window tool: Use this to transfer a copy of your active Map window to MapInfo or to another OLE container. During the process, the cursor will change to indicate the three stages of drag and drop: "begin drag," "dragging," and "drop copy." For more on using Drag and Drop, see [Bringing a Map Window into Your Application on page 507](#).



Help button: Use this to access help topics about embedding a MapInfo map.

Menus and Commands Available While Using the MapInfo Map

MapInfo Map replaces all container menus except File and Window with five MapInfo Professional menus: Edit, View, Table, Map and Help. Under each menu, selected MapInfo Professional features have been included, as outlined in this section. This section contains summaries of MapInfo Map's menu commands and tools. Be sure to refer to other chapters in this Guide and the rest of the MapInfo Professional documentation set for more complete discussions.



Edit: *Copy, Paste.* These commands allow you to place the Map window on the clipboard to transfer it to MapInfo Professional or another OLE application.

View: *Toolbar, Legend.* Controls the display of the thematic map legend (if any) and displays or hides the Toolbar on the menu. To disconnect the Toolbar from the menu, click and drag it to another location.

Table: *Open, Close, Close All.* Allows you to open and close multiple tables at the same time. If you have inserted a new MapInfo Map Object in your document (on the **INSERT** menu, click **OBJECT**), select the **TABLE** menu, and click **OPEN TABLE** to begin building your map. The Open MapInfo Table dialog box displays where you choose one or more tables to open (.tab format only).

On the **TABLE** menu, click **CLOSE** or **CLOSE ALL** to close any or all map layers. The Close dialog box allows you to close multiple tables at one time.

Map: *Find*, Layer Control, Create Thematic Map, Modify Thematic Map, Change View, Previous View, View Entire Layer, Options, Redraw Window.* Most of MapInfo Map's functionality is found here where you can locate objects, control the display and look of each map layer, analyze and display data thematically, and manipulate the view of the map contents within the Map window.

Use the Find command to locate and mark specific map objects in the Map window. From the first Find dialog box, specify the table and column that contains the object you wish to locate. At the second Find dialog box, type the name of the object. When MapInfo Map locates the object, it marks the location with a symbol. If the object was not previously in view, MapInfo Map redraws the Map window with the object in its center.

Help: *Help Topics, About MapInfo Map*. Direct access to instructions on embedding a MapInfo Map in OLE applications. Refer to the Help topics to learn about embedding a MapInfo Map Object in your applications. Refer to the About MapInfo Map dialog box to show the product version and license information (name, organization and serial number). Click the Tech Support button for information on contacting MapInfo Technical Support.

Shortcut Menu

A shortcut menu is available while you are editing your embedded MapInfo Map in another application. To access it, click the right mouse button. Choose from Layer Control, Change View, Previous View and View Entire Layer.

Using Layer Control with MapInfo Map

The Layer Control dialog box determines how your map layers look and act. During the OLE process you can change the layer order, add or remove layers, access the Display Options, Label Options and the Modify Thematic Map dialog boxes. You can make layers zoom layered by clicking the appropriate check box. You cannot make any map layers editable or selectable with MapInfo Map.

Create/Modify Thematic Map with MapInfo Map

You can analyze your data directly in your application via the Create/Modify Thematic Map commands. Choose them if you want to add or change a thematic map based on a layer in your Map window. You can build any of six types of thematic maps (ranged, graduated symbol, dot density, pie graphs, bar graphs, or individual value). Thematic mapping gives you a great deal of control from choosing the type of map that best illustrates your data, to how the data is calculated, how the data is visually presented, and how the map is customized. Thematic mapping is thoroughly discussed in this *User's Guide* and *Online Help*.

When you create a thematic map in MapInfo Map, a legend is created and placed in the Map window. If the thematic map is modified, the legend automatically resizes itself to accommodate the changes in thematic content. You can reposition the legend anywhere within the Map window by dragging it to a new location; however, you cannot resize it.

Change View

This command allows you to specify the settings for viewing the Map window, including window width, map scale, map resizing and center point.

Previous View

This command allows you to return to the previous view. If you have changed the view of your Map window at least once during the work session, the Previous View command is active, allowing you to return to the last view.

View Entire Layer

This command allows you to see the entire layer (or layers) in the Map window.

Options

The Options command allows you to change the map units for the Map window, including coordinate units, distance and area units, or the projection of the map.

Redraw Window

This command allows you to redraw the Map window. Use it to refresh the map after you press ESC to stop an earlier map redraw.

Limitations of OLE

Although MapInfo Map enables you to build a map very easily in your container application, not all of MapInfo Professional's features are available in the context of map embedding. Among them are editing map objects such as regions or polylines, querying a table for further analysis, geocoding to a table in the Map window, or displaying tables in other types of windows (Browser, Graph or Layout windows).

However, with MapInfo Professional's drag and drop capabilities you can still perform these functions in MapInfo Professional and bring over the Map window to your OLE container application for final viewing, formatting and editing enhancements.

Working with Embedded Maps

Now that you have had an introduction to MapInfo Map Object and what it can do for you as you work in another application, let's get down to the specifics of embedding an OLE object.

Although containers vary in their handling of OLE objects, there are some behaviors that are common to all. There are three ways that containers accept embedded OLE objects such as a Map window:

- On the **INSERT** menu, click **OBJECT** to choose the object to embed from a list.
- On the **EDIT** menu, click **PASTE** (or **PASTE SPECIAL**) to embed an object that was previously copied to the Clipboard.
- Drag and drop from the application to the container using the Drag Map Window tool.

The method you choose depends on which application you are in at the moment (server or client) and how much you want to do to create the final map.

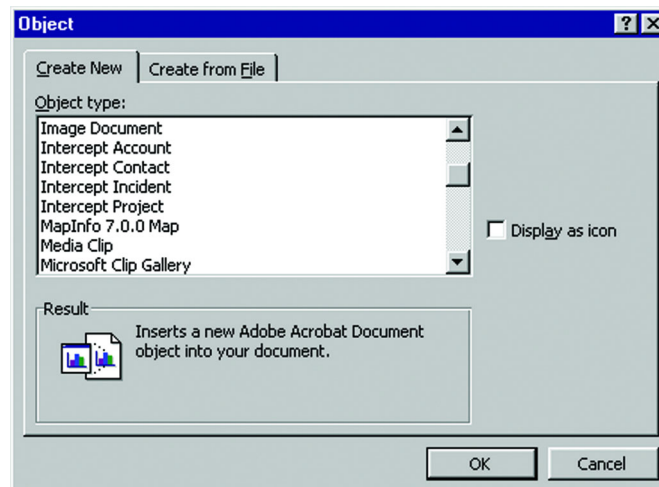
Creating a New Map Window in Your Container

You just decided that adding a map to your presentation will lend great support to some conclusions you have reached about your data. In this case, you will need to build the map from scratch in your presentation application. These instructions apply to any type of container application.

To embed a MapInfo Map Object in your application:

1. Position the cursor where you wish to place the Map window.
2. On the **INSERT** menu, click **OBJECT** (or on the **EDIT** menu, point to **INSERT** and click **OBJECT** in some applications).

A dialog box displays listing all OLE objects the application can accept.



3. Highlight the MapInfo Map item and click **OK**. A default Map window of the world and MapInfo logo displays. The Map window is also in an active state (surrounded by a hatched border), meaning that MapInfo Professional is running in the background. Your application's menu has changed to reflect MapInfo Map Object's menu.
4. To begin building your map, on the **TABLE** menu, click **OPEN**. The Open MapInfo Table dialog box displays.
5. Choose a table from the appropriate directory. **SHIFT-CLICK** or **CONTROL-CLICK** to choose additional tables to be opened at the same time. Click **OK** when you are through. The tables display as map layers in the Map window. You can now label the layers, change the display, create or modify thematic layers, resize or reposition the Map window, or prepare the document for final output.

Bringing a Map Window into Your Application

You have been working long and hard on a map in MapInfo Professional that would really give your sales report some visual interest. Since the map is nearly complete, it is more efficient to copy it to your text document instead of making a new map in your word processor. You can either copy the Map window to the Clipboard or use the Drag Map Window tool to embed it directly in your document.

To copy a Map window from MapInfo Professional using the Clipboard:  

1. In MapInfo Professional, make the Map window active and on the **EDIT** menu, click **COPY MAP WINDOW**. The object is copied to the Clipboard.

Note: To copy the Map window all objects on the map must be de-selected. If there are any objects selected, the Copy Map Window command will not be available.

2. Switch to your container application and position your cursor at the location where you want to place the map.
3. On the **EDIT** menu, click **PASTE** to paste from the Clipboard to your document. The Map window displays.

Note: The map is *not* active at this time. If you want to make changes to the map content, such as changing the view, creating a thematic layer or adding labels, you will need to start MapInfo Map. Double-click the map to activate it and start MapInfo Map.

If you only want to resize or reposition the object within your document, you do not need to start MapInfo Map. Select and change the inactive object according to the methods for your application.

In many OLE applications you can also choose **PASTE SPECIAL** to paste the MapInfo Map into your document. Paste Special allows you to choose from three types of objects: the MapInfo Map object which can be activated and edited; Picture, a graphic image format that cannot be edited; and Bitmap format, also a non-editable graphic image. See your application for more on Paste Special.

To copy a Map window from MapInfo Professional using the Drag Map Window tool :

1. With both MapInfo Professional and your container application running, adjust their placement on the screen so that you can see them side by side (To tile MapInfo Professional and another application running under Windows, click the task bar with the right mouse button and choose Tile Vertically). Position your cursor in your container where you want to place the map.
2. In MapInfo Professional, make the Map window active.
3. Click the **DRAG MAP WINDOW** tool on the Toolbar. The cursor becomes a hand and handle, indicating you can begin the drag operation.
4. Click anywhere within the Map window (except the title bar). The cursor changes to the hand grasping the handle for the “dragging” operation.
5. Drag the cursor to the container and click at the point where you want to drop the map. When positioned over a valid drop target, the cursor changes again to the DropCopy cursor. If the position cannot accept the object, the cursor will display a circle with a slash through it.

This operation will only drag and drop a *copy* of the object. Moving and linking are not available with MapInfo Professional OLE Embedding. You may find that for some container applications (for example, Microsoft Excel) you must use the Control key in combination with the Drag cursor to copy the object.

The Map window is not active after you drop it in the container. Double-click it to activate the map if you want to do further editing.

Saving your Embedded Maps

Once your Map window is embedded in your application, all you need to do to save it is to save your document. The next time you open the document, the Map window will display in its inactive state. If you want to edit the map at that time, simply double-click it to activate the map object.

Note: This is only possible if you reopen the document on the system that has both your application and 32-bit MapInfo installed.

If you wish to save the tables that make up the map for future use in MapInfo Professional, you will need to drag and drop the Map window, or copy it to the clipboard and paste it, back into MapInfo Professional. Then save the tables before leaving MapInfo Professional. If you have created a thematic map or labels, you will need to save the session to a workspace to save the thematic and label settings. You may wish to save the Map window as a workspace regardless of what type of map you have created for easy start-up next time.

Resizing and Repositioning an Embedded Map

Once you have your Map window in your container, you may find it necessary to resize or reposition it in your document. This is accomplished by the container application itself, not MapInfo Map, so use whatever methods the application supports such as select, cut and paste.

Note: In some containers the object must be *inactive* for any changes to take effect.

For example, in Microsoft Word, click outside the object to deactivate it. MapInfo Map closes and you are returned to the normal Word screen. Click once on the object to select it. With the cursor over one corner of the image, drag it diagonally to enlarge or reduce the size of the image (this method retains the correct proportions). Release the mouse button when you reach the desired size.

In Microsoft Excel, you can simply drag a corner of the Map window to resize it. The Map window can be either active or inactive during resizing.

For changing the view of the map contents, the object must be active. Use MapInfo Map's Change View button to re-display the map at a different scale or position. Use the Grabber tool to bring a different part of the map into view.

Printing a Document with an Embedded Map

When using Print or Print Preview in a document containing an embedded MapInfo map, we recommend that you first make the map inactive (click outside the map). This will allow your container to display or print the current map object. This is especially true if you make any changes to the map object immediately before you print or preview.

Sharing Documents with Embedded Maps

Once you have created a map in your document, you may want to share it with a colleague. Or you might want to use it on another system. When the document is opened on another system, the MapInfo Map Object displays as a metafile, or picture of the map, in the inactive state. The map is like any other graphic image at this point. If no map editing is necessary, the document can be

printed, reformatted, reorganized, and saved with no special handling required for the map. The map itself can even be resized or repositioned. You cannot, however, change the content of the map since it is not an active OLE object.

To activate the map for editing on another system, your colleague must have access to 32-bit MapInfo Professional and the data used to create the map. Double-click the map to activate the OLE object. MapInfo Professional will prompt for the location of the data files if it cannot find the original location. If the data is not available, cancel out of the Locate Data dialog box. The metafile image is replaced with the MapInfo Professional world map in the active state. To retrieve the original metafile image, close the document without saving and reopening it.

Note: Sharing MapInfo Professional and map data on other systems is limited to the extent of your license agreement(s).

MapInfo Map Objects vs. Data Map Objects

Microsoft Data Map is a feature of Microsoft Excel for Windows 97. Data Map allows you to create thematically shaded maps based on data in Excel worksheets. MapInfo Corporation developed Data Map in conjunction with Microsoft Corporation.

When you use Data Map to create a map, the map is an embedded OLE object. However, Data Map OLE objects are different than MapInfo OLE objects. The following list describes some of the differences:

- Data Map works with data that you select from a Microsoft Excel worksheet, or import from a Microsoft Access database; MapInfo Professional works with data from MapInfo Professional tables.
- Data Map provides only a small subset of MapInfo Professional's features. For example, Data Map does not allow you to perform geographic queries, such as finding a street address. Also, Data Map's editing capabilities are limited to simple operations, such as adding annotations to the map. Data Map's main use is creating thematic maps; thematic mapping is but one of MapInfo Professional's many uses.
- Data Map objects can *only* be edited by using the Data Map software; to launch Data Map, double-click the Data Map object. MapInfo map objects can *only* be edited by using MapInfo Map. In other words, the two object types are not interchangeable — you cannot edit a Data Map object in MapInfo Map.

Using MapInfo Tables with Data Map

Data Map uses MapInfo Professional tables. All of the sample maps provided with Data Map are actually MapInfo Professional tables.

If you have created your own MapInfo Professional tables, you can use your tables in Data Map. However, before you can display your table in Data Map, you must set up your table using the Data Map Data Installer. To launch the Data Installer, double-click the file DATAINST.EXE. (To locate this file, click the Windows Start button, and then click Find.) Once you have launched the Data Installer, complete the dialog boxes that appear on the screen.

Note that some MapInfo Professional tables cannot be used with Data Map. Specifically:

- Data Map cannot display raster image underlay tables.

- Data Map cannot display a table that is actually defined as a relational join of other tables (such as a MapInfo StreetPro table). To use a street table with Data Map, use MapInfo Professional's Save Copy As command, which saves a street table in a "flat" form that Data Map can use.
- Data Map cannot display point objects that use MapInfo Professional "Custom" symbol styles. (Custom symbols are selected by displaying MapInfo Professional's Symbol Style dialog box, and then selecting "Custom Symbols" from the Font drop-down list.) If your MapInfo Professional table contains points with custom symbol styles, those points will be invisible in Data Map.

For more information about Data Map, see the Data Map online Help. For more information about the Data Installer, see the Data Installer online Help.

Internet Connectivity and MapInfo

MapInfo Professional® contains options that allow you to bring the Internet into your mapping sessions, and to bring your maps to the Internet.

Using active objects and the new HotLink tool, you can now launch files and Internet URLs directly from objects or labels on your map. Active objects provide you with a powerful display tool that allows you to bring information from the Web and other applications together in your map.

These additional sources of information can give your analysis or presentation greater impact. For example, you can link a location on your map to a Web site that gives more information about the location or to an image file that shows certain aspects of the location in more detail.

In addition, you can use the maps you create in MapInfo Professional in your Web pages. The new HTML Image Map tool converts a MapInfo Professional map into an HTML image map. Visitors to your Web page will be able to click any region to link to other HTML pages specific to that region.

What are Active Objects?

Active objects are map objects that are associated with files or URLs. The file can be a bitmap, a MapInfo Professional workspace or table, a MapBasic program, or any type of executable file whose extension is associated with an application installed on your system.

The active object in this map (red triangle) is linked to a webcam website that displays an erupting volcano.



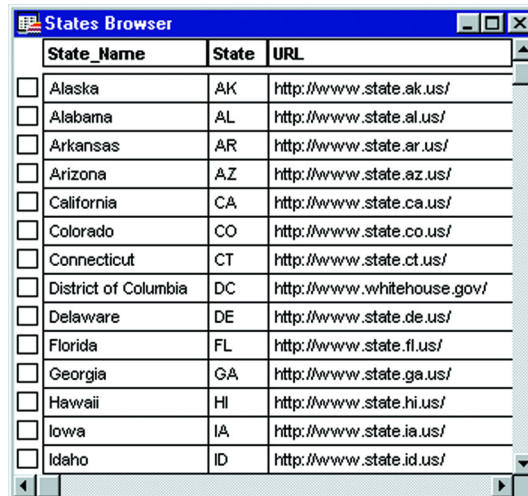
Creating Active Objects

To use active objects in your map, you must create a column in your table to store the file link information.

Modifying Your Table

Make sure the table that you want to contain an active object is open, and do the following:

1. On the **TABLE MENU**, point to **MAINTENANCE** and click **TABLE STRUCTURE**. The View/Modify Table Structure dialog box displays.
2. Choose **ADD FIELD**. Add a character field to contain the active object text. Make the length of the field long enough for the active object text, and name the field.
3. Click **OK** to complete the field addition.
4. Open the table in a Browser window (on the **WINDOW** menu, click **NEW BROWSER WINDOW**).
5. Enter the appropriate file link text in the new field for each row in the table.



	State_Name	State	URL
<input type="checkbox"/>	Alaska	AK	http://www.state.ak.us/
<input type="checkbox"/>	Alabama	AL	http://www.state.al.us/
<input type="checkbox"/>	Arkansas	AR	http://www.state.ar.us/
<input type="checkbox"/>	Arizona	AZ	http://www.state.az.us/
<input type="checkbox"/>	California	CA	http://www.state.ca.us/
<input type="checkbox"/>	Colorado	CO	http://www.state.co.us/
<input type="checkbox"/>	Connecticut	CT	http://www.state.ct.us/
<input type="checkbox"/>	District of Columbia	DC	http://www.whitehouse.gov/
<input type="checkbox"/>	Delaware	DE	http://www.state.de.us/
<input type="checkbox"/>	Florida	FL	http://www.state.fl.us/
<input type="checkbox"/>	Georgia	GA	http://www.state.ga.us/
<input type="checkbox"/>	Hawaii	HI	http://www.state.hi.us/
<input type="checkbox"/>	Iowa	IA	http://www.state.ia.us/
<input type="checkbox"/>	Idaho	ID	http://www.state.id.us/


Now that your table contains the active objects, you need to set the HotLink options for the table.

Using the HotLink Tool

Use the HotLink tool in the Main toolbar to launch the active objects on your map. The HotLink tool can be used with almost any layer that contains map objects or labels. It is not available for thematic, grid, raster, or cosmetic layers.

Options in Layer Control enable you to control whether the active object is launched from a map object or label.

To launch an active object:

1. Click the **HOTLINK** button. Notice that the cursor displays as a pointing hand.
2. Move the cursor over the map. When you pass the cursor over an active object, the cursor changes to a hand holding a lightning bolt, as shown. 
The link associated with the object or label displays in the Status bar.
3. Click the active object to launch the file, URL, workspace, etc.

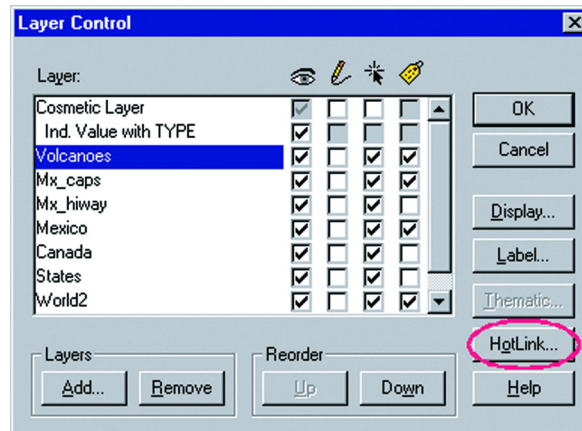
You must have active objects in your table for the HotLink tool to be active. You can easily set up your table for active objects in just a few steps.

See the next section for how to make the appropriate modifications.

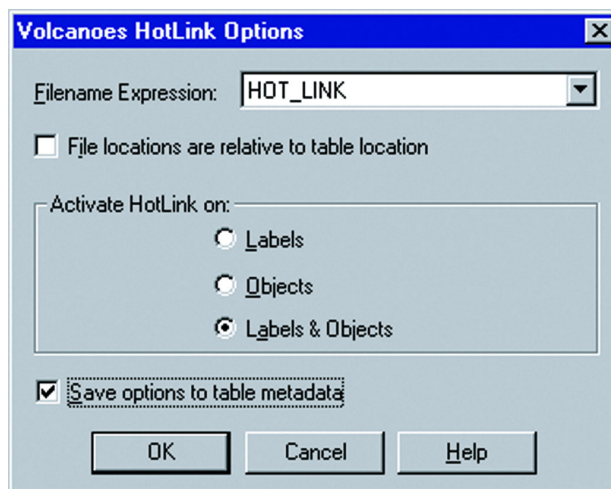
Setting the HotLink Options

To specify how the HotLink tool will launch the active object:

1. Display the table containing the active objects as a map (on the **WINDOW** menu, click **NEW MAP WINDOW**), if it is not already.
2. On the **MAP** menu, click **LAYER CONTROL**. The Layer Control dialog box displays. Select the layer that contains the active objects. This enables the **HOTLINK** button.



- Click the **HOTLINK** button. The HotLink Options for the table display.



- Choose the Filename Expression from the drop-down list. This is the name of the field you added to hold the file link information.
You can also use an expression that concatenates two or more fields to define the file link. For example, in a map of the United States, you can use this expression:

```
http://www." + State_Name + ".com
```
- To add the table path to the filename before launching it, check the File locations are relative to table location box.
- In the Activate on group, choose how you want the active object to launch when you click the object with the HotLink tool.
 - LABELS** – Choose Labels to launch the active object when you click the HotLink tool on an object's label.
 - OBJECTS** – Choose Objects to launch the active object when you click the HotLink tool on an object.
 - LABELS & OBJECTS** – Choose Labels & Objects to launch the active object when you click the HotLink tool on either an object or its label.
- Check the **SAVE OPTIONS TO METADATA** box to save the HotLink options to the table's metadata.
- Click **OK**.

Adding the Path to the Filename

If you want MapInfo Professional to add the table path to filenames before launching them, check the File locations are relative to table location box. This is useful if you are distributing tables containing HotLinks to files located in the same directory. Regardless of where the data is installed, the HotLinks will work. If the box is not checked, MapInfo Professional launches the file without modifying the name.

Note: Active objects that are URLs are not modified before they are launched, regardless of whether the box is checked.

Saving HotLink Options to Metadata

Check the Save options to table metadata box to save the HotLink options to the table's metadata. Every time you open the table, the HotLink options will be restored. This check box is not available if the table is read only or if metadata operations are not supported on the table type, e.g., Street Works tables.

If you do not check the box, the HotLink settings will be lost when you close the table, unless you save your session to a workspace.

The settings are added to the .tab file in the Metadata area. The syntax for the HotLink settings is as follows:

```
"\ActiveObject" = ""  
"\ActiveObject\Expr" = (where the field or expression is stored)  
"\ActiveObject\Mode" = (type of object from which to launch active object)
```

Entries can be one of the following:

```
"HOTLINK_MODE_OBJ"  
"HOTLINK_MODE_LABEL"  
"HOTLINK_MODE_BOTH"  
"\ActiveObject\Relative" = (relative to path)
```

Entries can be one of the following:

```
"TRUE"  
"FALSE"
```

Note: The HotLink options are written to metadata when you click OK in the HotLink Options dialog box. If you click Cancel in the Layer Control dialog box, the HotLink Options you set are not applied to the Map window. However, the options are still in the metadata.

Using the HotLink Tool in Browser Windows

If you have saved the HotLink options to the table's metadata, then you can also use the HotLink tool in the Browser window. Just click the HotLink tool to activate it, move the cursor to the field you have set up for your active objects, and click any of the links.

Note: The HotLink tool is available in a Browser window *only* when the HotLink settings are saved to the table's metadata. Saving your session to a workspace without saving the HotLink settings to metadata will not work because there are no user interface settings for using the HotLink tool in a Browser.

When you open a new Browser window, MapInfo Professional reads the table's metadata to determine if the HotLink filename expression matches any of the Browser's field expressions. If so, the text in that field is underlined, to indicate an active object. The HotLink tool will be available for that Browser window and you can select links from it.

If the HotLink filename expression is not a table column name, you can create a HotLink field in the Pick Fields dialog box, using the HotLink filename expression as the field expression. You cannot edit data in a Browser window while the HotLink tool is active, but you can select rows and move or resize Browser fields.

HTML Image Maps

Using the HTML Image Map tool, you can convert a MapInfo Professional Map window into an HTML image that can then be added to a Web page. The HTML Image Map tool supports:

- Point, arc, line, ellipse, rectangle, rounded rectangle, and polyline objects, in addition to the original support for polygon and region layers.
- Hotlinks and hyperlinks.
- Multiple layers.
- Ability to combine landing pages into a single HTML page.

Options in the application allow you to specify a title and copyright information for the Web page, specify an image size and file format (JPG or PNG), designate a column for tool tips, and create HTML landing pages for each object on the map.

The HTML Image Map tool is a MapBasic application that ships with MapInfo Professional. It is available through the Tool Manager (on the **TOOLS** menu, click **TOOL MANAGER**).

To add the Image Map tool:

1. On the **TOOLS** menu, click **TOOL MANAGER**. The Tool Manager dialog box displays.
2. Check the **LOADED** box for the HTML Image Map tool. If you want the HTML Image Map tool to load automatically every time you start MapInfo Professional, check the **AUTOLOAD** box as well.
3. Click **OK**. The HTML Image Map menu item is added to the Tools menu.

To create an HTML image map:

1. In MapInfo Professional, open the table(s) you want to use for your map.
2. Arrange the layers the way you want them in a Map window, and set the zoom, projection, and other display attributes.
3. On the **TOOLS** menu, click **HTML IMAGE MAP**. The HTML Image Map dialog box displays.
4. Select the layers for your image map. Use the **ADD** and **ADD ALL** buttons to move selected layers to the Layers in image map list. Use the **REMOVE** and **REMOVE ALL** buttons to move layers back to the Layers not in image map list.
5. Select the column that will be used for your map's tool tips for each layer.
6. Choose a title for your Web page and enter it in the Web page title box.
7. In the Image group, enter the copyright text. Click the **COPYRIGHT** button to insert the copyright symbol into your copyright notice. Specify a size, image format, and clip resolution for your HTML image map.
8. Specify a name and location for the HTML image map file in the HTML file name box. Click the **BROWSE** button to navigate to the location you want.

9. Check the **CREATE HTML LANDING PAGES** for each object box to create landing pages. Check the **POPULATE LANDING PAGES WITH RECORD CONTENT** box to use columns in your table as the content for the landing pages.
10. Click the **COLUMNS** button. The Choose Columns dialog box displays.
11. Choose the columns you want to include in the landing pages, and customize the column text. Customization options are explained in the next section. Click **OK**.
12. Click **OK** again to generate the HTML image map.

HTML Landing Pages

The Landing Pages option allows you to click any region in the HTML image map and link to a new HTML landing page specific to that region. You can put whatever content you want into the landing pages, including column information from your table. The user interface enables you to select the columns you want to use and customize the text.

Selecting Columns

You can select which columns you want to display on the landing page. Check the **POPULATE LANDING PAGES WITH RECORD CONTENT** box to activate the **COLUMNS** button. Click the Columns button to display the Choose Columns dialog box. You can add individual columns or all the columns from your table. By default all the columns in the table are selected and appear in the Columns on landing page list.

To remove a column from the landing page content, click a column to highlight it and click **REMOVE**. The column name appears in the Columns not on landing page list.

Using Column Name Aliases

You can use column aliases from your table's metadata as the basis of the content of your landing pages.

To bring your column alias metadata into the Choose Columns dialog box, click the **LOAD** from metadata button. The column aliases display in the Column name alias list. Now you can edit the column aliases so that the content of the landing page is what you want.

To edit a column name alias, click an alias from the Column name alias list to highlight it, and then click the **EDIT** button. You can make any text changes you want; it is completely customizable.

Additional buttons in the dialog box, **UPPER CASE**, **PROPER CASE**, and **REMOVE '_'**, allow you specify the case of the column text, or remove underscores from column name aliases.

Note: These buttons will change **all** the column name aliases in the list.

In addition, you can save your edits back to the table's metadata. Click the **SAVE** to metadata button when you have finished editing the column aliases.

ToolTips

When you hover your cursor over a region or polygon in your HTML image map, a ToolTip displays. The tooltip information comes from the column you selected in the dialog box.

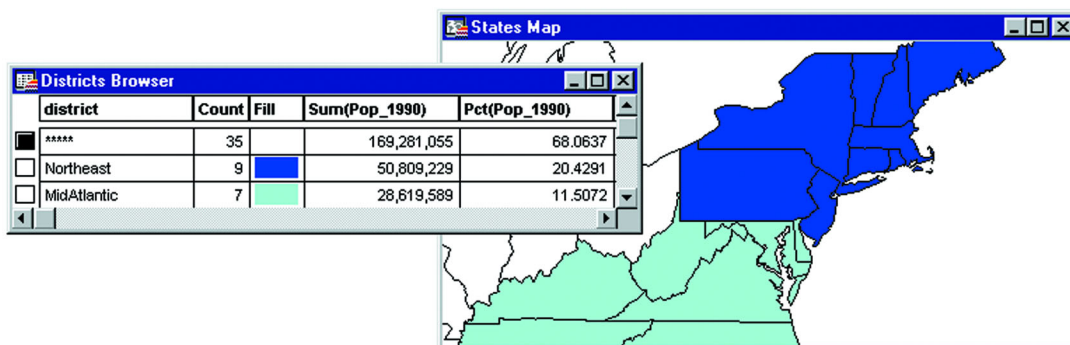
Redistricting — Grouping Map Objects into Districts

One popular use of MapInfo Professional® is to group map objects with a common field into districts or territories. MapInfo Professional's Redistricting feature allows you to create new districts, realign existing districts, all the while doing calculations of the attached data on the fly for instant analysis and decision-making.

What is Redistricting and How Can I Use It?

Redistricting is the process of grouping map objects into districts in order to perform aggregate calculations on the data to provide totals of net values for the districts. MapInfo Professional creates an individual value thematic map where the variable is the district name. The color-coded map shows the geographic extent of the districts. A special Districts Browser displays the districts in tabular form.

For example, if you have a layer of states, you might want to combine the state boundaries to create sales territories. Each state record includes a field, TOT_SALES, which contains the total sales for the previous year. You would ultimately like to sum up the TOT_SALES field for each state in a given sales territory. Redistricting gives you the tools for creating the sales territory and combining those TOT_SALES fields from each state's data into one table.



Note: The STATES table used in this example is from the MapInfo Professional Tutorial data, which is available from the MapInfo web site, www.mapinfo.com/miprotutorial.

But that is only one part of the redistricting process. The real power lies in the Districts Browser where you can see on-the-fly updates of district record counts and data totals when you click a map object and assign it to another district. This allows you to perform visual “what if” analysis to achieve district realignments, a process sometimes referred to as load balancing.

When you are satisfied with the distribution, you can make the district assignments permanent. Later, as the need arises, you can change the assignments and try out new distributions.

Redistricting does not create new map objects or permanently change the style of the map objects. Redistricting is simply a dynamic grouping tool that displays map objects that share the same district information as a group. While the map objects are not permanently affected, you can make the district assignments permanent by saving the table.

You can redistrict any mappable table containing region, line, or point objects. The redistrict map will reflect the appropriate fill, line, or symbol style for the objects. The Redistricter limits the number of districts in a table to 594.

You can use redistricting in a wide variety of applications such as creating and managing sales territories, school or voter districts, emergency service coverage areas, delivery routes, natural resource management areas, etc. Use it wherever there is a high degree of fluctuating data and the need to try out different realignment scenarios.

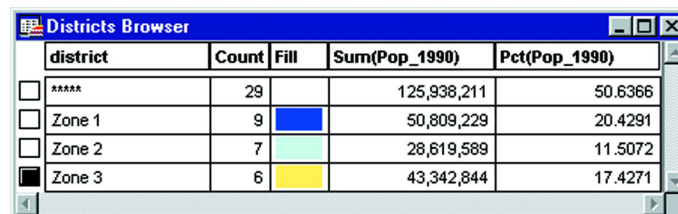
You can use redistricting whether you need to create districts from scratch or realign existing districts.

Before we get into the process, however, there are two key concepts to introduce: the Districts Browser and Target District.

Using the Districts Browser

The Districts Browser is the key to the process of creating and changing districts. While looking like other Browsers in MapInfo Professional, the Districts Browser is actually a dynamic window that allows you to make changes to the groups and recalculates total values on the fly. You can immediately see the results of your changes. You then have the option to make the changes permanent or continue to try out new district realignments.

The Browser window lists the districts as specified in your table, the record count for each district, and aggregate expression columns that contain the net total values of your data. You specify these columns in the New Redistrict window dialog box when you begin the redistricting session.



district	Count	Fill	Sum(Pop_1990)	Pct(Pop_1990)
*****	29		125,938,211	50.6366
Zone 1	9	Blue	50,809,229	20.4291
Zone 2	7	Light Green	28,619,589	11.5072
Zone 3	6	Yellow	43,342,844	17.4271

Setting up the Target District

The *target district* is the selected record shown in the Districts Browser. One record is always selected as the target. In redistricting, the target district receives the map object(s) that you assign from another district(s). MapInfo Professional automatically sets the target district to be the first district in the Browser, but you can change it to any district you desire by clicking on a district record's selection box in the first column of the Browser.

There are three ways to set the target district:

- Select a record from the Districts Browser.
- Select a map object in the Map window, make the Browser active, and on the **REDISTRICTER** menu, click **SET TARGET DISTRICT FROM MAP**. The district that owns the map object becomes the target district.
- Select a map object, make the Browser active, and choose the Set Target District from Map button.

The target district is identified in the Districts Browser as the selected record. The target district is also identified on the StatusBar in the lower left corner of the screen.

It is very easy to select a target district in the Browser when you have a small number of districts. However, when you have many districts (the limit is 594), you may find it quicker to select a map object and choose the Set Target District From Map command or button. If your default setting is Most Recently Used (on the **REDISTRIBUTE** menu, click **OPTIONS**), when you select a map object that is out of view in the Browser, MapInfo Professional will bring the corresponding record up near the top of the Browser. You can then use any of the three methods described above to set the target district.

To change the target district, simply select another district in the Browser or select a map object in a different district and choose Set Target District From Map.

There is always one (and only one) target district selected at a time. You cannot unselect the district by using **UNSELECT ALL** in the **QUERY** menu.

When you select map objects, MapInfo Professional temporarily assigns them to the target district and recalculates the totals for each district. The changes are instantly reflected in the Districts Browser. The object count for the target district increases as do the totals for the data columns to reflect the addition of the selected objects. At the same time, the object count and data totals for the source district decrease to reflect the removal of the object from that district.

Using Redistricting

In general, the redistricting process follows these steps:

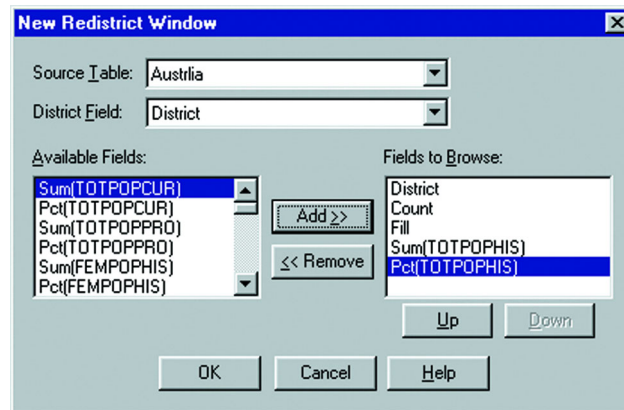
1. On the **WINDOW** menu, click **NEW REDISTRIBUTE WINDOW**. Specify your table and field choices in the Redistrict dialog box. MapInfo Professional displays a color-coded map and Districts Browser.
2. Select the target district, if necessary.
3. Select the map object(s) that you want to go into the target district.
4. Observe the changes to the data values in the Districts Browser.
5. Assign map objects to the target district.

The process is about the same whether you want to create new districts from scratch or make changes to a table of existing districts. The two situations are discussed in the next section.

Creating New Districts

If you do not have any established districts in your table, you can create them as you go during the redistricting session. You should first, however, prepare your table to store the new district names by adding an empty column to your table. To do so, on the **TABLE** menu, point to **MAINTENANCE** and click **TABLE STRUCTURE**.

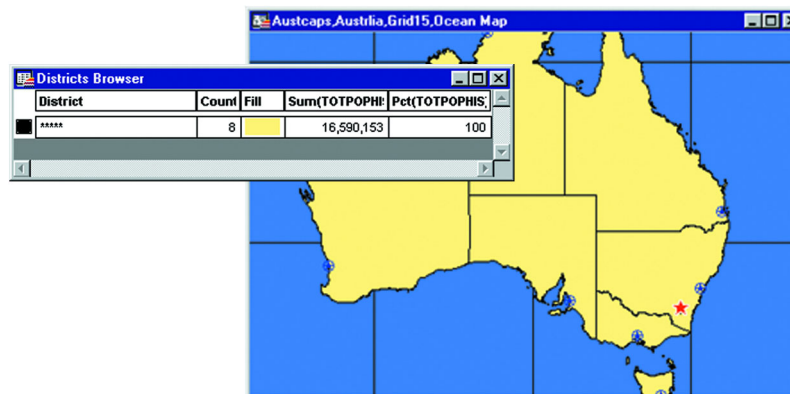
With that done, on the **WINDOW** menu, click **NEW REDISTRIBUTE WINDOW**. The Redistrict dialog box displays. Choose your table from the drop-down list. Choose the district field from its drop-down list. The district field is the empty field you created in your table to hold the district names.



A powerful feature of redistricting is the ability to calculate net total values from the data in your table. Any numeric field can be aggregated by sum or percent during the redistricting session. The Available fields list shows you what calculations are possible for the given table. Choose from this list and click the **ADD >>** button to move the expression to the Fields to Browse list. Only those items listed in the Fields to Browse list will be acted upon and displayed in the Districts Browser.

You can reorder the fields using the Up and Down buttons to list them in a certain order in the Browser. When you are satisfied with the choices in the dialog box, click **OK**. MapInfo Professional performs the redistricting operation.

When processing is finished, MapInfo Professional displays a map of your table with a single color and a Districts Browser with a placeholder for a district entry. This is because you told MapInfo Professional to carry out the redistricting on a column with an empty field.




To create another district, make sure the Districts Browser is active so that the Redistrict menu is available on the menu bar. On the **REDISTRIBUTE** menu, click **ADD DISTRICT**. The new district displays in the Browser with the name DistrictN, where N is the next higher number. Continue to add districts until you feel you have enough to begin reassigning objects to them. Enlarge the Browser, if necessary, to see the new district records.

Note: Each district you add will display with a generic name DistrictN, where N is the next higher number. To change the names, highlight the name and type in the new name.

To begin building your districts, make one of them the target district. Next, select map objects in the Map window to add objects to the new district. Notice how the values in the target district increase as the object(s) are selected.

At this point the objects are only temporarily assigned to the district. When you have made all the additions to the district that you want for the moment, make the Districts Browser active and on the **REDISTRIBUTE** menu, click **ASSIGN SELECTED OBJECTS** to make the assignment permanent.

Note: You can also choose the **ASSIGN SELECTED OBJECTS**  button from the Main toolbar. You cannot build another district until you complete the current one.

You must save the table at the end of the redistricting session to retain the new districts.

Continue to add and assign objects to districts until you have created as many districts as you need. You can now see the geographic extent of each color-coded district in the map window. You can also see the results of the expression calculations in the Browser showing the new total values for each district.

Now you can reassign districts to more equitably distribute resources, to include or exclude certain information, whatever your needs call for.

Reassigning Existing Districts

If you already have districts in your table, or have a column that contains values that are shared among the records, you can use those as the basis for your districts. When you activate the Redistricter, these values display as color-coded districts on a map.

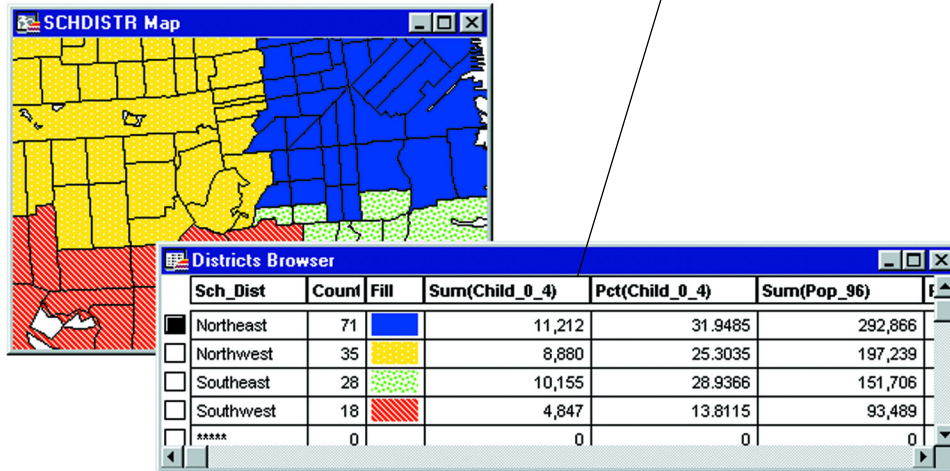
For example, choose a column that contains information that will make up groups of more than one record each, such as sales reps, postal codes, area codes, states. If you choose a column containing unique values like customer names you will create districts that only contain one record each, not very useful for creating districts.

Note: When you perform redistricting, MapInfo Professional alters the values in whatever column you choose. You may want to make a copy of the column so that you retain the column values. In addition, do not name your tables "Districts." MapInfo Professional uses "Districts" internally as a system table when beginning a redistricting session.

On the **WINDOW** menu, click **NEW REDISTRIBUTE WINDOW** to start the redistricting session. In the Redistrict dialog box, specify your table and field that contains the district names. From the Available Fields list, choose the fields you want displayed during redistricting. Reorder the fields as necessary. The fields will display in the Districts Browser in the order specified in the Fields to Browse list. Click **OK**. MapInfo Professional creates an individual value theme and the Districts Browser.

Now to begin the actual redistricting, or load-balancing, set the district that you want to add objects to as the target district. Select the map object(s) and watch the data change in the Districts Browser. You can select objects from more than one district and assign them to the same target district. Simply **SHIFT-CLICK** each additional map object after the first one.

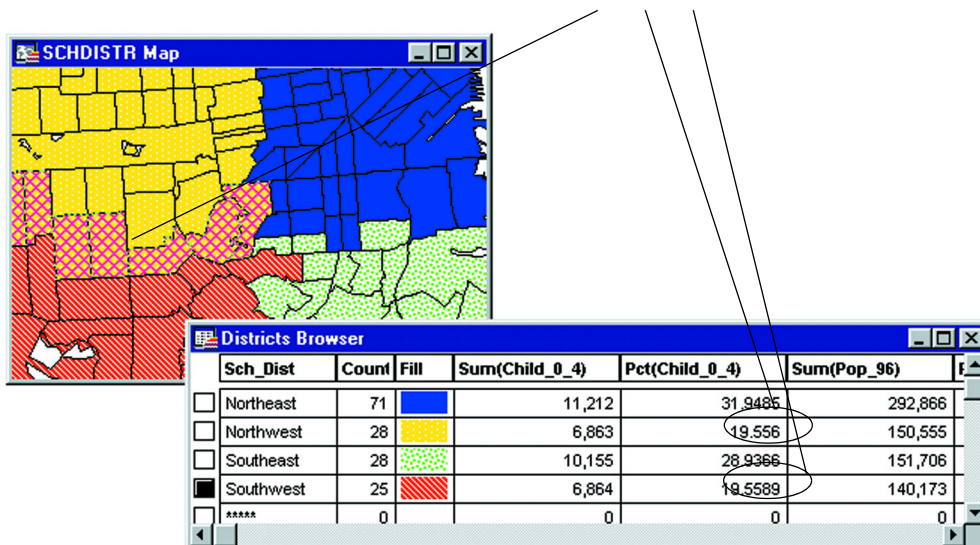
Before realignment, children under 4 were unevenly distributed among the districts.



As you choose map objects, the Browser immediately reflects the changes among the districts with new counts per district and new totals based on expressions you specified in the Redistrict dialog box, such as the sum or percent of a column value.

When you are satisfied with the reassigned objects for the target district, on the **REDISTRIBUTE** menu, click **ASSIGN SELECTED OBJECTS** to make the changes permanent. You can now choose a different target object and add other map objects to it. Continue until you are satisfied with the new distribution of map objects.

After adding the selected objects to the target district, the Southwest and Northwest districts contain about the same percentage of children



Creating New Objects

Keep in mind that MapInfo Professional's redistricting operation does not actually create new map objects. To combine objects in a district into a single object you must select the **TABLE** menu, and click **COMBINE OBJECTS USING COLUMN**. You will be prompted to save the table first before proceeding with the combine. For details, see [Combining Objects Using Column in Chapter 10 on page 368](#).

Note: You can only use Combine Objects Using Column for two dimensional objects such as regions.

Options in Redistricting

To control the order of districts in the Districts Browser, on the **REDISTRIBUTE** menu, click **OPTIONS**. The Redistricter Options dialog box displays. Choose your preferred sort order from among: most recently used, alphabetical, or unordered. You can also choose to show the Browser grid lines and save the options as your default.

As mentioned earlier, the Most Recently Used option can greatly aid you if you have more districts than the Districts Browser can display in a window. Whenever you select a map object that belongs to a district that is not currently visible in the Browser, MapInfo Professional will move that record near the top of the Browser window. You can then more easily set the new target district or view the changes in the data fields as you carry out your load-balancing scenario.

Changing the display of your districts is simple. Click the fill pattern, line style, or symbol in the Districts Browser that represents the district. The Region Style, Line Style, or Symbol Style dialog box displays, where you can change the tools used to display the district.

To save the style changes, you must save the redistricting session as a workspace. **SAVE TABLE** will only save the district assignment changes. The styles belong to a thematic layer, not to the table itself. The district changes are applied to the table and, thus, can be saved to the table.

Records with No Graphic Objects

Redistricting involves grouping map objects into districts. If you are redistricting a table that contains records that do not have graphic objects associated with them, keep in mind that MapInfo Professional includes them as well in the Districts Browser. You cannot assign these records to new districts. They will affect your data calculations when you move objects into new districts.

If you have numerous records without graphic objects in your table, it may be best to create and save a subset of the table and run the Redistricter on the new table.

Saving New Districts

Once you have settled on the new districts, you must save the changes to the table that contains the districts using **SAVE TABLE**. This will save the objects with the new district name.

If you created new districts, you can change the generic DistrictN names before saving the table.

Exiting the Redistricter

To end the redistricting session, close the Districts Browser window. The redistrict thematic layer will be removed from the Map window.

Note: You must end the current redistricting session before beginning a new one.

Creating Expressions

Formulating expressions is something like writing sentences. There is a vocabulary of words from which you can draw, and these words have to be combined according to syntactic rules. The syntax of expressions is much simpler than the syntax of English, and the vocabulary is vastly smaller. However, most of us have been using English for years and so it seems easy and natural whereas formulating expressions is, at first, sometimes a bit difficult.

However, just as English has simple sentences and complex sentences, so there are simple expressions and complex ones. Even if you don't get the hang of formulating complex expressions, you can still use all the MapInfo Professional® commands that use expressions. That is because formulating simple expressions is very easy and, at the same time, allows you to work with your data in powerful ways.

Constructing Simple Expressions

You formulate expressions using column (field) names and constants (i.e. specific data values), on the one hand, and functions and operators, on the other. Think of the column names and constants as nouns, and functions and operators as verbs, prepositions and conjunctions. You always need at least one column name or a constant in an expression. How many operators and functions you need depends on what you want to do with your expression.

The simplest possible expression consists of a column name, for example:

1. POP_1990
2. STATE

You could use such an expression in Thematic Mapping to indicate what data is to be represented on the map. In Update Column such an expression would tell MapInfo Professional what data to use in updating a column in the target table.

Here are some slightly more complex expressions:

3. POP_1990 > 17893
4. POP_1990 <= POP_1980
5. COUNTY <> "Orange"
6. POP_1980 * 1.2
7. POP_1990 / TOTAL_AREA
8. round(POP_1990/TOTAL_AREA,.1)

The first three examples use comparison operators. The first tests to see whether the 1990 population is greater than (>) some constant (17893). The second tests to see whether the value of one column, POP_1990, is less than or equal to (<=) the value of another column, POP_1980. The third tests to see whether or not the county is Orange. When the county does not equal (<>) "Orange" the record is selected. You could use any of these expressions in Select or in the Where Condition clause of SQL Select. These commands allow you to select a subset of the records in a table. The expression defines the characteristics of the subset.

Examples 6 and 7 use arithmetic operators. Example 6 multiplies (*) the value of POP_1980 by a constant (1.2) while example 7 divides one column, POP_1990, by the value of another column, AREA.

Example 8 uses the round function to round the value of the expression "POP_1990/TOTAL_AREA" to the nearest tenth (.1).

Expressions 6, 7 and 8 don't have comparison operators and therefore they would not be suitable for use in Select or in the Where Condition clause of SQL Select. However, you could use them alone in Thematic Mapping, Update Column, or Select columns in SQL Select.

Constructing Complex Expressions

Now consider examples 9 and 10, that are a bit more complex than 1 through 8:

9. $POP_1990 > POP_1980 * 1.2$
10. $round((POP_1980 * 1.2) / TOTAL_AREA, .1)$

We created expression 9 by taking expression 3 and replacing the constant "17893" with the whole of expression 6. Similarly, we created expression 10 by taking expression 8 and replacing "POP_1990" with expression 6.

In general, you create complex expressions by combining simple expressions. Perhaps the best way to learn how to do this is look at some of the examples we have provided (above and following) and create your own expressions based on those examples. However, there are two very general techniques for creating complex expressions.

- Replace a column name or a specific value with a simple expression.
- Combine expressions using logical operators (and, not, or).

Example six illustrates the first technique. There are many examples of the second technique throughout this entry. See particularly the discussion following "Logical Operators".

Entering Specific Values (Constants)

When entering specific character strings, numbers, and dates into expressions, you need to follow certain conventions.

Character Strings

When typing a particular string into an expression, you should enclose it in double quotes so that MapInfo Professional knows to treat it as a string, rather than treating it as a column name.

Examples 11 and 12 are valid string constants, but 13 and 14 are not.

11. "Orange"
12. "New York"
13. Orange
14. New York

Numbers

When entering specific numerical values, do not use thousands separators or currency symbols (such as dollar signs) or any characters other than numerals, the decimal sign (.) or commas (,) and the minus sign for negative numbers.

Dates

Dates consist of a month, a day, and an optional year. The year is specified by two or four digits and should be enclosed in double quotes. The components of a date can be separated by hyphens or slashes. The following are valid data constants:

15. "1-20-92"
16. "01/20/1992"
17. "1/20"

Operators - Mathematical Operators

Operator	Description	Example
+	plus	A + B
-	minus	A - B (subtraction) -A (negative)
*	times	A * B
/	divided by	A / B
^	exponentiation	A ^ B
\	integer division	A\B
mod	modulo arithmetic	A mod B

Note that you can:

- Add numbers to dates to yield another date
- Subtract a number from a date to yield another date
- Subtract a date from a date to yield a number

When you add numbers to dates, or subtract numbers from dates, MapInfo Professional treats the numbers as specifying a number of days. If you want to add or subtract a week, you would use the number 7. When you want to add or subtract a month, you could use 30 or 31. When MapInfo Professional subtracts a date from a date, the resulting number indicates a number of days.

Operators - String Operators

+	“concatenation” — connects strings and string expressions.
&	(can be used if preceded by a space)

Strings must be enclosed in double quotes. Consider the following example:

```
"Ms." + Last_Name
```

When MapInfo Professional evaluates this as part of an expression it places “Ms. ” in front of each last name. Note that the string constant (“Ms. ”) is in quotes. Similarly,

```
"Hello," + "world"
```

gives you “Hello, world.” And

```
"4"+"5"
```

gives you “45.”

Operators - Comparison Operators

Operators	Description
=	“equals”
<>	“not equals”
>	“greater than”
<	“less than”
>=	“greater than or equal to”
<=	“less than or equal to”

Numerical Comparison

Numerical comparisons are based on the numerical values of the expressions and numerical constants.

English: All rows where the household income is above \$65,000.

```
18. HH_INC>65000
```

Comment: Don't add the dollar sign or comma. MapInfo Professional doesn't know what to do with it and gives you an error message.

English: All rows where the median age is 42.

```
19. MED_AGE=42
```

Comment: This expression selects only those records where the median age is exactly 42. When your median age data contains a decimal portion (which is the case for MapInfo Professional-supplied demographic data) then it is unlikely that there are many regions with a median age of exactly 42.

The following expression gives you better results:

20. Round(MED_AGE, 1)=42

Comment: The function "round(*somenumber*, *somenumber*)" rounds the first number in the way specified by the second. In this example, the first number is the median age (MED_AGE) and the second is 1, indicating that median age is to be rounded to the nearest whole number.

English: All rows where the amount does not equal \$23,000.

21. AMOUNT<>23000

Comment: You might want to use the Round function, as in 10, if you are not concerned that the value be exactly 23000.

String Comparison

String comparisons are based on the exact character content of the string. In this case ">" means "alphabetically greater than" (i.e. comes after in the alphabet) and "<" means "alphabetically less than."

When typing a string into an expression, you should enclose it in quotes so that MapInfo Professional knows to treat it as a string, rather than treating it as a column name.

English: All rows where the vendor is Acme.

22. VENDOR="Acme"

Comment: Note that Acme is in quotes so that MapInfo Professional knows to treat it literally (as a character string) rather than to search for a column named Acme.

English: All rows where the vendor is not Acme.

23. VENDOR<>"Acme"

Date Comparison

English: All entries received on October 9, 1991.

24. RECEIVED="10-9-91"

Note: Consider these conventions:

- The date is enclosed in quotes
- It is in the form: Month, Day, Year
- The numbers in the data are separated by a hyphen or a slash (/)
- Two characters were used for the year. You can also use four characters (1991)

English: All received after October 9, 1991.

25. RECEIVED>"10-9-91"

Comment: This expression does not select those received on October 9, 1991. When you want them as well:

26. RECEIVED>="10-9-91"

English: Records for all received before August.

27. Month(RECEIVED)<8

Comment: This expression uses the Month function to extract the month in the date. It doesn't specify any particular year. When your database has records for several years, this expression does not pay attention to the particular year.

Logical Comparison

English: All that have shipped.

28. Shipped

Comment: The column "Shipped" is a logical column. It contains "T" for true, or yes, and "F" for false, or no. When an order is shipped, it is marked "T". Otherwise, it is not shipped. For orders that are shipped, expression 28 evaluates to true. For orders not shipped it evaluates to false.

English: All that have not shipped.

29. Str\$(Shipped)="F"

30. Not Shipped

Operators - Geographic Operators

MapInfo Professional has several geographic operators. Use them to select objects on the basis of their spatial relationship to some other object. MapInfo Professional has a special keyword you use with geographical operators: "obj" or "object". This keyword tells MapInfo Professional that it has to get values based on the graphical objects in the table rather than the tabular data.

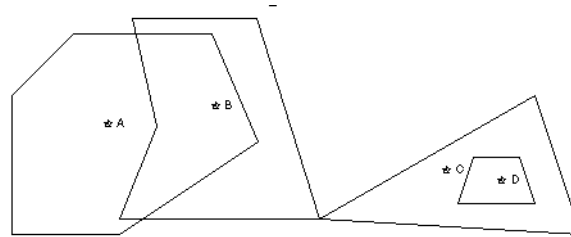
The geographic operators go between the objects being specified. Select the geographic operators from the Operators menu. Here are the geographic operators:

Contains	Object A Contains object B if B's centroid is anywhere within A's boundary.
Contains Entire	Object A Contains Entire object B if B's boundary is entirely within A's boundary.
Contains Part	Object A Contains Part object B if B's boundary is partly within A's boundary.
Within	Object A is Within object B if its centroid is inside B's boundary.
Entirely Within	Object A is Entirely Within object B if A's boundary is entirely within B's boundary.
Partly Within	Object A is Partly Within object B if A's boundary is partly within B's boundary.
Intersects	Object A Intersects object B if they have at least one point in common.

"Contains Part" and "Partly Within" are exactly equivalent to "Intersects" -- these are all treated the same way by MapInfo Professional, so the standard syntax "Intersects" is almost universally used.

"Contains" and "Within" are concerned only with objects' centroids.

"Contains Entire" and "Entirely Within" are concerned with the area covered by a region object; the location of the centroid doesn't matter.



M - Object Centroid

Thus, if A, B, C, and D are all *regions*:

Object A *contains* Object B

Object A *intersects* Object B

Object A *does not intersect* Object C

Object B *does not contain* Object A

Object B *intersects* Object A

Object B *intersects* Object C

Object C *contains* Object D

Object C *contains entire* Object D

Object C *intersects* Object D

Object D *does not contain* Object C

Object D *entirely within* Object C

If A, B, C, and D are all *polylines*, then the Contains and Within operators are not applicable, but:

Object B *intersects* Object A

Object B *intersects* Object C

Object C *does not intersect* Object D

Object D *does not intersect* Object C

Similarly, a polyline can not *contain* a point, but it can *intersect* a point; a point can not be *within* a polyline, but it can *intersect* a polyline.

Note: MapInfo Professional can perform a simple Contains or Within comparison more rapidly than a Contains Entire or Entirely Within. Therefore, unless you must be absolutely sure that objects are completely inside other objects you should use Contains and Within rather than Contains Entire or Entirely Within.

Operators - Logical Operators

Operator	Description
and	is "true" if (and only if) both of its arguments (the expressions it joins together) are true. A record must satisfy both of these conditions if it is to be selected.
or	is "true" if either one, or both, of its arguments (the expressions it joins together) are true. A record need satisfy only one of these conditions if it is to be selected. It is also selected if both of its conditions are satisfied.
not	is "true" if its argument (the expression it applies to) is false. A record is selected if it does not meet the stated condition.

"And", "or", and "not" are logical operators. You use them to combine expressions in Select and the Where Condition clause of SQL Select. MapInfo Professional treats each such expression as a test which it applies to each record in the table. For each test it gets a yes/no (true/false) answer. MapInfo Professional uses the logical operators to tell it how to combine the individual yes/no answers into an overall yes/no answer: Does the current record meet the selection condition?

Suppose you want to select all properties that are worth \$250,000 or more and are in Columbia county. Each record has to meet two criteria, each of which can be formulated as a simple expression:

- 31. VALUE >= 250000
- 32. COUNTY = "Columbia"

You could perform one selection for all properties worth \$250,000 or more. Then you could perform another selection on that result, looking for all properties in Columbia county. However, it is easier to combine the two operations into one using the logical operator "and".

- 33. COUNTY = "Columbia" and VALUE >= 250000

When MapInfo Professional examines a record to see whether or not it meets the condition set by this expression, it makes the two tests: Does COUNTY equal Columbia? Is the VALUE equal to or greater than 250000? When the answer to both of these questions is true (or yes), then the record is accepted into the current selection. When the answer to one or both of the questions is no (or false), then the record is not accepted into the current selection.

Now, what if you want all properties worth \$250,000 or more and not in Columbia county? You can use "not" to negate the first clause of expression 33, yielding expression 34:

- 34. not (COUNTY="Columbia") and VALUE>=250000

Only records where the county is not Columbia satisfy the first clause of expression 34. Now consider expression 35:

- 35. not (COUNTY="Columbia" and VALUE>=250000)

Expression 35 is simply the negation of expression 33. Any record that would satisfy 33 does not satisfy 35. Any record that does not satisfy 33 satisfies 35.

You can use "or" when you want to specify alternative conditions, such as:

- 36. COUNTY="Columbia" or COUNTY="Greene"

Any record evaluated against this condition is accepted if its county is any one of the two specified counties. One could, of course, use numerical tests as well. For example:

37. TOTAL_AREA>40 or VALUE>250000

This tests to see whether the area is greater than 40 or the value is greater than 250000. When either one is true of a record, then that record is accepted into the selection.

In formulating expressions using logical operators you have to be careful how you use them. The following expression, while it seems OK, does not work:

38. COUNTY="Columbia" or "Greene"

Judging from its English translation—COUNTY equals Columbia or Greene—this expression should operate just like expression 36 and give us any record containing Columbia County or Greene County. But the rules of computational logic and the rules of English are a bit different.

When MapInfo Professional reads expressions it reads them from left to right. One of the things it has to do is to determine how the items in the expression are grouped. Think of this operation as inserting parentheses into the expression. MapInfo Professional reads expression 35 as though it were grouped like expression 39, which is what we intend. It reads expression 38 as though it were grouped like 40, which is not at all what we want.

39. (COUNTY="Columbia") or (COUNTY="Greene")

40. (COUNTY="Columbia") or ("Greene")

Both 39 and 40 have the same first clause. But their second clauses (after the "or") are quite different. The second clause of 40 is simply a literal string, "Greene." By convention, MapInfo Professional evaluates a record against a literal string as being true if that record is not blank. When MapInfo Professional evaluates records against expression 40, all non-blank records are evaluated as true and be accepted into the selection. It does not make any difference how a record evaluates on the first clause. Any non-blank record evaluates as true on the second clause, and one "true" is all it takes to evaluate the entire expression as true.

Let us consider one final example, which is the negation of expression 36:

41. not (COUNTY="Greene" or COUNTY="Columbia")

Expression 39 is satisfied if the county is Greene or if it is Columbia, but not if it is Montgomery or Warren. Expression 41 is satisfied by any county other than Greene or Columbia, including Montgomery and Warren.

Numeric Clauses

English: All the household income is above \$65,000 and the median age is 42.

42. HH_INC>=65000 and Round(MED_AGE, 1)=42

Comment: This expression simply consists of two clauses. The clauses are connected by "and", that means that both clauses must be true of a record for it to be selected.

English: All with a price between \$50,000 and \$100,000.

43. PRICE>=50000 and PRICE<=100000

Comment: Now we are setting two conditions that a record must satisfy in order to be selected. By using the operators “greater than or equal to” (\geq) and “less than or equal to” (\leq) we ensure that the records with the exact prices of \$50,000 and \$100,000 are selected. When we had simply used “greater than” ($>$) and “less than” ($<$), the expression would select \$50,001 and \$99,999 but not \$50,000 or \$100,000.

English: All with a price between \$50,000 and \$100,000 or between \$150,000 and \$200,000.

44. $(PRICE \geq 50000 \text{ and } PRICE \leq 100000) \text{ or } (PRICE \geq 150000 \text{ and } PRICE \leq 200000)$

Comment: This expression has the overall form: $(expression1) \text{ or } (expression2)$. Each of these expressions has the same form as expression 36. When a row meets the condition specified by either $expression1$ or $expression2$, MapInfo Professional puts the row into the selection.

String Clauses

English: All customers from N to Q.

45. $LAST_NAME \geq "N" \text{ and } LAST_NAME < "R"$

Comment: The first part of the expression checks for names that are either alphabetically equal to “n” or that are alphabetically greater than (after) “n”. The second part of the expression checks for names that are alphabetically less than (before) “r”. Any name starting with letters “n” through “q” satisfies this condition.

English: All customers from N to Z.

Note: MapInfo Professional comparison operators for strings are not case-sensitive.

46. $LAST_NAME \geq "N"$

Comment: Since “z” is the last letter in the alphabet, there is no need to test for it. There cannot be any customers with a last name starting with some letter beyond “z”.

English: All customers whose last name begins with C.

47. $LAST_NAME \geq "C" \text{ and } LAST_NAME < "D"$

Comment: The logic of this expression is the same as the logic for expression 48.

English: All customers whose last name is between “Ce . . .” and “Cn . . .”

48. $LAST_NAME \geq "CE" \text{ and } LAST_NAME < "CO"$

Comment: The logic of this expression is the same as the logic for expression 46.

English: All not from Texas.

49. $\text{not } STATE = "TX"$

Comment: The expression causes MapInfo Professional to check the contents of the STATE column. When there is an entry other than “TX” the row is selected.

Date Clauses

English: Records for all received in August 1990

50. $\text{Month}(\text{RECEIVED}) = 8 \text{ and } \text{Year}(\text{RECEIVED}) = 1990$

Comment: In this expression we specify the year explicitly, using the “year(<somecolumn>)” function to extract it from the date.

51. RECEIVED>="8-1-90" and RECEIVED<="8-31-90"

Comment: In this expression we don't explicitly ask for month and year. Instead, we rethink a bit and use an expression that might more accurately be rendered in English as: Records for all received on or after August 1, 1990 and on or before August 31, 1990. The two expressions give equivalent results, but they are formulated differently.

English: Records for all received in July or September

52. Month(RECEIVED)=7 or Month(RECEIVED)=9

Comment: As in a previous example, no year for the dates. Depending on the data in your table and what you're trying to achieve, that may or may not be a problem. When you want to specify the year:

English: Records for all received in July or September of 1989

53. month(RECEIVED)=any(7, 9) and year(RECEIVED)=89

Comment: The first clause of this expression uses the keyword “any”. The first clause is satisfied if any of the items in parenthesis match the month received — in this case, the months of July and September.

Keywords

MapInfo Professional supports the use of keywords “any”, “all”, “in” and “between”. These keywords must be typed into expressions.

Use “any” to select any item in a set of items.

54. ABBR = any(“AL”, “MN”, “TX”)

Expression 54 is true of any record where the state is Alabama, Minnesota, or Texas.

To understand the use of “all” consider expression 55:

55. ABBR <> all(“AL”, “MN”, “TX”)

This statement says: Give me all orders where the state does not equal Alabama, Minnesota, or Texas. It selects all orders *except* those from Alabama, Minnesota or Texas. Consider what would happen if we issued 56:

56. ABBR <> any(“AL”, “MN”, “TX”)

Orders from Alabama would be selected because they are not from either Minnesota or Texas; and orders from Minnesota and Texas would be selected for a similar reason.

This example, shows the use of “in”:

57. ABBR in(“AL”, “MN”, “TX”)

This produces the same result as 54.

Note that “in” is equivalent to “=any” and “not in” is equivalent to “<>all”.

Finally, consider 58 and 59, which illustrate “between”:

58. PRICE between 50000 and 100000

59. (PRICE between 50000 and 100000) or (PRICE between 150000 and 200000)

These are equivalent to expressions 43 and 44 respectively. You can also use between with character strings (such as are in examples 48, 50, and 51).

Operator Precedence

When MapInfo Professional evaluates expressions it needs to know which components of an expression to evaluate first. This is called precedence. By convention, certain operators are assigned different levels of precedence. Those with the highest level are evaluated first. The following table lists MapInfo Professional's operators in the order in which they are evaluated. Operators at the same level of precedence are evaluated from left to right. Exponentiation evaluates from the right. This affects expressions with multiple exponents: $2^{-3^{-4}} = 2^{-(3^{-4})}$

Highest Priority:

- parenthesis
- exponentiation
- negation
- multiplication, division
- addition, subtraction
- geographic operators
- comparison operators
- Not
- And

Lowest Priority:

- Or

For example, the expression $3+4*2$ produces a result of 11. That is because multiplication has a higher precedence than addition and is performed first, in effect:

```
3+4*2=
3+8=
11
```

We can add parenthesis to force MapInfo Professional to do the addition first:

```
(3+4)*2=
7*2=
14
```

Now consider expression 60, which is intended to select all records July or September of 1989.

60. year(RECEIVED)=89 and month(RECEIVED)=7 or month(RECEIVED)=9

Because "and" has higher precedence than "or", MapInfo Professional treats this expression as though "year(RECEIVED)=89 and month(RECEIVED)=7" was enclosed in parentheses.

61. (year(RECEIVED)=89 and month(RECEIVED)=7) or month(RECEIVED)=9

In this case, any record for July of 89 or for September of any year would be selected. That's probably not what you want. However, by adding parentheses to the second expression, you can get what you want:

62. `year(RECEIVED)=89 and (month(RECEIVED)=7 or month(RECEIVED)=9)`

In this expression, the parentheses tell MapInfo Professional that “month(RECEIVED)=7” and “month(RECEIVED)=9” are alternatives in the second clause of the expression. MapInfo Professional treats this the same as it treats number 53 above.

Note: When you are not sure how MapInfo Professional evaluates an expression with several operators, you should use parentheses to group elements as you want them.

Functions

Functions take data values and perform some operation on them to produce a new value.

Functions have the following form:

`SomeFunction(parameters)`

Most of MapInfo Professional's functions take one or two parameters. A parameter can be a column or it can be another expression.

MapInfo Professional uses the keyword “obj” or “object” with the geographic functions: Area, CentroidX, CentroidY, ObjectLen, Perimeter. This keyword tells MapInfo Professional that it has to get values based on the graphical objects in the table rather than the tabular data.

Abs

Syntax: `Abs(num_expr)`

Action: Returns the absolute value of a numerical expression. When the expression has a value greater than zero, Abs returns that value. When the expression has a value less than zero, Abs returns a value equal to the value of the expression multiplied by negative one.

Example: Consider the following expression:

63. `Abs(numA-numB)`

(returns the absolute difference between numA and numB, regardless of which is larger)

The following illustrates how Abs works:

`Abs(5) = 5`

`Abs(-3) = 3`

`Abs(-0.02) = 0.02`

Area

Syntax: `Area(obj, units)`

Action: Returns the area of the object. 0 is returned if the object has no area or there is no object for the record. Arcs, text, points, lines, and polylines do not have areas.

When you choose Area from a menu the “obj” keyword is placed between the parentheses along with the current unit in double-quotes. In most cases the current unit is square miles. When you want area to be in some other unit, you should type the unit in, between quotes.

The units available are:	Unit Name
square miles	"sq mi"
square kilometers	"sq km"
square inches	"sq in"
square feet	"sq ft"
square survey feet	"sq survey ft"
square yards	"sq yd"
square millimeters	"sq mm"
square centimeters	"sq cm"
square meters	"sq m"
square chains	"sq ch"
square links	"sq li"
square rods	"sq rd"
perches	"perch"
roods	"rood"
acres	"acre"
hectares	"hectare"

Examples: To select all rows for objects that have an area greater than 59 square miles:

64. `Area(obj,"sq mi")>59`

To calculate the population density for an object:

65. `Population/Area(obj,"sq mi")`

To select all rows for objects with a population density less than 250 people per unit area:

66. `Population/Area(obj,"sq mi")<250`

When you want the area in hectares:

67. `Area(obj,"hectare")`

When you want the area in square kilometers:

68. `Area(obj,"sq km")`

CentroidX

Syntax: `CentroidX(object)`

Action: Returns the x coordinate of the centroid of the object, which is the longitude value for earth maps. The centroid is usually the center of the object's minimum bounding rectangle (MBR).

The value is in decimal degrees if the coordinates are latitudes and longitudes. The value is in whatever units were specified for the table if its coordinates are not latitudes and longitudes.

Examples: To select all objects west of New York City:

69. CentroidX(obj)<-73.997890

To select all objects east of New York City:

70. CentroidX(obj)>-73.997890

CentroidY

Syntax: CentroidY(object)

Action: Returns the y centroid of the object, which is the latitude value for earth maps.

The value is in decimal degrees if the coordinates are latitudes and longitudes. The value is in whatever units were specified for the table if its coordinates are not latitudes and longitudes.

Examples: To select all objects north of New York City:

71. CentroidY(obj)>40.750450

To select all objects south of New York City:

72. CentroidY(obj)<40.750450

To select all objects northeast of New York City:

73. CentroidX(obj)>-73.997890 and CentroidY(obj)>40.750450

The first clause in the expression selects objects east of New York City while the second clause in the expression selects objects north of New York City. Because the two clauses are joined by “and” an object must satisfy both clauses to be selected.

To select all objects that are either north or east of New York City:

74. CentroidX(obj)>-73.997890 or CentroidY(obj)>40.750450

The first clause in the expression selects objects east of New York City while the second clause in the expression selects objects north of New York City. Because the two clauses are joined by “or” an object needs to satisfy only one of them in order to be selected.

Chr\$

Syntax: Chr\$(*num_expr*)

Action: Chr\$ interprets the value of *num_expr* as a character value. It returns the character corresponding to that value. Accordingly, *num_expr* should be an integer between 0 and 255.

Example: You might want to have labels with information on two lines. You can use Chr\$ to insert a carriage return into a label expression. The ANSI value for a carriage return is 13. Assume that you want the first line of a label to be a country name and the second line of a label to be the county population.

The following expression produces that result:

75. Proper\$(County)+Chr\$(13)+Population

Note: Some BASIC languages use the convention Chr\$(10) to represent a line feed. MapBasic allows you to specify either Chr\$(13) or Chr\$(10).

Cos

Syntax: Cos(*num_expr*)

Action: The Cos function returns the cosine of the value of a numeric expression, where that expression represents an angle expressed in radians.

CurDate

Syntax: CurDate()

Action: Returns a date value representing the current date.

Examples: To enter the current date into a column:

76. CurDate()

You might use this in conjunction with Update Column where you want to enter the current date into some column.

To select all received 30 or more days ago:

77. Received<=CurDate()-30

Day

Syntax: Day(*datefield*)

Action: Returns the day of the month from the date. The day is represented as an integer from one (1) to thirty-one (31).

Examples: To select all rows where the date is the first of the month:

78. Day(date)=1

To select all rows where the day is Friday and the date is not the thirteenth:

79. Weekday(date)=6 and Day(date)<>13

This expression has two clauses. The first clause uses the Weekday function to select records where the day of the week is a Friday. The second clause uses the Day function to select records where the day of the month does not equal (<>) 13. Since the two clauses are connected by "and" both clauses must be true for a row to be selected.

Distance

Syntax: Distance(*x1, y1, x2, y2, units*)

x1 and x2 are East-West (Longitude) coordinates for earth maps

y1 and y2 are North-South (Latitude) coordinates for earth maps

Units is the current distance unit

Action: Calculates the distance between two points.

When you choose Distance from a menu the "obj" keyword is placed between the parentheses along with the current unit in double-quotes. In most cases the current unit is miles.

When you want distance to be in some other unit, you should type the unit in, between quotes. The units available are:

Unit Name	Unit Represented
"mi"	miles
"km"	kilometers
"in"	inches
"ft"	feet
"survey ft"	survey feet
"li"	links
"rd"	rods
"ch"	chains
"yd"	yards
"mm"	millimeters
"cm"	centimeters
"m"	meters
"nmi"	nautical miles (1 nautical mile represents 1852 meters)

Examples: To calculate the distance between some objects and New York City, located at -73.997890 longitude and 40.750450 latitude:

80. Distance(-73.997890, 40.750450, CentroidX(obj), CentroidY(obj),"mi")

To select all objects west of New York and not more than 20 miles from it:

81. CentroidX(obj)<-73.997890 and Distance(-73.997890, 40.750450, CentroidX(obj), CentroidY(obj),"mi")<=20

This expression has two clauses. The first clause specifies that an object must be west of New York to be selected. The second clause specifies that an object must be no more than twenty miles from New York in order to be selected. Since the two clauses are connected by "and" both must be true if an object is to be selected.

Format\$

Syntax: Format\$ (*value*, *pattern*)

value is a numeric expression

pattern is a string that specifies how to format the results

Action: Produces a string representation of the numeric value *num_expr*.

Examples: The Format\$ () function produces a specially-formatted character string that incorporates a numeric value (specified by the *value* parameter). The Format\$ () function can embed a variety of formatting characters (e.g. currency symbols such as \$, %, periods, and

commas) to make the result string more readable or more aesthetically pleasing. Given a numeric value such as 12345.67, your program can use the Format\$() function to produce formatted results, such as \$12,345.67.

The Format\$() function's *value* parameter represents the numeric value that you want to format. The *pattern* parameter is a string of code characters, carefully chosen (by you) to produce a particular type of formatted result. The *pattern* string should include one or more special format characters, such as #, 0, %, the comma character, the period, or the semicolon character; these characters control how the results looks. The *pattern* string can also include one or more cosmetic characters, such as \$, -, (, or), to make the results more attractive.

The next table summarizes the format characters.

Pattern Control Characters	Role in formatting results
#	The result includes one or more digits from the value. However, if the control string contains one or more # characters to the left of the decimal place, and the value is between zero and one, the formatted result string may not include a zero before the decimal place.
0	A digit placeholder similar to the # character; however, if the control string contains one or more 0 characters to the left of the decimal place, and the value is between zero and one, the formatted result string includes a zero before the decimal place.
.	The period character is used in conjunction with the # character. When the pattern string includes a period character, then the number of # characters to the right of the period dictates the number of decimal places that the result string displays.
,	When you include a comma character before the first # character, the result string includes a comma every three digits to the left of the decimal place. The number ten million would appear as "10,000,000" rather than "10000000".
%	The result represents the value multiplied by one hundred; a value of 0.75 produces a result string of "75%". When you wish to include a percent sign in your result, but you do not want MapBasic to multiply the value by one hundred, place a \ (backslash) character before the percent sign.
E+	The result is formatted according to scientific notation; for example, the value 1234 produce the result "1.234e+03". When the exponent is positive, a plus sign appears after the "e". When the exponent is negative (which is the case for fractional numbers), a minus sign appears after the "e".
E-	This string of control characters functions just as the "E+" string, except that the result never shows a plus sign following the "e".
;	By including a semicolon in your pattern string, you can specify one format for positive numbers and another format for negative numbers. The semicolon should appear after the first set of format characters, and before the second set of format characters. The second set of format characters applies to negative numbers. If the pattern string includes a <i>second</i> semicolon, the third format string (following the second semicolon) will be used to format the special-case value of 0 (zero).

Pattern Control Characters	Role in formatting results
-	When your pattern string includes both positive and negative formats in this fashion, the result does not automatically include a minus sign. When you wish to include a minus sign in the results, you should include a "-" character in the second set of format characters. See examples in next table.
\	When the backslash character appears in a pattern string, MapBasic does not perform any special processing for the character that follows the backslash. This allows you to include special characters (such as the percent sign) in the results, without causing the special formatting actions described above.

In the next table, the left column shows sample strings that you could use as the Format\$() function's *pattern* parameter. The middle column shows sample numbers, such as you might use as the *value* parameter. The right column shows the results that Format\$() would return, given the parameters from the left columns.

Pattern	Value Parameter	Format\$() Returns:
“,#”	12345	”12,345”
“,#”	-12345	”-12,345”
“\$#”	12345	”\$12345”
“\$#”	-12345	”-\$12345”
“\$,#”	12345	”\$12,345”
“\$,#”	-12345	”-\$12,345”
“\$,###”	12345.678	”\$12,345.68”
“\$,###”	-12345.678	”-\$12,345.68”
“\$,###;(\$,###)”	12345.678	”\$12,345.68”
“\$,###;(\$,###)”	-12345.678	”(\$12,345.68)”
“,####”	12345.6789	”12,345.679”
“,#. #”	12345.6789	”12,345.7”
“#. #”	12345.6789	”12345.7”
“#.###E+##”	12345.6789	”1.235e+04”
“#.###E+##”	-12345.6789	”-1.235e+04”
“#.###E+##”	0.054321	”5.432e-02”
“#.###E-##”	12345.6789	”1.235e04”
“#.###E-##”	0.054321	”5.432e-02”

Pattern	Value Parameter	Format\$() Returns:
"#%"	0.054321	"5%"
"###%"	0.054321	"5.43%"
"#\%"	0.054321	".05%"
"0.\%"	0.054321	"0.05%"

InStr

Syntax: InStr(*position*, *string*, *substring*)

Action: InStr tests whether or not some *string* has a specific *substring*. MapInfo Professional searches *string* starting at the character position specified by *position*. When *position* is one, MapInfo Professional starts searching at the beginning of *string*. When it has the value 6, MapInfo Professional starts searching at the sixth character in *string*.

When *string* contains *substring*, InStr returns the character position where *substring* starts.

Note: When *string* does not contain *substring*, InStr returns zero.

Example: You are preparing to geocode a file and you want to identify all the entries with Post Office boxes for addresses. That means you want all entries that have the string "box" in their address column. They may also have "P.O.", but you cannot be sure of that. Nor can you be sure of how "box" is capitalized in the entries. Here is your expression:

82. InStr(1,UCase\$(ADDRESS),"BOX")>0

This expression directs MapInfo Professional to search the Address column for the string "BOX". All entries containing this string are selected.

For example, *if* your data looks like this:

"This is a test of the insert function."

You want to find the position of "test." The INSTR function will look like this:

INSTR(1,"This is a test of the insert function", "test")

When this statement is executed, the value 11 will be returned.

Note: If the string that you are searching for does not exist, the value 0 will be returned.

Int

Syntax: Int(*num_expr*)

Action: Returns the nearest integer that is less than or equal to the specified value (*num_expr*).

Examples: The following table shows how Int treats various values:

Number	Int(Number)
5.2	5
5.999	5
-7.8	-8

Number	Int(Number)
-7.2	-8

When you apply Int to a Logical variable type, it will produce a 1 if the Logical value is TRUE, or 0 if the Logical value is FALSE.

It is also possible to evaluate logical expressions with Int. For example,

83. Int(STATE_NAME="Maine")

returns an integer value of 1 if the State_Name column or variable contains the string "Maine", or an integer value of 0 if State_Name contains any other string value.

LCASE\$

Syntax: LCASE\$(*string*)

Action: Returns the lower case of the string.

Examples: Consider the following expression:

84. LCASE\$(CITY)

The following table shows how LCASE\$ converts an input string (from a column in your table) into a returned string:

Input String	Returned String
NEW YORK	new york
New york	new york
new york	new york

LEFT\$

Syntax: LEFT\$(*string*, *number*)

Action: Returns a string that consists of the leftmost *number* of characters in *string*.

Examples: Consider the following expression:

85. LEFT\$(CITY,5)

The following table shows how that expression converts an input string into a returned string:

Input String	Returned String
New York City	New Y
Denver	Denve
Singapore	Singa

Now consider the following expression, where Phone is a column containing telephone numbers prefixed by area codes:

86. LEFT\$(PHONE,3)="404"

This expression selects all rows where the first three digits of the phone number are “404”. Note that the Phone column contains character data and therefore the comparison value, 404, has to be in quotes so MapInfo Professional knows to treat it as a character string.

see *also*: Right\$, Mid\$

Len

Syntax: Len(*string*)

Action: Returns the number of characters in a string.

LTrim\$

Syntax: LTrim\$(*string*)

Action: LTrim\$ removes any non-printing characters (e.g. spaces, TABs) from the beginning of *string*.

see *also*: RTrim\$

Maximum

Syntax: Maximum(*num_expr*, *num_expr*)

Action: Maximum returns the larger of two numbers.

Example: To find the highest address number for a street segment in a StreetPro file:

87. Maximum(TOLEFT,TORIGHT)

ToLeft is the highest address number on the left side of a segment and ToRight is the highest address number of the right side of a segment.

Mid\$

Syntax: Mid\$(*string*, *position*, *length*)

string is a character expression

position is an integer indicating a starting position in *string*

length is an integer indicating the number of characters to extract

Action: Mid\$ returns a string of a set *length*, starting at given *position*, in a specified *string*.

Examples: Consider the following expression:

88. Mid\$(CITY,5,4)

The following table shows how that expression converts an input string into a returned string:

Input String	Returned String
New York City	York
Denver	er
Singapore	apor

Note: The expression only returned two characters from “Denver”. That is because “Denver” is too short to have a four-character string starting at its fifth character.

Minimum

Syntax: `Minimum(num_expr, num_expr)`

Action: Minimum returns the smaller of two numbers.

Examples: To find the lowest address number for a street segment in a StreetPro file:

89. `Minimum(FROMLEFT, FROMRIGHT)`

FromLeft is the highest address number on the left side of a segment and FromRight is the highest address number of the right side of a segment.

Month

Syntax: `Month(datefield)`

Action: Returns the month of the date as a number, 1 through 12.

Examples: To select all received in August:

90. `Month(received)=8`

To select all received before August:

91. `Month(received)<8`

To select all received in August 1990:

92. `Month(received)=8 and Year(received)=1990`

This expression has two clauses. The first specifies that the month must be August and the second that the year must be 1990. The clauses are connected by the AND operator and so both must be True for a row to be selected.

To select all received in August or September:

93. `Month(received)=8 or Month(received)=9`

This expression has two clauses. The first selects rows where the month is August and the second selects rows where the month is September. Since the clauses are connected by “or” only one must be True for a row to be selected.

To select all received in August or September:

94. `Month(received)=any(8,9)`

This expression achieves the same result as 92, but is formulated using the keyword “any”.

To select all received in August or September of 1990:

95. `Month(received)=any(8,9) and Year(received)=1990`

This expression has two clauses. The first selects rows where the month is August or September and the second selects rows where the year is 1990. The clauses are connected by the AND operator and so both must be True for a row to be selected.

ObjectLen

Syntax: ObjectLen(*obj*, *unit*)

Action: Returns the length of lines and polylines. Returns a value of 0 for other objects.

When you choose ObjectLen from a menu place the “obj” keyword between the parentheses along with the current unit in double-quotes. In most cases the current unit is miles. When you want length to be in some other unit, type the unit using double quotes. The units available are:

Unit Name	Unit Represented
“mi”	miles
“km”	kilometers
“in”	inches
“ft”	feet
“survey ft”	survey feet
“yd”	yards
“mm”	millimeters
“cm”	centimeters
“li”	links
“rd”	rods
“ch”	chains
“m”	meters
“nmi”	nautical miles (1 nautical mile = 1852 meters)

Examples: To calculate the length of an object:

96. ObjectLen(obj, “mi”)

To have the length calculated in kilometers:

97. ObjectLen(obj, “km”)

To have the length calculated in nautical miles:

98. ObjectLen(obj, “nmi”)

When you wanted to convert from kilometers to miles you would use a conversion factor of .621.

To select all objects more than 10 miles long:

99. ObjectLen(obj, “mi”)>10

Perimeter

Syntax: `Perimeter(obj, unit)`

Action: Returns the perimeter of the object for regions, ellipses, rectangles, and rounded rectangles. When you choose Perimeter from a menu the “obj” keyword is placed between the parentheses along with the current unit in double-quotes. In most cases the current unit is miles.

When you want perimeter to be in some other unit, you should type the unit using double quotes. See the table above for the available units.

Examples: To calculate the perimeter of an object:

100.`Perimeter(obj, “mi”)`

To calculate the perimeter in kilometers:

101.`Perimeter(obj, “km”)`

To calculate the Perimeter in meters”

102.`Perimeter(obj, “m”)`

To select all objects with a perimeter greater than 35 miles long:

103.`Perimeter(obj, “mi”)>35`

Proper\$

Syntax: `Proper$(string)`

Action: Returns a string that has the first letter of each word capitalized and all other letters lowercase.

Examples: Consider the following expression:

104.`Proper$(CITY)`

This table shows how the Proper\$ function reformats a column in your table:

Original text	Reformatted text
NEW YORK	New York
New yorK	New York
new york	New York
New York	New York

Right\$()

Syntax: `Right$(string_expr, num_expr)`

Action: Returns part or all of a string beginning at the right end of the string.

Example:

105.`Right$(CITY, 4)`

The following table shows how that expression converts an input string into a returned string:

Input String	Returned String
New York City	City
Denver	nver
Singapore	pore

see also: Left\$, Mid\$

Round

Syntax: Round(*number1*, *number2*)

Action: Returns the rounded *number1*. *number2* specifies how to round it.

Examples: Consider the following expression:

106.Round(*number1*,*number2*)

The next table gives examples. The first column contains the function arguments (*number1*, *number2*) and the second column contains the rounded result.

Arguments	Rounded Number
14347,10000	10000
14347, 100	14300
14347, 10	14350
12.18353, .1	12.20000
12.18353, .001	12.18400

To select all rows where the median age is 42, you might use the following expression:

107.Round(MED_AGE, 1)=42

Depending on your data, this expression may give better results than one that compares median age directly with a target value (MED_AGE=42). The median age column in MapInfo Professional's STATES table has the median age calculated to one decimal place. When we compare those values directly with 42 MapInfo Professional would not select records where the median age is, for example, 41.7, 42.1, or 42.4. Yet we probably want those records. By rounding the median age value to a whole number, we can get those values.

RTrim\$

Syntax: RTrim\$(*string*)

Action: RTrim\$ removes any white-space characters (e.g. spaces, and TABs) from the end of *string*.

see also: LTrim\$

Sin

Syntax: Sin(*num_expr*)

Action: The Sin function returns the sine of the value of a numeric expression, where that expression represents an angle expressed in radians.

Str\$

Syntax: Str\$(*expr*)

Action: Str\$ converts a numerical expression into a string that represents it. When the numerical expression is negative the first character in the string will be a negative sign (-). The first character returned for a positive value is the *first number*. If the expression is an object, Str\$() returns a string describing the type of object (e.g., "region"). If the expression is a Logical (true/false) value, Str\$ returns "T" for true or "F" for false.

When applied to a Float variable type, Str\$ will produce a text string representing the floating-point number rounded to:

- Six digits of precision (total of 6 non-zero digits, including any number of leading or trailing zeroes depending on the location of the decimal point) *if the number is less than 100,000*.
- The nearest .01 (hundredth) *if the number is greater than 100,000*.

To control the number of digits of accuracy displayed in a string, use the Format\$() function.

UCase\$

Syntax: UCase\$(*string*)

Action: Returns the upper case of the string.

Examples: Consider the following expression:

108.UCase\$(CITY)

This table shows how it converts an input string (from a column in your table) into a returned string:

Input String	Returned String
NEW YORK	NEW YORK
New yorK	NEW YORK
new york	NEW YORK

see *also*: Lcase\$, Proper\$

Val

Syntax: Val(*char_expr*)

Action: The Val function extracts a numerical value from a character expression. It ignores any tabs, spaces, and line feeds at the start of a string and then tries to interpret the first sequence of numeric characters as a numerical value. It stops processing the string as soon as it finds a non-numeric character.

Note: Except that it will also accept a minus (hyphen) sign and a decimal point (period), e.g., Val ("-9.9") = -9.9. When the first character after initial tabs, spaces, and line feeds is not a numeric character, Val returns a value of zero.

Examples: The following table illustrates how Val extracts a numerical value from an input string:

char_expr	Val(char_expr)
12 thousand	12
52 - 62 Brunswick	52
Eighteen	0
Box 239	0

Weekday

Syntax: *Weekday(datefield)*

Action: Returns the day of the week from the data. The day is given as a number between 1 and 7. 1 is Sunday and 7 is Saturday.

Examples: To select all rows where the weekday is Wednesday:

109.Weekday(date)=4

To select all rows where the weekday is Wednesday, Thursday, or Friday:

110.Weekday(date)=any(4,5,6)

The “any” keyword directs MapInfo Professional to select any row where the week day is one of the specified days.

To select all rows where the day is Friday and the month is July:

111.Weekday(date)=6 and Month(date)=7

This expression has two clauses. The first clause uses the Weekday function to select records where the day of the week is a Friday. The second clause uses the Month function to select records where the month is July. Since the two clauses are connected by the AND operator, both clauses must be True for a row to be selected.

Year

Syntax: *Year(datefield)*

Action: Returns the year of the date.

Examples: To find all orders received in 1990:

112.Year(date)=1990

To find all orders received in 1990 or 1991:

113.Year(date)=any(1990,1991)

To find all orders received between 1985 and 1990, including those orders received in 1985 and 1990:

114.Year(date)>=1985 and Year(date)<=1990

This expression has two clauses. The first selects all rows where the date is 1985 or greater. The second clause selects all rows where the date is 1990 or less. Both clauses must be satisfied for a row to be selected.

Working with the MapBasic Window

This section allows advanced MapInfo Professional® users to go behind the scenes and take advantage of functions that enhance the use of MapInfo Professional through the MapBasic window. MapBasic® is MapInfo Professional's programming language that allows you to customize and automate MapInfo Professional functionality. When MapBasic was created, the MapBasic Window feature was added to MapInfo Professional as a means of testing and debugging code for an application. It became apparent that the MapBasic window is also a useful tool to MapInfo Professional users for doing certain tasks such as complex selections and queries based on object information.

The MapBasic window is limited to selected commands from the MapBasic programming language. The MapBasic window can take commands line by line. It does not include the capability for looping, interapplication communication, and other more complex commands. If you find yourself using the MapBasic window often, you may want to consider transferring your code to a MapBasic application that will automate the process.

The MapBasic *Reference* is available as a PDF file on the MapInfo Professional CD. Refer to the Reference for more complete information on the statements used in this chapter. You can also find the listing of MapBasic defines (MAPBASIC.DEF) in the Appendix C of the MapBasic *Reference Guide*. Owners of MapBasic have complete printed documentation for all statements and functions included in the language.

Accessing the MapBasic Window

To access the MapBasic window, on the **OPTIONS** menu, click **SHOW MAPBASIC WINDOW**. The MapBasic window displays on your screen. As with any other window, you may resize it or move it to a new location. The window allows you to enter MapBasic code or to view MapBasic code as it is generated by MapInfo Professional.

To see how MapInfo Professional carries out a select statement:

1. Open the MapBasic window and then open the **WORLD** table.
2. On the **QUERY** menu, click **SELECT**.
3. Type in the expression `POP_1994 > 1000000`. Make sure that the Browse Results box is checked.
4. Click **OK**. The syntax for these commands appears in the MapBasic window as follows:

```
Open Table "C:\MAPINFO\DATA\WORLD\WORLD.tab" Interactive
Map From World
select * from World where Pop_1994 > 1000000 into Selection
browse * from Selection
```

The first line is a result of opening the **WORLD** table. The second line of code is written automatically because the **WORLD** table displays in a Map window by default. The third line is the syntax for the select statement. The fourth line is the result of checking the Browse results box.

You can also enter MapBasic commands into the MapBasic window. Position your cursor under the browse from Selection line. Type the following:

```
Map from Selection
```

Press **ENTER** after the line, and the command executes. You should see your selection displayed in a Map window.

As stated before, the MapBasic window was primarily designed to assist MapBasic programmers. You can statements and functions in the MapBasic window such as Buffer() function or Insert statement.

Refer to the MapBasic *Reference Guide* in an easy to navigate PDF format on the MapInfo Professional CD to find the appropriate usage and syntax for these statements and functions. It provides a comprehensive guide to MapBasic programming statements and functions along with examples. Choose the appropriate option from the CD Browser to access the Reference.

Examples of MapBasic Programs

This section shows examples of MapBasic programs you can use to enhance your maps.

Converting a Table of Coordinates to a Table of Lines

The following steps can be used to create lines for each record in a table. You must have a column for each of the necessary coordinates. It is suggested that you make any changes on a copy of your table. If there are already objects in a Map window for this table, they will be lost.

1. On the **OPTIONS** menu, click **SHOW MAPBASIC WINDOW**. The MapBasic window appears on the screen.
2. Type the following command in the window:

```
update point_table set obj=createline(Start_X, Start_Y,End_X,End_Y)
```

Where `point_table` is the copy of your original table, `Start_X` is the column containing the first X coordinate, `Start_Y` is the column containing the first Y coordinate, `End_X` is the column containing the second X coordinate, and `End_Y` is the column containing the second Y coordinate. These columns will be the names that you have already specified in your table.

MapInfo Professional will go row by row through your table and create a line object based on the information in that row. You will not see a change in the table until you redraw the window or open a new Map window for it.

Troubleshooting (Converting a Table of Coordinates to a Table of Lines)

Before you proceed with the update make sure that the table in which the lines will be stored is mappable. To make the table mappable, on the **TABLE** menu, point to **MAINTENANCE** and click **TABLE STRUCTURE** and check the **TABLE IS MAPPABLE** box.

If your map is projected, the line objects may not be created properly. To work around this situation, see the Set Coordsys statement in the MapBasic *Reference* to change the MapBasic coordinate system.

Creating Circles Around Points Using the MapBasic Window

The following `createcircle` command can be used to convert a table of points to a table of circular regions. This command is similar to creating buffers on a point layer. It differs, however, from buffering in that it actually converts the point objects into circles. It is suggested that you make any changes on a copy of your table. If there are already objects in a Map window for this table, they will be lost.

1. On the **OPTIONS** menu, click **SHOW MAPBASIC WINDOW**.
2. Type the following line in the window (all on one line):

```
update tablename set  
obj=createcircle(centroidx(obj),centroidy(obj),radius)
```

Where *tablename* is the name of the copy of the table, and *radius* is the radius of the circle in current system units.

The table will then be automatically updated.

Troubleshooting (Creating Circles Around Points Using the MapBasic Window)

This command modifies the object column of your table. The command replaces the point object with circular objects. If you wish to undo this operation, make sure the Map window is active on the **EDIT** menu, click **UNDO** or on the **FILE** menu, click **REVERT TABLE** and revert the table to the last time it was saved.

The final parameter in the MapBasic command, 10 in this example, is the radius of the newly created buffers, in miles. This figure is adjustable. If you perform the command and find that the radius is too small or too large, perform the command again, with a different radius.

If your map is projected, the circular objects may not be created properly.

If you wish to convert a table of circular objects back to a table of points, run the MapBasic command:

```
Update tablename set obj=Buffer(obj,smoothness,distance,units)
```

Using the ObjectInfo Function to Describe Graphical Object Types

The `ObjectInfo` command is used to return the type of graphic object associated with each row. Each object type is represented by a small integer. MapInfo Professional has 12 types of objects. They are listed in the `ObjectInfo` function section in the MapBasic *Reference*.

To determine the different types of objects in a single layer, do the following:

1. On the **OPTIONS** menu, click **SHOW MAPBASIC WINDOW** to display the MapBasic window.
2. Enter the following SQL Select command:

```
Select ObjectInfo (obj,1) from tablename
```

Where *obj* refers to the object associated with the row of the table, *1* is the code to return the object type, and *tablename* is your table.

3. On the **WINDOW** menu, click **NEW BROWSER WINDOW**.
4. Choose to browse selection. A list of the number codes for each object type appear.

Selecting All Records of a Specific Object Type

1. On the **OPTIONS** menu, click **SHOW MAPBASIC WINDOW**.
2. Type the following SQL Select statement:

```
Select * from tablename where str$(obj)="objecttype"
```

Where *tablename* is your table and *objecttype* is the type of object you wish to select. To determine the type of an object, double-click the object. A dialog box displays with the region type listed.

3. Choose to browse or map the selection of these objects. You can also search for other types of objects including regions, arcs, lines, ellipses, rectangles, points, and polylines.

Selecting Streets by Color Using SQL Select

To select all streets from a StreetPro file by the width, pattern, and color of the line segment, do the following:

1. With your street file open, on the **OPTIONS** menu, click **SHOW MAPBASIC WINDOW**. The MapBasic Window displays on the screen.
2. To select thin red lines, type the following:

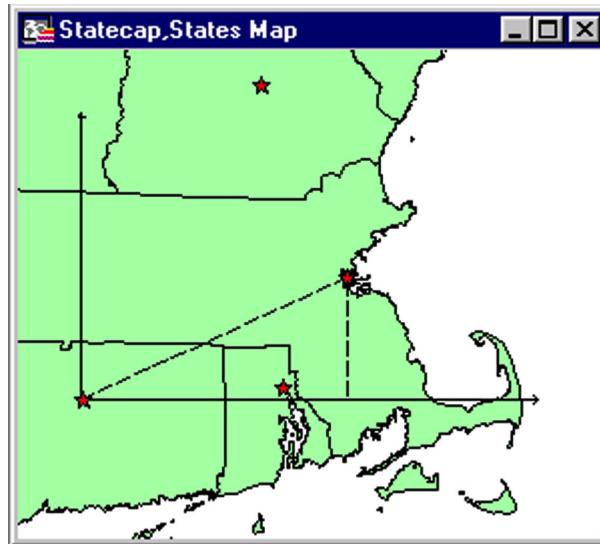
```
Str$(ObjectInfo(obj,2))="Pen (2, 2, 16711680)"
```

Finding the Angle from a Horizontal

The following procedure finds the angle (angle A in the next example) between a line that connects two given points and a horizontal line. This is done by creating a right triangle where the hypotenuse is the line between the two points and the adjacent is the line between the origin point and a point on the horizontal directly below or above the destination point. After you find the hypotenuse and adjacent distances, you can find the angle by taking the arc cosine of the adjacent divided by the hypotenuse.

Note: The angle will be calculated using a Cartesian coordinate system. For some projections, a calculated 90 degree angle may be obviously different from a "right angle" on the projected map.

The two points will be referred to as the origin and the destination. The origin is the point that is on the horizontal line. The destination is the other point. In the next example, Hartford is the origin. It lies on the imaginary horizontal line. Boston is the destination. The hypotenuse is the distance from Hartford to Boston; the adjacent is the distance from Hartford to the point where the horizontal intersects the vertical dotted line that passes through Boston.



1. On the **OPTIONS** menu, click **SHOW MAPBASIC WINDOW** and open the MapBasic window.
2. Double-click the origin point (Hartford). MapInfo Professional opens a Point Object window that shows the coordinate information. Write down the X and Y coordinates. These coordinates will be referred to as OriginX and OriginY.
3. Double-click the destination point (Boston). MapInfo Professional opens a Point Object window that shows the coordinate information. Write down the X and Y coordinates. These coordinates will be referred to as DestX and DestY.
4. In the MapBasic Window, type and run the following command:

```
Print Distance(OriginX, OriginY, DestX, DestY, "mi")
```

Substitute the values you find in step 2 and 3 for OriginX, OriginY, DestX, and DestY. MapInfo Professional returns the distance between the origin and destination points in a Message window. The value is the hypotenuse of the triangle.

5. In the MapBasic window, type and run the following command:

```
Print Distance(OriginX, OriginY, DestX, OriginY, "mi")
```

Substitute the values you find in step 2 and 3 for OriginX, OriginY, DestX and DestY. MapInfo Professional returns the distance between the origin and a point on the horizontal directly below the destination point. MapInfo Professional will display the distance in a Message window. The value is the adjacent of the triangle.

6. Finally, find the angle with the following MapBasic command:

```
Print (ACOS (Adjacent/Hypotenuse) *57.2958)
```

Substitute the values that you found in step 4 and 5 for adjacent and hypotenuse. MapInfo Professional returns the angle in degrees. MapInfo Professional will print the angle in a Message window.

If you would like to find the angle in radians, omit the multiplication at the end of the statement, leaving:

```
Print (ACOS (Adjacent/Hypotenuse) )
```

If, instead of two points, you have one line that has the destination and origin as endpoints, do the following instead of steps 2 and 3:

Double-click the line object. MapInfo Professional opens a window that shows the coordinate information. Write down the Start Point and End Point X and Y coordinates.

Determine whether the Start Point or the End Point is higher, that is, which point has a more northerly Y coordinate.

If the destination is above the origin (like the example above), then the destination will have the coordinates of the most northerly point (determined in the previous step). The origin would then take the coordinates of the other endpoint of the line.

If the origin is above the destination, then it takes the coordinates of the more northerly point.

Continue with step 4.

Finding Floating Windows

Floating windows are the special windows in MapInfo Professional that sit on top of the Map, Browser, Graph, and Layout windows. These windows are the Info window, Statistics window, button pads, ruler, and message window. You can move these windows around and place them off to the side of the screen. Occasionally, one of these windows may be shifted out of view. Using the MapBasic window, you can easily bring these windows back to the center of your screen. This example uses the Info window. Other special windows are listed in the Set Window statement in the MapBasic *Reference*.

1. On the **OPTIONS** menu, click **SHOW MAPBASIC WINDOW**. The MapBasic window displays.
2. Type the following code into the window:

```
Set Window Info Position (1.5,2.0) Units "in"
```

The Info dialog box displays in the center of your screen.

Setting the Default Zoom for a Map

When you open a map in MapInfo Professional, it displays in the default view every time, even though you probably changed the zoom when you last opened the map. You can change the default zoom for a map with the Set Map statement.

For example, if you open the standard world map that ships with MapInfo Professional, it displays with the whole world in view, by default. You frequently use the world map to view just the European countries and would like the map to display in that view every time you open it. To change the map's default zoom, do the following:

1. On the **OPTIONS** menu, click **SHOW MAPBASIC WINDOW**. The MapBasic window displays.
2. Open the WORLD map.
3. Set the zoom level and position of your map to view Europe only.
4. In the MapBasic window, enter the following command:

```
Set Map Layer 1 Default Zoom
```

5. Close the WORLD table.
6. Re-open the WORLD table. It opens in the zoom level that you set.

Street Characteristics of MapInfo Data

Description of Object	Graphic Object Details	Pen (width, pattern, color)
Primary highways	Thin red line	Pen (2,2,16711680)
All other roads	Thin black line	Pen (1,2,0)
Railroads	Thin Black railroad	Pen (1,26,0)

Pen Width will always be returned as a number from 1–7. One is the narrowest and 7 is the widest. These numbers correspond to the lines you would see in the pull down menu on the **OPTIONS** menu, point to **LINE STYLE** and click **WIDTH**.

The pattern will be returned as a number from 1 to 77. These numbers correspond to the patterns you see in the pull down menu on the **OPTIONS** menu, point to **LINE STYLE** and click **STYLE** going left to right.

Digitizing Maps with MapInfo Professional

Sometimes the only way to bring a map into MapInfo Professional is to trace the map by hand. Using MapInfo's digitizing feature, you can trace the details of a paper map with a puck and a digitizing tablet and record the tracings as a vector image (object with geographic coordinates) that can then be displayed in MapInfo as a map layer. Since they are vector images, digitized maps allow you to use all of MapInfo's powerful functionality with them.

Digitized Maps vs. Raster Images

While digitizing is a time-consuming process, it has some advantages over scanned raster images, particularly if you want to use the map for geographic analysis.

Digitizing a map creates a vector image that is just like any other MapInfo map layer. Each feature you digitize becomes a map object that you can edit, move, customize, or attach data to. You can include as much detail as you want to trace from the paper map.

A raster map, on the other hand, is simply a graphic image that is used for display purposes only. You cannot edit or attach data to it. It is used as a backdrop for other map layers. Its main advantage over digitizing is input speed.

For more on raster images, see Chapter 19, Displaying Raster Images.

Digitizing Requirements

Digitizing in MapInfo requires special equipment and setup so that MapInfo can read the information from the paper map.

Digitizing Tablet and Puck

To digitize in MapInfo you will need a digitizing tablet and a puck. A digitizing tablet is the surface that you attach the map to for tracing. The puck is the device with which you trace the map. It is a lot like a mouse.

MapInfo supports the GRASS interface.

Digitizer Drivers

You will also need the appropriate device driver or interface that MapInfo recognizes. MapInfo supports the following digitizer drivers:

- VTI Tablet Interface (version 2.10 or later)
- Wintab

VTI allows you to use a variety of commercial digitizers. It includes a control panel applet that allows you to configure your digitizer and a template editor and loader that allows direct access to MapInfo's menu items from the digitizing tablet. Versions 2.10 or later also allow caching of digitizer events. Users with version 1.0 will need to upgrade or switch to Wintab. If you have installed an older version of VTI, MapInfo displays the following message on startup and continues running, but with digitizing disabled: "Virtual Tablet Interface must be version 2.10 or later for use with MapInfo."

You will need to obtain the digitizer driver from a third party — either Digitizer Technology (for VTI) or the tablet manufacturer (for Wintab). In most cases, the tablet will come with a Wintab driver.

Digitizer Technology Company provides both sales and support for the Virtual Tablet Interface. Their address is:

Digitizer Technology Company
16541 Redmond Way, Suite 195C
Redmond, WA 98052 USA
Tel: (425) 868-3246
WWW: <http://www.vtablet.com>

The latest VTI and Wintab drivers support digitizing under Windows 2000, Windows NT, and Windows 95/98.

Source Map

You can digitize any paper map, aerial photo, or drawing that you can affix to a digitizing tablet and trace the map features by hand.

Setting Up the Digitizing Equipment

Connect your digitizing tablet and puck according to manufacturer's instructions.

Connect your digitizing tablet and puck according to the manufacturer's instructions and install the appropriate device driver.

Attach your paper map securely to the digitizing tablet. It is very important that the map not be moved during the digitizing session, or it will invalidate any control points you have established for the map.

Digitizer Setup

To communicate the tracings on the paper map to MapInfo properly, you must provide some information about your map. In the Digitizer Setup dialog box, you specify control points for your map, the map projection and appropriate map units, and configure the buttons on your digitizing puck. Choose **MAP > DIGITIZER SETUP** to begin. The Digitizer Setup dialog box displays. Each part of the dialog box is discussed below.

Map Projection

Maps are drawn using a particular projection, or distortion, of the earth's surface to maintain the relationship of the curved earth's features on a flat piece of paper. When you digitize a map using MapInfo, you must specify the projection so that MapInfo can take the map's distortion into consideration and maintain the correct relationship among the map features.

You cannot change the projection after you have begun to digitize, so make sure you set it correctly now. Click the Projection button in the Digitizer Setup dialog box to select a projection. In general, the projection is specified in the map legend. MapInfo supports a wide variety of projections. For aerial photographs, use Longitude/Latitude as the projection.

Map Units

In addition to knowing the projection, you must specify the map units used for the coordinate system. For instance, a map in the Longitude/Latitude projection will show map coordinates in degrees.

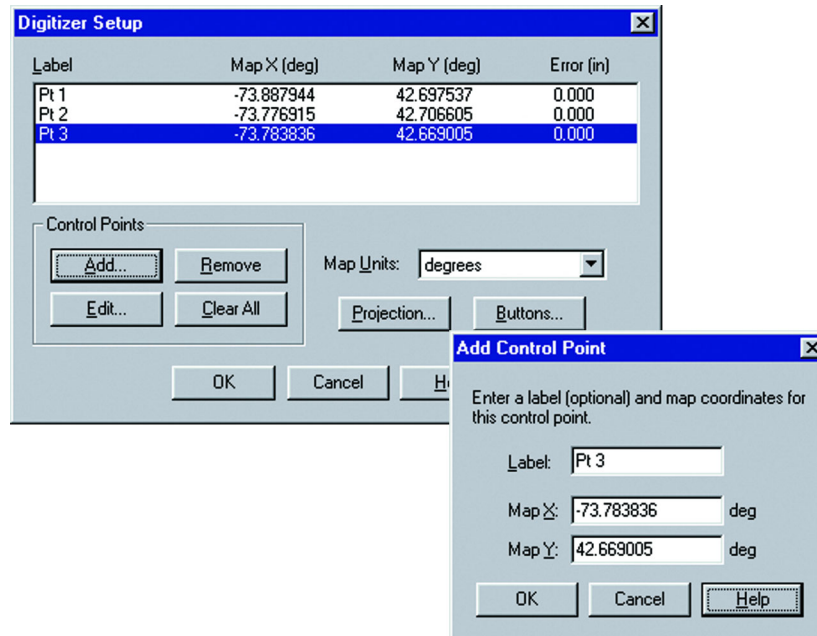
If you do not have coordinates for the map, you will need to digitize it as a non-earth map, which means points on the image will only be relative to each other, not to points on the earth. Create a non-earth map table first and display it in the active Map window.

Specify the map units from the Map Units drop-down list in the dialog box that matches the coordinate units on the paper map. Degrees will always be available for earth maps. In addition, other map units may be available if you have identified the map in a projection other than Longitude/Latitude.

Entering Control Points

For MapInfo to make a digitized copy of your paper map, it must be able to correctly interpret the location of the digitizing puck on the tablet as you trace the map. To do this, you must first set the parameters by specifying locational coordinates for several control points on the map. To set a control point, choose a point on the tablet and click a button on the puck. Type the coordinates that correspond to that point in the Digitizer Setup dialog box.

To add, edit, remove, or clear all control points, choose the appropriate button in the Digitizer Setup dialog box. A dialog box appears for each button to walk you through the steps.

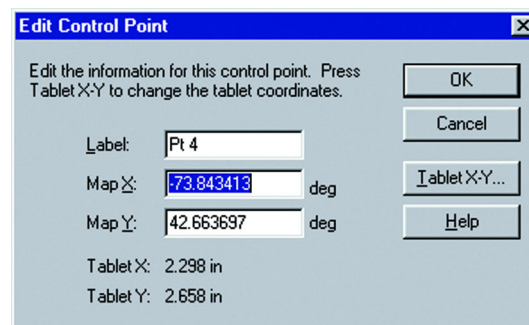


For instance, to add a control point, choose **ADD**. The Pick Tablet Point dialog box displays telling you to choose a point on the tablet and click a digitizer button. Now the Add Control Point dialog box displays prompting you for a label (optional) and the map coordinates for the point. When you are through, click **OK**. Repeat this process for each control point you enter.

Keep in mind that you must enter the coordinates in the units you specified in the Digitizer Setup dialog box. If your map unit is in degrees, be sure to type in the coordinates as decimal degrees. For a discussion on converting degrees, minutes, and seconds to decimal degrees see [Converting Coordinate Information with the Degree Converter Tool in Chapter 4 on page 194](#).

Editing Control Points

To edit a control point, choose the point from the list of control points in the Digitizer Setup dialog box and press the **EDIT** button. The Edit Control Point dialog box displays. Make the appropriate changes to the label or X and Y coordinates.



You can also change the tablet position of the point through this dialog box. For instance, if the coordinates are correct, but you realized that you clicked on the wrong point on the tablet, you can choose the **TABLET X-Y** button in the Edit Control Point dialog box. This is easier than adding a new control point and removing the incorrect one.

You can also remove a control point by highlighting the point in the Setup dialog box and choosing the Remove button. To remove all points and reset the projection to that of the active Map window, choose **CLEAR ALL**.

Saving Control Points

You can save your control points to a workspace. This is helpful if you must interrupt the session before you have finished entering your control points. When you open the workspace later, MapInfo automatically turns digitizer mode on. There are some cases where MapInfo will not be able to turn on digitizer mode. They are the following:

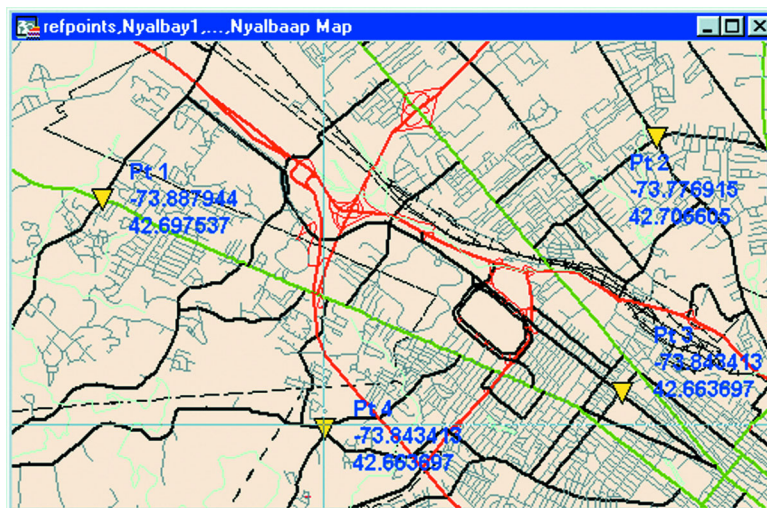
- If there are less than 3 control points entered in the workspace. You will need to enter at least 1 or 2 more control points in Digitizer Setup.
- If your control points run in a straight line. You must enter control points that are at different angles from each other.
- The digitizer size or resolution has changed since the workspace was saved. You will need to enter new control points in Digitizer Setup.

These problems do not, however, prevent the workspace from opening.

Control Point Error

You should use at least four control points when digitizing a paper map. When digitizing an aerial photograph or an image without a projection, you might want to use 30 or more control points.

MapInfo uses the control points to perform an affine transformation, whereby the digitized objects are skewed, shifted and scaled to fit the control point locations.



MapInfo determines the relative positions of the control points based on the coordinates you specify. It can then determine where those points should be on the tablet. MapInfo then calculates an error estimate that is the difference between where the point should be on the tablet and where you actually clicked.

The error estimates give you an idea of how accurate the resulting computer map will be. Error values should be quite small, on the same scale as the resolution of your digitizer. In most cases errors should be in thousandths or hundredths of an inch. Those errors approaching a tenth of an inch are probably too large.

To minimize the likelihood of a high error estimate, increase the number of control points and be as precise as possible when specifying the coordinates for control points. Double-check that you specified the correct projection in Digitizer Setup.

Configuring Digitizer Buttons

To configure the buttons on your digitizing puck, click **BUTTONS** in the Digitizer Setup dialog box. The dialog box that displays will instruct you to click the digitizer button that you want to use as the main button and then to click the digitizer button that you want to use as the double-click button.

If you only have one button on the puck, you will use it for both drawing and completing the polyline/polygon. A single click enters a point when drawing an object; a double-click completes the object.

Note: If you use the same button for single-clicking and double-clicking, MapInfo may mistake rapid single-clicks as a double-click.

Digitizer Mode

MapInfo automatically turns digitizer mode on after you have entered three or more control points. Not only does it turn on automatically, but with the additional capabilities now available in digitizer mode, there is little reason to turn it off. Digitizer mode no longer locks you in. You do not have to exit from digitizer mode to do something else. You can now do anything in digitizer mode that you can do in mouse mode: open tables and windows, use any of the tools, use the mouse, etc.

You can still, however, turn digitizer mode off and on with the **D** key. Again, similar to when you have saved control points to a workspace, MapInfo will not turn digitizer mode on if you have only entered one or two control points or if your control points run in a straight line.

The details of the new digitizer mode functionality is explained below.

Using Tools with the Digitizer

You can use any of the tools with the digitizer. You are no longer limited to just the drawing tools, as you were in version 3.0. Now, for instance, you can zoom in on the area you are digitizing with the Zoom in tool, use the Ruler tool to measure distances, or add nodes, etc. without ever having to leave digitizer mode.

Mouse Cursor

You can now use the mouse and the digitizer at the same time. The mouse is always active, even when digitizer mode is on. So you no longer need to exit from digitizer mode to use the mouse. The mouse cursor is always visible, and can always be controlled with the mouse. Its appearance depends on which tool is selected.

You can also control the mouse with the digitizer using the mouse emulation capability of the digitizer driver (this must be configured outside of MapInfo). If digitizer mode is off, or if digitizer mode is on and a Map window is not active, the digitizer controls the mouse. If a Map window is active and digitizer mode is on, the digitizer controls the digitizer cursor.

Digitizer Cursor

The digitizer cursor is now a large cross hair that covers the entire width and height of the Map window. Its appearance does not change to indicate which tool is selected. It is always a large cross hair, making it much easier to see.

The digitizer cursor is always visible as long as a Map window is active. For example, if you decide to open a Browser window while you are in digitizer mode and work in the Browser, digitizer mode will still be on, but because the Browser is now the active window, you won't see the digitizer cursor.

The status bar only displays the digitizer cursor location if you choose to display it (**MAP > OPTIONS**). This is different than MapInfo 3.0, where the cursor location always displayed in the status bar while digitizer mode was on.

Digitizing Your Map

Once you have specified the control points, projection and map units of your map and have determined that the error for control points is acceptable, you are ready to digitize your map.

To begin digitizing:

1. Make the Map window active and make a layer editable.
2. Choose any tool.
3. Choose **MAP > CHANGE VIEW** to set the zoom of the Map window to be larger than the area of the map you are digitizing. This will keep the cursor in view during digitizing.
4. In the Change View dialog box, specify the X and Y coordinates of a point that generally falls in the center of the map to be digitized.
5. Click **OK**. The Map window now shows roughly the same area as your paper map. If you have entered at least three control points in the Digitizer Setup dialog box, digitizer mode should be on, and the digitizer cursor should appear in the Map window.
6. Press the **D** key to turn on digitizing mode. The cross hair cursor now becomes a cross hair.
7. Begin tracing the map.

Note: MapInfo Professional does not support digitizing in stream mode.

Tracing Existing Objects

MapInfo makes it much easier to trace an existing polygon network, e.g., the United States. The new autotrace feature allows you to easily trace the nodes of an object when using the Polyline or Polygon tools. This makes it easier to digitize objects that share a border because you don't have to re-digitize the shared portion of the border. You can autotrace it.

Autotrace is available when Snap mode is turned on. Note that you can only use autotrace with existing polylines and polygons. You cannot autotrace rectangles, ellipses, arcs, or other shapes made with the drawing tools.

To autotrace a polyline/polygon while digitizing, do the following:

1. Activate Snap mode (press the **S** key), and click on a node of the polyline/polygon you want to autotrace.
2. Move the puck to another node of the same object.
3. Do one of the following:
 - For polylines, hold down the **SHIFT** key and click.
 - For polygons, hold down either the **SHIFT** or **CTRL** key and click.

As soon as you press either the **SHIFT** or **CTRL** key, MapInfo highlights the path to be autotraced. When you click, MapInfo automatically traces all the segments between the two nodes and adds them to the polyline/polygon you are drawing.

Note: The **SHIFT** key autotraces the shorter path between the two nodes (the path with the lesser number of nodes), and the **CTRL** key autotraces the longer path (the path with the greater number of nodes). Autotrace works the same way as when you are selecting multiple nodes in Reshape mode.

You can only autotrace one object at a time. The second node you **SHIFT/CTRL**-click on must belong to the same object as the first node. If it belongs to a different object, MapInfo will draw a straight line between the two nodes. If you click on a node that's shared by two objects (e.g., a shared border), you can begin autotracing from either polygon.

Digitizing Trouble Shooting Tips

Here are some tips that should help you resolve any issues you have when digitizing maps for use with MapInfo Professional.

Digitizer Mode – D Key

You must be in digitizer mode when you begin to trace your paper map. This is so MapInfo can recognize the coordinates and place the map in the correct geographic context. If you trace the map in mouse mode, you are only drawing objects that do not have any tie to your paper map.

You are in digitizer mode when you click the **D** key or when you have entered at least three control points in the Digitizer Setup dialog box. You should see the digitizer cursor in the Map window. It is a large cross hair that covers the entire width and height of the Map window. A Map window must be active for the digitizer cursor to display. The Status Bar will also say DIG when you are digitizer mode.

Digitized Map Does Not Display in Expected Location

If your map does not display in its proper geographic location, it is likely that you did not specify the appropriate negative degree coordinates for your control points. If you zoom out to view the entire world, you will see your points in a different area.

At the Digitizer Setup dialog box, be sure to specify negative coordinates if your map includes west longitude and/or south latitudes. For instance, for maps in the United States, you should specify a negative X coordinate. For Africa, the Y coordinate is negative. For South America, both coordinates are negative. (For Europe, both coordinates are positive).

If you still do not see your map in the expected location, it could be due to bad control points, incorrect projection, or map units, etc.

High Error for Control Points

A high control point error means that MapInfo thinks there is a discrepancy between the point you chose on the tablet and where the point should be, based on the coordinates you specified. This can lead to inaccurate maps.

To reduce the error, edit the control point to be more precise with your click. Check to make sure the coordinates you entered are correct. You can also increase the number of control points.

Distances Do Not Measure Properly

If you measured a segment on the tablet using the puck and Ruler tool, you will come up with inaccurate results. The only way you can measure a segment is to first digitize it, then use the Ruler tool to measure it on screen.

If you still have bad results, it could be due to a setup problem (check projection and map units), control point problem (high error estimate, recheck coordinates), or inaccurate digitizing.

When Switching to Digitizer Mode, the Digitizer Cursor Does Not Appear

If you do not see the cursor when you switch into digitizer mode, check to make sure the coordinates are correct. You may need to specify negative coordinates (see Digitized Map does not Display in Expected Location, above).

Other things to do:

Set the center of the map to be one of your control points. In the Change View dialog box you can specify the coordinates of a point that falls in the general center of your paper map.

Put the cursor exactly on one of the control points.

Digitizer Cursor Jumps Off Screen When Digitizing

This happens when your Map window is set at a much different zoom than the map you are digitizing. Increase the active zoom to better reflect the area being digitized. For instance, if the map you want to digitize is 300 miles across, set the Map window zoom to about 300 using **MAP > CHANGE VIEW**.

You do not have to see the digitizer cross hair to digitize, but it is helpful. View Entire Layer may also help, if working with a pre-existing map. It is also possible that the digitizing tablet is damaged and has empty spots.

Digitizer is Connected but Digitizer Setup is Unavailable

Check the following:

- MapInfo supports the digitizing tablet you are using.
- Make sure the tablet is turned on and is correctly connected to the computer.
- The digitizer driver is properly installed.
- The tablet is properly configured.
- The right tablet/driver combination is being used.
- There is no problem with the tablet, the connection, or the connecting cables.

If the tablet works with other applications or is being used as a mouse pointer in windows, and everything listed above checks out fine, there may be a problem with our support of the tablet. If possible, configure the tablet to emulate different tablets supported by MapInfo. Make sure the system.ini file is updated to reflect the changes, and restart Windows each time a change is made to the system.ini.

If the tablet works with other applications or is being used as a mouse pointer in windows, and everything listed above checks out fine, there may be a problem with our support of the tablet. If possible, configure the tablet to emulate different tablets supported by MapInfo.

Digitizing Two Maps

You must set control points for each map individually, even if the maps are adjacent.

Limitations of Digitizing

The *Snap to nodes* feature is available while digitizing. However, the snap tolerance is a pixel value that is based on the current zoom level of the Map window. Press the **S** key to turn Snap mode off.

Auto polygon closure does not work in digitizing. You must click on the button you set up to close a polygon (or double-click on the button if you only have one digitizing button).

If you change the zoom level of your map, or scroll in the Map window after you have selected your digitizer points and then switch into digitizer mode, your cursor may disappear from the screen, because the location in the map corresponding to the puck is no longer visible in the Map window. The active Map window view must correspond to the view represented on the paper map to see the cursor when in digitizer mode. Zoom out to see the cursor again.

A

Directory of MapInfo Professional Shortcuts

This Appendix contains a comprehensive list of the shortcuts available in the MapInfo Professional application. You can create custom shortcuts by editing the MAPINFOW.MNU file using a text editor.

CAUTION: Making changes to the MAPINFOW.MNU file may cause the default shortcuts you change to stop working. Make these changes carefully and record your changes so you can change them back, if necessary.

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Shortcuts for File Menu Items

Menu Item	Keystrokes
File > New Table	CTRL+N
File > Open	CTRL+O
File > Save Table	CTRL+S
File > Save Workspace	CTRL+K
File > Print	CTRL+P
File > Exit	ALT+F4

Shortcuts for Edit Menu Items

Menu Item	Keystrokes
Edit > Undo	CTRL+Z
Edit > Cut	CTRL+X
Edit > Copy	CTRL+C
Edit > Paste	CTRL+V
Edit > Clear	DEL
Edit > Reshape	CTRL+R
Edit > New Row	CTRL+E
Edit > Get Info	F7

Shortcut to Tools Menu Items

Menu Item	Keystrokes
Tools > Run MapBasic Prog	CTRL+U

Shortcuts to Objects Menu Items

Menu Item	Keystrokes
Objects > Set Target	CTRL+T
Objects > Clear Target	CTRL+DELETE

Shortcuts for Query Menu Items

Menu Item	Keystrokes
Query > Unselect All	CTRL+W
Query > Find	CTRL+F
Query > Find Selection	CTRL+G

Shortcuts for Options Menu Items

Menu Item	Keystrokes
Options > Line Style	SHIFT+F8
Options > Region Style	CTRL+F8
Options > Symbol Style	ALT+F8
Options > Text Style	F8

Shortcuts for Map Menu Items

Menu Item	Keystrokes
Map > Layer Control	CTRL+L
Map > Create Prism Map	F10
Map > Create 3D Map	F11
Map > Create Thematic Map	F9
Map > Modify Thematic Map	ALT+F9
Map > Previous View	ALT+LEFT ARROW

Shortcut for Layout Menu Item

Menu Item	Keystrokes
Layout > Previous View	ALT+LEFT ARROW

Shortcuts for Window Menu Items

Menu Item	Keystrokes
Window > New Browser	F2
Window > New Mapper	F3
Window > New Grapher	F4
Window > New Layout	F5
Window > Redraw Window	CTRL+D
Window > Tile Windows	SHIFT+F4
Window > Cascade Windows	SHIFT+F5

Shortcuts by Keystroke

Menu Items	Keystrokes
Map > Previous View and Layout > Previous View	ALT+LEFT ARROW
File > Copy	CTRL+C
Window > Redraw Window	CTRL+D
File > New Row	CTRL+E
Query > Find	CTRL+F
Query > Find Selection	CTRL+G
File > Save Workspace	CTRL+K
Map > Layer Control	CTRL+L
File > New Table	CTRL+N
File > Open	CTRL+O
File > Print	CTRL+P
File > Reshape	CTRL+R
File > Save Table	CTRL+S
Objects > Set Target	CTRL+T
Tools > Run MapBasic Program	CTRL+U
File > Paste	CTRL+V
Query > Unselect All	CTRL+W
File > Cut	CTRL+X
File > Undo	CTRL+Z
Objects > Clear Target	CTRL+DELETE
Window > New Browser	F2
Window > New Mapper	F3
Window > New Grapher	F4
Window > New Layout	F5
File > Get Info	F7
Options > Text Style	F8
Map > Create Thematic Map	F9

Menu Items	Keystrokes
Map > Create Prism Map	F10
Map > Create 3D Map	F11
File > Exit	ALT+F4
Options > Symbol Style	ALT+F8
Map > Modify Thematic Map	ALT+F9
Options > Region Style	CTRL+F8
Window > Tile Windows	SHIFT+F4
Window > Cascade Windows	SHIFT+F5
Options > Line Style	SHIFT+F8
Edit > Delete	DEL

Elements of a Coordinate System

In this Appendix:

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- ◆ Projection Datums 580
- ◆ For More Information on Projections 590

Projections and Their Parameters

The next table indicates the parameters applicable to each projection, which are listed in the order they appear in the relevant coordinate system lines in the MAPINFOW.PRJ file.

	Datum	Units	Origin, Longitude	Origin, Latitude	Standard Parallel 1	Standard Parallel 2	Azimuth	Scale Factor	False Easting	False Northing	Range
Albers Equal-Area Conic	X	X	X	X	X	X			X	X	
Azimuthal Equidistant	X	X	X	X *							X
Cassini-Soldner	X	X	X	X					X	X	
Cylindrical Equal Area	X	X	X		X						
Double Stereographic	X	X	X	X				X	X	X	
Eckert IV	X	X	X								
Eckert VI	X	X	X								
Equidistant Conic	X	X	X	X	X	X			X	X	
Gall	X	X	X								
Hotine Oblique Mercator	X	X	X	X			X	X	X	X	
Lambert Azimuthal Equal-Area	X	X	X	X †							X
Lambert Conformal Conic	X	X	X	X	X	X			X	X	
Longitude-Latitude	X										
Mercator	X	X	X								
Miller	X	X	X								
Mollweide	X	X	X								
New Zealand Map Grid	X	X	X	X					X	X	
Polyconic	X	X	X	X					X	X	
Regional Mercator	X	X	X		X						
Robinson	X	X	X								
Sinusoidal	X	X	X								
Stereographic	X	X	X	X				X	X	X	

Swiss Oblique Mercator	X	X	X	X					X	X	
Transverse Mercator	X	X	X	X				X	X	X	

* MapInfo supports the Azimuthal Equidistant and Lambert Azimuth Equal-Area projections in the polar aspect only. The Origin Latitude for these projections must be either 90 or -90.

† Versions of MapInfo prior to 6.0 support the Azimuthal Equidistant and Lambert Azimuthal Equal-Area projections in the polar aspect only. The Origin Latitude for these projections must be either 90 or -90. An Oblique Azimuthal Equidistant projection was introduced in version 6.0 that supports all Origin Latitudes, including the poles. For version 6.5 a new Lambert Azimuthal Equal-Area projection has been added that also supports all Origin Latitudes, including the poles.

Projection

The projection is the equation or equations used by a coordinate system. The following list names the projections MapInfo uses and gives the number used to identify the projection in the MAPINFOW.PRJ file:

Number	Projection
9	Albers Equal-Area Conic
28	Azimuthal Equidistant (all origin latitudes)
5	Azimuthal Equidistant (polar aspect only)
30	Cassini-Soldner
2	Cylindrical Equal-Area
31	Double Stereographic
14	Eckert IV
15	Eckert VI
6	Equidistant Conic, also known as Simple Conic
17	Gall
7	Hotine Oblique Mercator
4	Lambert Azimuthal Equal-Area (polar aspect only)
29	Lambert Azimuthal Equal-Area
3	Lambert Conformal Conic
19	Lambert Conformal Conic (modified for Belgium 1972)
1	Longitude/Latitude
10	Mercator
11	Miller Cylindrical

Number	Projection
13	Mollweide
18	New Zealand Map Grid
27	Polyconic
26	Regional Mercator
12	Robinson
16	Sinusoidal
20	Stereographic
25	Swiss Oblique Mercator
8	Transverse Mercator, (also known as Gauss-Kruger)
21	Transverse Mercator, (modified for Danish System 34 Jylland-Fyn)
22	Transverse Mercator, (modified for Danish System 34 Sjaelland)
23	Transverse Mercator, (modified for Danish System 34/45 Bornholm)
24	Transverse Mercator, (modified for Finnish KKJ)

Projection numbers in the MAPINFOW.PRJ may be modified by the addition of a constant value to the base number listed in the Projection table, above. Valid values and their meanings are tabulated below:

Constant	Meaning	Parameters
1000	System has affine transformations	Affine units specifier and coefficients appear after the regular parameters for the system.
2000	System has explicit bounds	Bounds appear after the regular parameters for the system.
3000	System with both affine and bounds	Affine parameters follow system's parameters; bounds follow affine parameters.

Example:

Assume you want to work with a simple system based on the Transverse Mercator projection and using the NAD 1983 datum. You might have a line such as the following in your MAPINFOW.PRJ file:

```
"UTM Zone 1 (NAD 83)", 8, 74, 7, -177, 0, 0.9996, 500000, 0
```

Now let's say that you want a system based on this, but with an affine transformation specified by the following parameters: Units=meters; A=0.5; B=-0.866; C=0; D=0.866; E=0.5; and F=0. The required line in the MAPINFOW.PRJ file is:

"UTM Zone 1 (NAD 83) - rotated 60 degrees", 1008, 74, 7, -177, 0, 0.9996, 500000, 0, 7, 0.5, -0.866, 0, 0.866, 0.5, 0

Alternatively, if you want to bound the system to (x1, y1, x2, y2)=(-500000, 0, 500000, 1000000), the required line is:

"UTM Zone 1 (NAD 83) - bounded", 2008, 74, 7, -177, 0, 0.9996, 500000, 0, -500000, 0, 500000, 1000000

To customize the system using both of these modifications, the line is:

"UTM Zone 1 (NAD 83) - rotated and bounded", 3008, 74, 7, -177, 0, 0.9996, 500000, 0, 7, 0.5, -0.866, 0, 0.866, 0.5, 0, -500000, 0, 500000, 1000000

Projection Datums

The datum is established by tying a reference ellipsoid to a particular point on the earth. The following table lists these details for each datum:

- The number used to identify the datum in the MAPINFOW.PRJ file.
- The datum's name
- The maps for which the datum is typically used
- The datum's reference ellipsoid

Number	Datum	Area Maps	Ellipsoid
1	Adindan	Ethiopia, Mali, Senegal, Sudan	Clarke 1880
2	Afgooye	Somalia	Krassovsky
1007	AGD 66, 7 parameter	Australia, A.C.T.	Australian National
1008	AGD 66, 7 parameter	Australia, Tasmania	Australian National
1009	AGD 66, 7 parameter	Australia, Victoria/ NSW	Australian National
1006	AGD 84, 7 parameter	Australia	Australian National
3	Ain el Abd 1970	Bahrain Island	International
118	American Samoa	American Samoa Islands	Clarke 1866
4	Anna 1 Astro 1965	Cocos Islands	Australian National
119	Antigua Island Astro 1943	Antigua, Leeward Islands	Clarke 1880

Number	Datum	Area Maps	Ellipsoid
5	Arc 1950	Botswana, Lesotho, Malawi, Swaziland, Zaire, Zambia, Zimbabwe	Clarke 1880
6	Arc 1960	Kenya, Tanzania	Clarke 1880
7	Ascension Island 1958	Ascension Island	International
9	Astro B4 Sorol Atoll	Tern Island	International
8	Astro Beacon "E"	Iwo Jima Island	International
10	Astro DOS 71/4	St. Helena Island	International
11	Astronomic Station 1952	Marcus Island	International
151	ATS77 (Average Terrestrial System 1977)	Canada	ATS77
12	Australian Geodetic 1966 (AGD 66)	Australia and Tasmania Island	Australian National
13	Australian Geodetic 1984 (AGD 84)	Australia and Tasmania Island	Australian National
151	Average Terrestrial System 1977 (ATS77)		
120	Ayabelle Lighthouse	Djibouti	Clarke 1880
110	Belgium	Belgium	International
14	Bellevue (IGN)	Efate and Erromango Islands	International
15	Bermuda 1957	Bermuda Islands	Clarke 1866
16	Bogota Observatory	Colombia	International
121	Bukit Rimpah	Bangka and Belitung Islands (Indonesia)	Bessel 1841
17	Campo Inchauspe	Argentina	International
18	Canton Astro 1966	Phoenix Islands	International
19	Cape	South Africa	Clarke 1880
20	Cape Canaveral	Florida and Bahama Islands	Clarke 1866
1005	Cape, 7 parameter	South Africa	WGS 84
21	Carthage	Tunisia	Clarke 1880
22	Chatham 1971	Chatham Island (New Zealand)	International

Number	Datum	Area Maps	Ellipsoid
23	Chua Astro	Paraguay	International
122	Co-Ordinate System 1937 of Estonia	Estonia	Bessel 1841
24	Corrego Alegre	Brazil	International
123	Dabola	Guinea	Clarke 1880
124	Deception Island	Deception Island, Antarctica	Clarke 1880
1000	Deutsches Hauptdreick-snetz (DHDN)	Germany	Bessel
25	Djakarta (Batavia)	Sumatra Island (Indonesia)	Bessel 1841
26	DOS 1968	Gizo Island (New Georgia Islands)	International
27	Easter Island 1967	Easter Island	International
115	EUREF 89	Europe	GRS 80
28	European 1950 (ED 50)	Austria, Belgium, Denmark, Finland, France, Germany, Gibraltar, Greece, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland	International
29	European 1979 (ED 79)	Austria, Finland, Netherlands, Norway, Spain, Sweden, Switzerland	International
108	European 1987 (ED 87)	Europe	International
125	Fort Thomas 1955	Nevis, St. Kitts, Leeward Islands	Clarke 1880
30	Gandajika Base	Republic of Maldives	International
116	GDA 94	Australia	GRS 80
32	Geodetic Reference System 1967 (GRS 67)	Worldwide	GRS 67
33	Geodetic Reference System 1980 (GRS 80)	Worldwide	GRS 80

Number	Datum	Area Maps	Ellipsoid
126	Graciosa Base SW 1948	Faial, Graciosa, Pico, Sao Jorge, and Terceira Islands (Azores)	International 1924
34	Guam 1963	Guam Island	Clarke 1866
35	GUX 1 Astro	Guadalcanal Island	International
150	Hartbeesthoek 94	South Africa	WGS 84
127	Herat North	Afghanistan	International 1924
128	Hermannskogel	Yugoslavia (Prior to 1990), Slovenia, Croatia, Bosnia and Herzegovina, Serbia	Bessel 1841
36	Hito XVIII 1963	South Chile (near 53°S)	International
37	Hjorsey 1955	Iceland	International
38	Hong Kong 1963	Hong Kong	International
1004	Hungarian Datum (HD 72)	Hungary	GRS 67
39	Hu-Tzu-Shan	Taiwan	International
40	Indian	Thailand and Vietnam	Everest (India 1830)
41	Indian	Bangladesh, India, Nepal	Everest (India 1830)
129	Indian	Pakistan	Everest (Pakistan)
130	Indian 1954	Thailand	Everest (India 1830)
131	Indian 1960	Vietnam	Everest (India 1830)
132	Indian 1975	Thailand	Everest (India 1830)
133	Indonesian 1974	Indonesia	Indonesian 1974
42	Ireland 1965	Ireland	Modified Airy
134	ISTS 061 Astro 1968	South Georgia Island	International 1924
43	ISTS 073 Astro 1969	Diego Garcia	International
1015	Japanese Geodetic Datum 2000 (JGD2000)	Japan	Bessel
44	Johnston Island 1961	Johnston Island	International
45	Kandawala	Sri Lanka	Everest (India 1830)
46	Kerguelen Island	Kerguelen Island	International

Number	Datum	Area Maps	Ellipsoid
47	Kertau 1948	West Malaysia and Singapore	Everest (W. Malaysia and Singapore 1948)
1016	KKJ Finnish	Finland	International
135	Kusaie Astro 1951	Caroline Islands, Federated States of Micronesia	International 1924
48	L.C. 5 Astro	Cayman Brac Island	Clarke 1866
136	Leigon	Ghana	Clarke 1880
49	Liberia 1964	Liberia	Clarke 1880
113	Lisboa (DLx)	Portugal	International
50	Luzon	Philippines (excluding Mindanao Island)	Clarke 1866
51	Luzon	Mindanao Island	Clarke 1866
52	Mahe 1971	Mahe Island	Clarke 1880
53	Marco Astro	Salvage Islands	International
54	Massawa	Eritrea (Ethiopia)	Bessel 1841
114	Melrica 1973 (D73)	Portugal	International
55	Merchich	Morocco	Clarke 1880
56	Midway Astro 1961	Midway Island	International
57	Minna	Nigeria	Clarke 1880
137	Montserrat Island Astro 1958	Montserrat, Leeward Islands	Clarke 1880
138	M'Poraloko	Gabon	Clarke 1880
58	Nahrwan	Masirah Island (Oman)	Clarke 1880
59	Nahrwan	United Arab Emirates	Clarke 1880
60	Nahrwan	Saudi Arabia	Clarke 1880
61	Naparima, BWI	Trinidad and Tobago	International
109	Netherlands	Netherlands	Bessel
31	New Zealand Geodetic Datum 1949 (NZGD 49)	New Zealand	International
62	North American 1927 (NAD 27)	Continental US	Clarke 1866

Number	Datum	Area Maps	Ellipsoid
63	North American 1927 (NAD 27)	Alaska	Clarke 1866
64	North American 1927 (NAD 27)	Bahamas (excluding San Salvador Island)	Clarke 1866
65	North American 1927 (NAD 27)	San Salvador Island	Clarke 1866
66	North American 1927 (NAD 27)	Canada (including Newfoundland Island)	Clarke 1866
67	North American 1927 (NAD 27)	Canal Zone	Clarke 1866
68	North American 1927 (NAD 27)	Caribbean (Turks and Caicos Islands)	Clarke 1866
69	North American 1927 (NAD 27)	Central America (Belize, Costa Rica, El Salvador, Guate- mala, Honduras, Nicaragua)	Clarke 1866
70	North American 1927 (NAD 27)	Cuba	Clarke 1866
71	North American 1927 (NAD 27)	Greenland (Hayes Peninsula)	Clarke 1866
72	North American 1927 (NAD 27)	Mexico	Clarke 1866
73	North American 1927 (NAD 27)	Michigan (used only for State Plane Coordinate System 1927)	Modified Clarke 1866
74	North American 1983 (NAD 83)	Alaska, Canada, Central America, Continental US, Mexico	GRS 80
139	North Sahara 1959	Algeria	Clarke 1880
107	Nouvelle Triangulation Francaise (NTF) Greenwich Prime Meridian	France	Modified Clarke 1880
1002	Nouvelle Triangulation Francaise (NTF) Paris Prime Meridian	France	Modified Clarke 1880
111	NWGL 10	Worldwide	WGS 72
117	NZGD 2000	New Zealand	GRS 80

Number	Datum	Area Maps	Ellipsoid
1010	NZGD 49, 7 parameter	New Zealand	International
75	Observatorio 1966	Corvo and Flores Islands (Azores)	International
140	Observatorio Meteorologico 1939	Corvo and Flores Islands (Azores)	International 1924
76	Old Egyptian	Egypt	Helmert 1906
77	Old Hawaiian	Hawaii	Clarke 1866
78	Oman	Oman	Clarke 1880
79	Ordnance Survey of Great Britain 1936	England, Isle of Man, Scotland, Shetland Islands, Wales	Airy
80	Pico de las Nieves	Canary Islands	International
81	Pitcairn Astro 1967	Pitcairn Island	International
141	Point 58	Burkina Faso and Niger	Clarke 1880
142	Pointe Noire 1948	Congo	Clarke 1880
143	Porto Santo 1936	Porto Santo and Madeiras Islands	International 1924
1000	Potsdam	Germany	Bessel
82	Provisional South American 1956	Bolivia, Chile, Colombia, Ecuador, Guyana, Peru, Venezuela	International
36	Provisional South Chilean 1963	South Chile (near 53°S)	International
83	Puerto Rico	Puerto Rico and Virgin Islands	Clarke 1866
1001	Pulkovo 1942	Germany	Krassovsky
1012	PZ90	Russia	PZ90
84	Qatar National	Qatar	International
85	Qornoq	South Greenland	International
1000	Rauenberg	Germany	Bessel
86	Reunion	Mascarene Island	International
112	Rikets Triangulering 1990 (RT 90)	Sweden	Bessel

Number	Datum	Area Maps	Ellipsoid
1011	Rikets Triangulering 1990 (RT 90), 7 parameter	Sweden	Bessel
87	Rome 1940	Sardinia Island	International
88	Santo (DOS)	Espirito Santo Island	International
89	São Braz	São Miguel, Santa Maria Islands (Azores)	International
90	Sapper Hill 1943	East Falkland Island	International
91	Schwarzeck	Namibia	Modified Bessel 1841
144	Selvagem Grande 1938	Salvage Islands	International 1924
145	Sierra Leone 1960	Sierra Leone	Clarke 1880
146	S-JTSK	Czech Republic	Bessel 1841
1013	SK42	Russia	PZ90
1024	SK95	Russia	PZ90
92	South American 1969	Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Venezuela, Trinidad, and Tobago	South American 1969
93	South Asia	Singapore	Modified Fischer 1960
94	Southeast Base	Porto Santo and Madeira Islands	International
95	Southwest Base	Faial, Graciosa, Pico, Sao Jorge, Terceira Islands (Azores)	International
1003	Switzerland (CH 1903)	Switzerland	Bessel
147	Tananarive Observatory 1925	Madagascar	International 1924
96	Timbalai 1948	Brunei and East Malaysia (Sarawak and Sabah)	Everest (India 1830)
97	Tokyo	Japan, Korea, Okinawa	Bessel 1841
1015	Tokyo97	Japan	Bessel 1841
98	Tristan Astro 1968	Tristan da Cunha	International

Number	Datum	Area Maps	Ellipsoid
99	Viti Levu 1916	Viti Levu Island (Fiji Islands)	Clarke 1880
148	Voirol 1874	Tunisia/Algeria	Clarke 1880
149	Voirol 1960	Algeria	Clarke 1880
100	Wake-Eniwetok 1960	Marshall Islands	Hough
101	World Geodetic System 1960 (WGS 60)	Worldwide	WGS 60
102	World Geodetic System 1966 (WGS 66)	Worldwide	WGS 66
103	World Geodetic System 1972 (WGS 72)	Worldwide	WGS 72
104	World Geodetic System 1984 (WGS 84)	Worldwide	WGS 84
105	Yacare	Uruguay	International
106	Zanderij	Surinam	International

Units

The following table lists the available coordinate units and the number used to identify the unit in the MAPINFOW.PRJ file:

Number	Units
6	Centimeters
31	Chains
3	Feet (also called International Feet)*
2	Inches
1	Kilometers
30	Links
7	Meters
0	Miles
5	Millimeters
9	Nautical Miles**
32	Rods
8	US Survey Feet (used for 1927 State Plane)***

Number	Units
4	Yards

*One International Foot equals exactly 30.48 cm.

**One Nautical Mile equals exactly 1852 meters.

***One US Survey Foot equals exactly 12/39.37 meters, or approximately 30.48006 cm.

Coordinate System Origin

The origin is the point specified in longitude and latitude from which all coordinates are referenced. It is chosen to optimize the accuracy of a particular coordinate system. As we move north from the origin, Y increases. X increases as we move east. These coordinate values are generally called northings and eastings.

For the Transverse Mercator projection the origin's longitude defines the central meridian. In constructing the Transverse Mercator projection a cylinder is positioned tangent to the earth. The central meridian is the line of tangency. The scale of the projected map is true along the central meridian.

In creating a Hotine Oblique Mercator projection it is necessary to specify a great circle that is not the equator nor a meridian. MapInfo does this by specifying one point on the ellipsoid and an azimuth from that point. That point is the origin of the coordinate system.

Standard Parallels (Conic Projections)

In conic projections a cone is passed through the earth intersecting it along two parallels of latitude. These are the standard parallels. One is to the north and one is to the south of the projection zone. To use a single standard parallel specify that latitude twice. Both are expressed in degrees of latitude.

Oblique Azimuth (Hotine Oblique Mercator)

When specifying a great circle (Hotine Oblique Mercator) using a point and an azimuth (arc), the azimuth is called the Oblique Azimuth and is expressed in degrees.

Scale Factor (Transverse Mercator)

A scale factor is applied to cylindrical coordinates to average scale error over the central area of the map while reducing the error along the east and west boundaries. The scale factor has the effect of recessing the cylinder into the earth so that it has two lines of intersection. Scale is true along these lines of intersection.

You may see the scale factor expressed as a ratio, such as 1:25000. In this case it is generally called the scale reduction. The relationship between scale factor and scale reduction is:

$$\text{scale factor} = 1 - \text{scale reduction}$$

In this case the scale factor would be $1 - (1/25000)$ or 0.99996.

False Northings and False Eastings

Calculating coordinates is easier if negative numbers aren't involved. To eliminate this problem in calculating State Plane and Universal Transverse Mercator coordinates, it is common to add measurement offsets to the northings and eastings. These offsets are called False Northings and False Eastings. They are expressed in coordinate units, not degrees. (The coordinate units are specified by the Units parameter.)

Range (Azimuthal Projections)

The range specifies, in degrees, how much of the earth you are seeing. The range can be between 1 and 180. When you specify 90, you see a hemisphere. When you specify 180 you see the whole earth, though much of it is very distorted.

Polyconic Projection

The following description is copied from "Map Projections – A Working Manual", USGS Professional Paper 1395, by John P. Snyder.

The Polyconic projection, usually called the American Polyconic in Europe, achieved its name because the curvature of the circular arc for each parallel on the map is the same as it would be following the unrolling of a cone which had been wrapped around the globe tangent to the particular parallel of latitude, with the parallel traced onto the cone. Thus, there are many ("poly-") cones involved, rather than the single cone of each regular conic projection.

The Polyconic projection is neither equal-area nor conformal. Along the central meridian, however, it is both distortion free and true to scale. Each parallel is true to scale, but the meridians are lengthened by various amounts to cross each parallel at the correct position along the parallel, so that no parallel is standard in the sense of having conformality (or correct angles), except at the central meridian. Near the central meridian, distortion is extremely small.

This projection is not intended for mapping large areas. The conversion algorithms used break down when mapping wide longitude ranges. For example, WORLD.TAB, from the sample data shipped with MapInfo Professional, may exhibit anomalies if reprojected using Polyconic.

For More Information on Projections

The first three publications listed are relatively short pamphlets. The last two are substantial books. We've also given addresses and phone numbers for the American Congress of Surveying and Mapping (the pamphlets) and the U.S. Geological Survey (the books).

American Cartographic Association. *Choosing a World Map—Attributes, Distortions, Classes, Aspects*. Falls Church, VA: American Congress on Surveying and Mapping. Special Publication No. 2. 1988.

American Cartographic Association. *Matching the Map Projection the Need*. Falls Church, VA: American Congress on Surveying and Mapping. Special Publication No. 3. 1991.

American Cartographic Association. *Which Map is Best? Projections for World Maps*. Falls Church, VA: American Congress on Surveying and Mapping. Special Publication No. 1. 1986.

John P. Snyder. *Map Projections—A Working Manual*. Washington: U.S. Geological Survey Professional Paper 1395. 1987

John P. Snyder and Philip M. Voxland. *An Album of Map Projections*. Washington: U.S. Geological Survey Professional Paper 1453. 1989.

Contact Information

The Department of Geography at the University of Colorado at Boulder has made available "The Geographer's Craft" project, a website devoted to explanations of map projections, geodetic datums, and coordinate systems. It is particularly valuable because many of the explanations were presented using MapInfo Professional.

The materials may be used for study, research, and education. If you link to or cite the materials below, please credit the author: Peter H. Dana, The Geographer's Craft Project, Department of Geography, The University of Colorado at Boulder.

For geodetic datum information and explanations, go to:

<http://www.colorado.edu/geography/gcraft/notes/datum/datum.html>

For information on coordinate systems and associated topics, go to:

<http://www.colorado.edu/geography/gcraft/notes/coordsys/coordsys.html>

For information on map projections, go to:

<http://www.colorado.edu/geography/gcraft/notes/mapproj/mapproj.html>

C

Registering SPOT Images

In this Appendix:

- ◆ Registering SPOT Image Files 593

Registering SPOT Image Files

SPOT images are satellite (raster) images of the earth. SPOT Image Corporation offers these images under the name SPOTView™. SPOT images work well with MapInfo Professional® and are particularly useful when scant vector data is available for a geographic region, or when you want to super-impose vector data on top of a highly accurate raster backdrop. Additionally, MapInfo works with the Geospot™, format.

This appendix describes how to use information in SPOT and Geospot™ files to register the image in MapInfo. The advantage of using this information in this way is the increased accuracy that can be achieved over manually aligning the image with vector data.

This appendix assumes you have some familiarity with manually registering raster images. If the subject is new to you, see [Registering the Coordinates of a Raster Image on page 459](#) in this user guide.

The process described here is not foolproof. Because of inaccuracies in the header file settings or problems in companion vector data, you may occasionally need to manually readjust the control points using the Register Raster Image dialog. Refer to *Register Raster Image* earlier.

Part of registering a SPOT image is assigning the proper coordinate system. The standard coordinate systems for most US SPOT images are Universal Transverse Mercator and State Plane. But in other cases a SPOT image may use a different coordinate system and may even require that you add a new coordinate system to MapInfo. This appendix will help you identify what settings to use for a SPOT image, as well as when to add a coordinate system to MapInfo, should you need to. A SPOT image consists of several files, not all of which are required by MapInfo. Here are the files that MapInfo uses:

- .HDR file – A header file in ASCII form that contains information about the image's size, coordinate system, (SPOTView™ only) and location on the earth.
- .BIL file – A binary file that contains the image's raw raster data.
- .CLR file – A palette file that contains a list of suggested colors to be used with the image. This file is only provided with color images, and MapInfo reads the contents of this file when present.

A report (.REP) file in ASCII form also accompanies each Geospot™ product. Although MapInfo does not read this file, you may find that it too contains useful information for registering the image, particularly image rotation and coordinate system information.

Gathering Coordinate System and Control Point Information

Like other raster images, registering a SPOT image involves choosing a coordinate system and assigning at least three control points in the Register Raster Image Dialog. Before doing so, you must gather the appropriate information from settings in the image's .HDR/.REP files.

If you open a SPOTView™ image's .HDR file using an ASCII editor, you'll see that it contains settings like the following. The settings for your image will likely differ.

SPOTView™ Settings

```

! GIS FORMAT HEADER FILE
! IDENTIFICATION BLOCK
PRODUCT_NAME      SPOTView Custom Frame Special Change Detection
FORMAT_VERSION    1.5
MAP_FRAME         22' X 30'
SCENE_ID          2_595272_910701_165923_2X
!                2_595272_930410_171958_2P
!                2_595272_930729_170345_2X
IMAGE_DATE        01 JUL 91
!                10 APR 93
!                29 JUL 93
CORRECTION_LEVEL  TER
! IMAGE INFORMATION BLOCK
NCOLS             4276
NROWS             4251
ULXMAP            522147
ULYMAP            4086917
MAPUNITS          Meters
XDIM              10.00
YDIM              10.00
NBANDS            3
NBITS             8
LAYOUT            BIL
BYTEORDER         I
SKIPBYTES         0
BANDROWBYTES      4276
TOTALROWBYTES     12828
BAND_RGB          321
! MAP INFORMATION BLOCK
MAP_NAME          St Louis, MO Change Detection
UL_LON/LAT
LR_LON/LAT
PROJECTION        Albers Equal Area
ORIGIN_LON        W 96,30,00
ORIGIN_LAT        N 00,00,00
STD_PARALLEL_1    N 36,36,00
STD_PARALLEL_2    N 43,00,00
DATUM             NAD27

```

Geospot™ Settings

The .HDR and .REP files will contain settings similar to these.

(.HDR file contains the following)

```

! GIS FORMAT HEADER FILE
! COORDINATE BLOCK
PRODUCT_NAME      SPOTView Custom Frame Special Change Detection
FORMAT_VERSION    1.5
MAP_FRAME         22' X 30'
SCENE_ID          2_595272_910701_165923_2X
!                2_595272_930410_171958_2P
!                2_595272_930729_170345_2X
IMAGE_DATE        01 JUL 91
!                10 APR 93
!                29 JUL 93
CORRECTION_LEVEL  TER

```

```

! IMAGE INFORMATION BLOCK
NCOLS          4276
NROWS          4251
ULXMAP         522147
ULYMAP         4086917
MAPUNITS       Meters
XDIM           10.00
YDIM           10.00
NBANDS         3
NBITS          8
LAYOUT         BIL
BYTEORDER      I
SKIPBYTES      0
BANDROWBYTES   4276
TOTALROWBYTES  12828
BAND_RGB       321
! CARTOGRAPHIC PARAMETER BLOCK (REP file)

```

(not in .REP file)

```

MAP_NAME          St Louis, MO  Change Detection
UL_LON/LAT
LR_LON/LAT
PROJ_ID           Albers Equal Area
PROJ_MERIDIAN     W 96,30,00
PROJ_PARALLEL     N 00,00,00
STD_PROJ_PARALLEL_1  N 36,36,00
STD_PROJ_PARALLEL_2  N 43,00,00
DATUM             NAD27

```

Coordinate System Information (SPOTView™ Only)

The first step in registering a SPOT image is assigning the appropriate coordinate system. The image's .HDR file should contain all the information you need to determine the proper coordinate system.

Occasionally you'll want to open a SPOT image that uses a coordinate system not currently supported in MapInfo. When this is the case, you'll need to modify MapInfo's list of supported coordinate systems by adding a new line to the MAPINFOW.PRJ file; this is an ASCII file that can be easily modified with a text editor. *Appendix F: Creating Your Own Coordinate System* gives a complete description of how to edit this file and what elements to use within a line for a given coordinate system.

For example, in the sample .HDR files settings above, the PROJECTION and DATUM settings might lead you to believe that one of MapInfo's standard Albers Equal-Area Conic coordinate systems would be appropriate for the sample SPOT image. But if you examine the MAPINFOW.PRJ file, you'll see that the Albers Equal-Area Conic coordinate system lines look like this.

```

"--- North American Coordinate Systems ---"
"Albers Equal-Area Conic (North America)", 9, 62, 7, -96, 23, 20, 60, 0, 0
"Albers Equal-Area Conic (Continental US)", 9, 62, 7, -96, 23, 29.5, 45.5, 0,
0
"Albers Equal-Area Conic (Alaska)", 9, 63, 7, -154, 50, 55, 65, 0, 0
"Albers Equal-Area Conic (Hawaii)", 9, 62, 7, -157, 3, 8, 18, 0, 0

```

Comparing the origin and standard parallel settings (arguments 4 through 7) to the ORIGIN_LON, ORIGIN_LAT, STD_PARALLEL_1, and STD_PARALLEL_2 settings in the .HDR file shown above, you'll see that they do not match up. In this case, you would need to add a line like this to the MAPINFOW.PRJ file:

```
"Albers Equal-Area Conic (St. Louis)", 9, 62, 7, -96.5, 0, 36.6, 43, 0, 0
```

Note that when adding a new coordinate system for an image, if a required setting is missing from the .HDR file, enter zero in its place. In the sample line above, for example, zero was used for the False Easting and False Northing settings—the final two arguments on the line.

Control Point Information

ULXMAP, ULYMAP, XDIM, and YDIM are the settings within the .HDR file that are used for determining a SPOT image's three control points. PIXEL_ROTATION_SIN and

PIXEL_ROTATION_COS are optional rotation settings within the image's .REP file; this file is only present with Geospot products. If a .REP file is not present or the .REP file does not contain any PIXEL_ROTATION_SIN and PIXEL_ROTATION_COS settings, here are the values to use for these settings when calculating control points:

```
PIXEL_ROTATION_SIN = 0
PIXEL_ROTATION_COS = 1
```

The following table shows the pixel coordinates and corresponding equations for determining the three control points. The column on the right of the table shows the results of calculating the control points using the sample data from above. In this case, the image has no .REP file.

Image X,Y	Equation	Example
0,0	ULXMAP,ULYMAP	522147,4086917
1,0	ULXMAP + PIXEL_ROTATION_COS * XDIM, ULYMAP + PIXEL_ROTATION_SIN * XDIM	522157,4086917
0,1	ULXMAP + PIXEL_ROTATION_SIN * YDIM, ULYMAP - PIXEL_ROTATION_COS * YDIM	522147,4086907

Notice that the control points are at the top left corner of the image (0,0), one pixel to the left (1,0), and one pixel below (0,1); no additional accuracy is gained by choosing control points that are any further apart. Here are the settings you would enter in the Register Raster Image dialog when registering the sample SPOT image:

Label	Map X	Map Y	Image X	Image Y
Pt 1	522147 m	4086917 m	0	0
Pt 2	522157 m	4086917 m	1	0
Pt 3	522147 m	4086907 m	0	1

See [Registering the Coordinates of a Raster Image on page 459](#) if it is unclear to you where to enter this information.

You can contact SPOT Image Corporation directly for more information on SPOT images and the SPOTView product line.

SPOT Image Corporation
1897 Preston White Drive
Reston, VA 22091-4368
Phone (703)620-2200 Fax (703)648-1813

MapInfo Map Interchange Format

This Appendix describes the data interchange format for MapInfo Professional®. In this appendix, you will find information on:

- MIF File Header
- MIF Data Section
- Pen, Brush, Symbol, and Font Codes in MIF
- MID File

This versatile format allows generic data to be attached to a variety of graphical items. Since it is ASCII, it is editable, relatively easy to generate, and works on all platforms supported by MapInfo. Perhaps the best way to understand the MapInfo Interchange Format (MIF) is to study the sample file at the end of this appendix in conjunction with the explanation of the file format. You can also create samples of your own by exporting files to MIF and then examining those files in a text editor.

MapInfo data is in two files — the graphics reside in a .MIF file and textual data is contained in a .MID file. The textual data is delimited data, with one row per record and either Carriage Return, Carriage Return plus Line Feed, or Line Feed between lines. The MIF file has two areas — the file header area and the data section. Information on how to create MapInfo tables is in the header; the graphical object definitions are in the data section.

In this Appendix:

- ◆ **MIF File Header** 599
- ◆ **MIF Data Section** 605
- ◆ **Pen Styles** 609
- ◆ **Brush Styles** 610
- ◆ **Symbol Styles** 611
- ◆ **Font Styles for Symbols** 613
- ◆ **Colors for Symbols** 613

MIF File Header

This is a description of MIF file header with optional information in square brackets.

```

VERSION n
NAME
[ no spaces allowed in the column name ]
Charset "characterSetName"
[ DELIMITER "<c>" ]
[ UNIQUE n,n.. ]
[ INDEX n,n.. ]
[ COORDSYS... ]
[ TRANSFORM... ]
COLUMNS n
  <name> <type>
  <name> <type>
  .
  .
DATA

```

MIF File Header Version

- TAB files are always saved as 300 unless noted.
- WOR files are always saved as 400 unless noted.
- Once a table is 'upgraded' to a later version, MapInfo *Professional* does not 'downgrade' it to an earlier version if the feature which forced the 'upgrade' is removed.
- Workspaces are written fresh each time, and so can be 'downgraded' if there are no features that require the 'upgrade'.
- MIF/MID files created by exporting TAB files from MapInfo *Professional* match the version of the TAB file.
- Pen(0,0,0) and Brush(0,0,0) which were valid in 4.1 are not valid in 4.5 and later.
- Line widths in points are encoded in the Pen clause by multiplying the line width value by 10 and adding 10 to the result (.2 -> 12, 1.0 -> 20, etc.). This forces a 450 in the MIF file header.
- Interleaved line styles are encoded in the Pen clause by increasing the line style value by 128. This does not force a 450 workspace, appears to be 4.x compatible, and gets a 400.

File versions and TAB, MIF/MID, and WOR Support

Version Number	TAB	MIF - MID	WOR	Action
400	X			Table is a linked ODBC table
	X	X	X	Table uses interleaved line styles or objects in the cosmetic layer containing interleaved line styles
			X	Saved queries (controlled by 'Save Queries in Workspaces' check box in the Startup Preferences dialog box) are implemented as straight Select statements
410	X	X		Table uses MS Access databases
450	X	X		Region and polyline objects, that have more than 32K nodes !edit_version 450 and !version 300
	X	X		Table uses point sized line widths
	X	X		Table is a query table
			X	Workspaces that specify dot density color (shade ... density... color)
			X	Workspaces that specify Line width in points (Pen (12,x,x))
	X	X		Table uses a Datum or ellipsoid released in a specific version. *See release notes for new datums and new ellipsoids
452	X	X		Regional Mercator projection - (#26)
500	X	X		Table specifies a 'grid' file (*.MIG, raster style = 6 1)
			X	Workspaces that contain surface thematic layers (inflect)
			X	Workspaces that contain cartographic legends (Create Cartographic Legend)
550	X	X		Polyconic projection - (#27)
	X	X		Irish (WOFO) ellipsoid - (#49)
	X	X		Table is a linked\live Oracle 8i table
			X	Workspaces with Oracle 8i connection information
			X	Workspaces that include surface thematics with Hillshading
	X	X		Table uses a Datum or ellipsoid released in a specific version. * See release notes for new datums and new ellipsoids
600	X	X		Azimuthal Equidistant projection, Oblique aspect - #(28)
	X	X		Everest (Pakistan) ellipsoid - #(50)

Version Number	TAB	MIF - MID	WOR	Action
	X	X		ATS 77 ellipsoid - #(51)
				New Datums introduced in Version 6.0. Their numbers are in a range 115-150 (115 and 150 included) and 1004-1011 (1004 and 1011 included) 600, since MapInfo Professional writes Datum number if all the parameters match to the parameters of our internal Datum table. Also note, that we write the FIRST datum number with these parameters, that we find in our internal table. That means that if for example table was created using Datums EUREF89 (115), GDA94 (116) or NZGD2000 (117), the MIF file will have Datum GRS 80 (33) written into it and MIF file version would not be incremented. Since MapInfo Professional does not write datum number into TAB file, version will be incremented only if ellipsoid is new.
			X	Workspace includes Advanced Printer settings
			X	Workspace includes a Hotlink
			X	Workspace includes a 3D Mapper window
			X	Workspaces that include new clip region settings
	X	X		Table uses a Datum or ellipsoid released in a specific version. *See release notes for new datums and new ellipsoids
650	X	X		New object types: Multipoint and Collection (actually !edit_version 650 and !version 300)
	X	X		Cassini-Soldner projection (number 30)
	X	X		Lambert Azimuthal Equal-Area projection - Oblique aspect(number 29)
			X	Cassini-Soldner projection for the map window
			X	Lambert Azimuthal Equal-Area projection (Oblique aspect) for the map window
			X	New object types (Multipoint and Collection) created in a cosmetic layer or in a layout
			X	Save a workspace with a Prism Map
700	X			TAB file linked to a ShapeFile

Version Number	TAB	MIF - MID	WOR	Action
	X	X	X	#152 - JGD2000 datum used in Japan. #1012 - PZ90 datum based on PZ90 ellipsoid. This datum is used in Russia. #1013 - SK42 datum based on PZ90 ellipsoid. This datum is used in Russia. #1014 - SK95 datum based on PZ90 ellipsoid. This datum is used in Russia. "Longitude / Latitude (Russia PZ90)", 1, 1012 "Longitude / Latitude (Russia SK42)", 1, 1013 "Longitude / Latitude (Russia SK95)", 1, 1014 Double Stereographic projection. New datum - ATS77 (which uses ATS77 ellipsoid). Prince Edward Island and New Brunswick Projection
			X	ROP Method selected for advanced options for Save Window As or Printing

Charset

The Charset clause specifies which character set was used to create text in the table. For example: Specify "WindowsLatin1" to indicate that the file was created using the Windows US & Western Europe character set; specify "MacRoman" to specify the Macintosh US & Western Europe character set; or specify "Neutral" to avoid converting the text into another character set. If you are not using one of these character sets, you can determine the correct syntax for your character set by exporting a table and examining the .MIF file in a text editor.

Delimiter

Specify the delimiting character in quotation marks, for example:

```
DELIMITER ";"
```

The default delimiter is Tab; if you are using the default, you do not need the DELIMITER line.

Unique

Specify a number. This number refers to a database column; 3 is the third column, 7 is the seventh column, and so forth. What happens to columns in the UNIQUE list is subtle. For example, imagine that you have a database with highways in it. Each highway has only one name, but it might be represented by several segments. You would put the NAME column in the UNIQUE list, while the column containing data for the individual segments would not be in that list. This has the effect of creating two related tables; one with names, and one with the other attributes of the objects. This is how MapInfo's various street maps (StreetPro) are prepared.

Index

To indicate that columns in the table are indexed, include a number (or a comma-separated list of numbers) in the Index clause. Each number refers to a database column; 3 is the third column, 7 is the seventh column, and so forth. Columns in the INDEX list will have indexes prepared for them.

CoordSys Clause

Specify the COORDSYS clause to note that the data is not stored in longitude/latitude form. When no COORDSYS clause is specified, data is assumed to be stored in longitude/latitude form.

All coordinates are stored with respect to the northeast quadrant. The coordinates for points in the United States have a negative X while coordinates for points in Europe (east of Greenwich) have a positive X. Coordinates for points in the Northern hemisphere have a positive Y while coordinates for points in the Southern hemisphere have a negative Y.

```
Syntax1
CoordSys Earth
  [ Projection type,
    datum,
    unitname
    [ , origin_longitude]
    [ , origin_latitude ]
    [ , standard_parallel_1 [ , standard_parallel_2 ] ]
    [ , azimuth ]
    [ , scale_factor ]
    [ , false_easting ]
    [ , false_northing]
    [ , range ] ]
  [ Affine Units unitname, A, B C, D, E, F ]
  [ Bounds ( minx, miny) ( maxx, maxy) ]
```

Syntax2

```
CoordSys Nonearth
  [ Affine Units unitname, A, B C, D, E, F ]
  Units unitname
  Bounds ( minx, miny) ( maxx, maxy)
```

Syntax3

```
CoordSys Layout Units paperunitname
```

Syntax4

```
CoordSys Table tablename
```

Syntax5

```
CoordSys Window window_id
```

type is a positive integer value representing which coordinate system to use

datum is a positive integer value identifying which datum to reference

unitname is a string representing a distance unit of measure (e.g. -m" for meters); for a list of unit names, see Set Distance Units

origin_longitude is a float longitude value, in degrees

origin_latitude is a float latitude value, in degrees
standard_parallel_1 and *standard_parallel_2* are float latitude values, in degrees
azimuth is a float angle measurement, in degrees
scale_factor is a float scale factor
range is a float value from 1 to 180, dictating how much of the Earth will be seen
minx is a float specifying the minimum x value
miny is a float specifying the minimum y value
maxx is a float specifying the maximum x value
maxy is a float specifying the maximum y value
paperunitname is a string representing a paper unit of measure (e.g. -in" for inches); for a list of unit names, see Set Paper Units
tablename is the name of an open table
window_id is an Integer window identifier corresponding to a Map or Layout window

A performs scaling or stretching along the X axis.
 B performs rotation or skewing along the X axis.
 C performs shifting along the X axis.
 D performs scaling or stretching along the Y axis.
 E performs rotation or skewing along the Y axis.
 F performs shifting along the Y axis.

Transform Clause

When you have MIF files with coordinates stored with respect to the northwest quadrant (quadrant 2), you can transform them to the northeast quadrant (quadrant 1) with a transform clause.

Quadrant 2: Northwest Quadrant	Quadrant 1: Northeast Quadrant
Quadrant 3: Southwest Quadrant	Quadrant 4: Southeast Quadrant

The transform clause has the following syntax:

```
TRANSFORM Xmultiplier, Ymultiplier, Xdisplacement, Ydisplacement
```

To transform quadrant 2 data into quadrant 1 data, use the following transform clause:

```
TRANSFORM -1,0,0,0
```

The zeroes instruct MapInfo to ignore that parameter.

When you have an application which creates MIF files in quadrant 2, you can:

- Add the TRANSFORM clause to the MIF files
- Change the application so that it creates coordinates in quadrant 1
- Change the application so that it adds a TRANSFORM clause to the MIF files

Columns

Specify the number of columns. Then, for each column, create a row containing the column name, the column type, and, for character and decimal columns, a number to indicate the width of the field.

Note: Field names cannot have spaces.

Valid column types are:

- char (width)
- integer (which is 4 bytes)
- smallint (which is 2 bytes, so it can only store numbers between -32767 and +32767)
- decimal (width,decimals)
- float
- date
- logical

This is an example of the columns section of the header:

```
COLUMNS 3
STATE char (15)
POPULATION integer
AREA decimal (8,4)
```

For the database specified in this header, the MID file has three columns:

- a 15 character field that represents the STATE column,
- an integer field that represents the POPULATION column,
- an AREA column that consists of a decimal field with up to 8 total characters (digits, decimals points, and optional sign) and 4 digits after the decimal.

MIF Data Section

The data section of the MIF file follows the header and must be introduced with DATA on a single line:

```
DATA
```

The data section of the MIF file can have any number of graphical primitives, one for each graphic object. MapInfo matches up entries in the MIF and MID files, associating the first object in the MIF file with the first row in the MID file, the second object in the MIF file with the second row in the MID file, and so on.

When there is no graphic object corresponding to a particular row in the MID file, a “blank” object (NONE) must be written as a place holder in the corresponding place in the MIF file.

```
NONE
```

The graphical objects that can be specified are:

```
point
line
```

polyline
 region
 arc
 text
 rectangle
 rounded rectangle
 ellipse
 multipoint
 collection

A point object takes two parameters; an X coordinate and a Y coordinate. As an option, specify the symbol that represents the point. Symbols are designated by numbers. If you omit the SYMBOL clause, the current symbol is used.

```
POINT    x y
        [ SYMBOL (shape, color, size)]
```

Each MapInfo version supports variations on the SYMBOL clause; see [Symbol Styles on page 611](#) in this appendix.

A line objects requires four parameters; an X and a Y coordinate for each end point. As an option, specify a pen type. When no pen type is specified, the current pen type is used.

```
LINE    x1 y1 x2 y2
        [ PEN (width, pattern, color)]
```

A polyline object consists of one or more sections. If the polyline has more than one section, include the MULTIPLE keyword, followed by the number of sections. For each section, specify a numpts argument (which indicates the number of nodes in that section), followed by an x/y coordinate pair for each node. Use the optional PEN clause (described later in this appendix) to specify the line style. If you include the optional SMOOTH keyword, the polyline is smoothed.

```
PLINE [ MULTIPLE numsections ]
      numpts1
      x1 y1
      x2 y2
      :
[ numpts2
  x1 y1
  x2 y2      ]
      :
      [ PEN (width, pattern, color)]
      [ SMOOTH ]
```

A region object consists of one or more polygons. Specify the number of polygons through the numpolygons argument (immediately after the REGION keyword). For each polygon, specify a numpts argument (which indicates the number of nodes in that polygon), followed by an x/y coordinate pair for each node. Use the optional PEN and BRUSH clauses (described later in this appendix) to specify the object's style. Use the optional CENTER clause to define the object's centroid explicitly. The centroid must be within the object.

```
REGION numpolygons
      numpts1
```

```

    x1 y1
    x2 y2
    :
[ numpts2
  x1 y1
  x2 y2 ]
  :
[ PEN (width, pattern, color)]
[ BRUSH (pattern, forecolor, backcolor)]
[ CENTER x y ]

```

An arc requires the diagonally opposite corners of its bounding rectangle and the beginning (a) and ending (b) angles of the arc in degrees, moving counter-clockwise with zero at three o'clock. As an option, specify the pen type. (An arc specifies a section of an ellipse, the corners of which are determined by the bounding rectangle.)

```

ARC  x1 y1 x2 y2
     a b
     [ PEN (width, pattern, color)]

```

A text object consists of a text string, up to 255 characters long. To make the text string wrap onto multiple lines, insert the characters `\n` within the textstring argument (e.g. "First line \nSecond line \nThird line"). The x1, y1, x2, and y2 arguments specify the location of the text on the map. Spacing can be 1.0 (single spacing), 1.5, or 2.0 (double spacing). Use the Font clause (described later in this appendix) to control the typeface, etc.

```

TEXT  "textstring"
     x1 y1 x2 y2
     [ FONT...]
[ Spacing {1.0 | 1.5 | 2.0}]
[ Justify {Left | Center | Right}]
[ Angle text_angle]
[ Label Line {simple | arrow} x y ]

```

A rectangle requires the coordinates of the diagonally opposite corners. As an option, specify pen and brush types.

```

RECT  x1 y1 x2 y2
     [ PEN (width, pattern, color)]
     [ BRUSH (pattern, forecolor, backcolor)]

```

A rounded rectangle requires the coordinates of the diagonally opposite corners and the degree of rounding (a). As an option, specify pen and brush types. Degree of rounding is expressed in coordinate units.

```

ROUNRECT  x1 y1 x2 y2
          a
          [ PEN (width, pattern, color)]
          [ BRUSH (pattern, forecolor, backcolor)]

```

An ellipse object requires the coordinates of the diagonally opposite corners of its bounding rectangle. As an option, specify pen and brush types.

```

ELLIPSE x1 y1 x2 y2
        [ PEN (width, pattern, color)]
        [ BRUSH (pattern, forecolor, backcolor)]

```

A multipoint object takes multiple parametrics, consisting of xy coordinate pairs. The number of points is indicated by the num_points parameter as an option, specify the symbol that represents the multipoint. Symbols are designed by numbers. If you omit the SYMBOL clause, the current symbol is used.

```
MULTIPOINT num_points
      x1 y1  x2 y2  x3 y3 ...
```

EXAMPLE:

```
Multipoint 7
-3.113504 10.532464
-2.113504 11.532464
-1.113504 12.532464
-0.113504 14.532464
-4.113504 11.532464
-0.113504 8.532464
0.886496 13.532464
      Symbol (35,0,12)
Collection format
Collection num_parts
Region
.....
Pline
.....
Multipoint
.....
```

A collection object takes multiple parameters, consisting of the parameters of the object types included in the collection. Individual formats for the Region, Pline, and Multipoint parts of the collection are the same as those for the corresponding object type. The num_parts parameter is required if the number of parts in the collection is less than three. If this number is omitted, it is assumed that the collection contains all three parts. In exports, MapInfo always writes this number into the MIF file.

```
COLLECTION num_parts
Region
Pline
Multipoint
EXAMPLE:
```

```
Collection 3
Region 3
5
4.850832 10.077456
5.850832 11.077456
6.850832 13.077456
12.850832 19.077456
4.850832 10.077456
4
-5.149168 0.077456
-4.149168 1.077456
-3.149168 3.077456
-5.149168 0.077456
4
14.850832 20.077456
15.850832 21.077456
16.850832 23.077456
```



```
14.850832 20.077456
  Pen (1,2,0)
  Brush (2,16777215,16777215)
  Center 8.850832 14.577456
Pline 3
-7.149168 0.077456
-3.149168 -2.922544
-2.149168 2.077456
  Pen (1,2,0)
Multipoint 2
-6.149168 -0.922544
-5.149168 0.077456
  Symbol (35,0,12)
```

Pen Styles

The Pen clause specifies the width, pattern, and color of a linear object, such as a line, polyline arc, or the border of a region. The Pen clause has the following syntax:

```
PEN (width, pattern, color)
```

Width is a number from 1 to 7. 1–7 is the width in screen pixels. 11–2047 are values that will be converted to points:

$\text{penwidth} = (\text{number of points} * 10) + 10$

0 is only valid when the pen pattern is 1 for invisible lines.

Color is an integer, representing a 24-bit RGB color value.

Pattern is an integer from 1 to 118; pattern number 1 is invisible. The pattern number corresponds to a pen number in the pen file. The pen file can be modified using a pen editor.

Valid pen numbers are from 1 to maximum number of pens in the pen file, which should not exceed 127. If a pen style is interleaved, 128 will be added to the pen number. Interleaved styles are in the range 129–255. Because the pen file can be modified, and interleaved can be specified, the pen pattern can be a number between 1–255.

The following table lists the available line styles by default:

01		31		61		91	
02		32		62		92	
03		33		63		93	
04		34		64		94	
05		35		65		95	
06		36		66		96	
07		37		67		97	
08		38		68		98	
09		39		69		99	
10		40		70		100	
11		41		71		101	
12		42		72		102	
13		43		73		103	
14		44		74		104	
15		45		75		105	
16		46		76		106	
17		47		77		107	
18		48		78		108	
19		49		79		109	
20		50		80		110	
21		51		81		111	
22		52		82		112	
23		53		83		113	
24		54		84		114	
25		55		85		115	
26		56		86		116	
27		57		87		117	
28		58		88		118	
29		59		89			
30		60		90			

Brush Styles

Brush specifies the pattern, foreground color, and background color of a filled object, such as a circle or region. The Brush clause has the following syntax:

```
Brush (pattern, forecolor [, backcolor ])
```

The forecolor and backcolor arguments are both integers, representing 24-bit RGB color values.

Pattern is a number from 1 to 71. Note: Pattern number 1 is “no fill,” and pattern number 2 is a solid fill. Pattern numbers 9–11 are reserved.

Note: To specify a transparent fill style, use pattern number three or larger, and omit the backcolor argument. For example: Brush(5, 255)

Symbol Styles

The Symbol clause specifies the appearance of a Point object. There are three different forms of the Symbol clause:

- MapInfo 3.0 Syntax
- TrueType Font Syntax
- Custom Bitmap File Syntax

Symbol Clause-MapInfo 3.0 Syntax

The Symbol clause specifies the appearance of a Point object. There are three different forms of the Symbol clause. To specify a symbol style using “Old MapInfo Symbols” (the symbols that were used in earlier versions of MapInfo), use the following syntax:






































```
SYMBOL (shape, color, size)
```

The shape argument is an integer value, 31 or larger; 31 represents a blank symbol (i.e. the object will not be visible). The standard set of symbols includes symbols 32 through 67, inclusive, but the user can customize the symbol set by using the Symbol application.

The color argument is an integer representing a 24-bit RGB color value.

The size argument is an integer from 1 to 48, representing a point size.

The following table lists the default symbols provided with MapInfo:

31		41		51		61	
32		42		52		62	
33		43		53		63	
34		44		54		64	
35		45		55		65	
36		46		56		66	
37		47		57		67	
38		48		58			
39		49		59			
40		50		60			

Symbol Clause – TrueType Font Syntax

To specify a symbol style based on a character from a TrueType font, use the following syntax:

```
SYMBOL (shape, color, size, fontname, fontstyle, rotation)
```

The fontname argument is a text string that identifies the name of a font (e.g. "Wingdings").

The fontstyle argument is an integer that controls settings such as Bold. The following table lists the values you can use as fontstyle.

fontstyle value	Effect on Symbol style
0	Plain text
1	Bold text
16	Black border around symbol
32	Drop shadow
256	White border around symbol

To specify two or more style attributes, add the values from the left column. For example, to specify Bold and Drop Shadow, use 33.

The rotation argument is a floating-point number, representing a rotation angle, in degrees.

Symbol Clause – Custom Bitmap File Syntax

To specify a symbol style based on a character from a TrueType font, use the following syntax:

```
SYMBOL (filename, color, size, customstyle)
```

The filename argument is a text string that identifies a bitmap file (e.g. "ARROW.BMP") in the CustSymb directory.

The customstyle argument is an integer that controls whether color and background attributes are used. The following table lists the values you can use as customstyle:

customstyle value	Effect on Symbol style
0	Both the Show Background setting and the Apply Color setting are off; symbol appears in default state. White pixels in the bitmap appear transparent, allowing whatever is behind the symbol to show through.
1	The Show Background settings is on; white pixels in the image are opaque.
2	The Apply Color setting is on; non-white colors in the image are replaced with the Symbol's color value.
3	Both Show Background and Apply Color settings are on.

Font Styles for Symbols

The Font clause specifies the appearance (typeface, color, etc.) of text objects. The Font clause has the following syntax:

```
FONT ("fontname", style, size, forecolor [, backcolor] )
```

Fontname in double quotation marks is the typeface to be displayed. Style is the text attribute of the typeface as shown in the following table. Size must be 0 in a MIF file, because each text object on a Map is attached to the map itself (thus the text size changes as you zoom in or out). Forecolor is an integer representing a 24-bit RGB color. The background color is optional; if you include it, MapInfo fills the area behind the text with the color you specify.

style value	Effect on Font Appearance
0	Plain
1	Bold
2	Italic
4	Underline
16	Outline (only supported on the Macintosh)
32	Shadow
256	Halo
512	All Caps
1024	Expanded

To specify two or more style attributes, add the values from the left column. For example, to specify Bold and All Caps, use 513.

Colors for Symbols

Colors are often defined in relative concentrations of red, green, and blue. Each color is a number from 0 to 255, inclusive; the RGB value of a color is calculated by the following formula:

$$(\text{red} * 65536) + (\text{green} * 256) + \text{blue}$$

These are some often used colors and their values:

Red: 16711680

Green: 65280

Blue: 255

Cyan: 65535

Magenta: 16711935

Yellow: 16776960

Black: 0

MID File

The MID file contains data, one record of data per row, delimited by the character specified in the delimiter statement. The default delimiter is Tab. Each row in the MID file is associated with a corresponding object in the MIF file; first row with first object, second row with second object.

If delimiter character is included as part of the data in a field, enclose the field in quotation marks.

The MID file is an optional file. When there is no MID file, all fields are blank.










































Fill Patterns Used in MapInfo Professional

In the Region Style dialog box, you have the option of selecting fill patterns for regions. This appendix shows the fill patterns and their ID numbers.

Sections in this Appendix:

- ◆ **Fill Pattern Table (Before MapInfo Professional 7.5) 617**
- ◆ **New Fill Patterns (Added in MapInfo Professional 7.5) 618**

Fill Pattern Table (Before MapInfo Professional 7.5)

MB ID	Image	MB ID	Image	MB ID	Image
1	None	27		50	
2		28		51	
3		29		52	
4		30		53	
5		31		54	
6		32		55	
7		33		56	
8		34		57	
12		35		58	
13		36		59	
14		37		60	
15		38		61	
16		39		62	
17		40		63	

MB ID	Image	MB ID	Image	MB ID	Image
18		41		64	
19		42		65	
20		43		66	
21		44		67	
22		45		68	
23		46		69	
24		47		70	
25		48		71	
26		49			






New Fill Patterns (Added in MapInfo Professional 7.5)

Here is a list of the new fill patterns we supply with MapInfo Professional:

MB ID	Image	MB ID	Image	MB ID	Image
72		107		142	
73		108		143	
74		109		144	

MB ID	Image	MB ID	Image	MB ID	Image
75		110		145	
76		111		146	
77		112		147	
78		113		148	
79		114		149	
80		115		150	
81		116		151	
82		117		152	
83		118		153	
84		119		154	
85		120		155	
86		121		156	
87		122		157	
88		123		158	
89		124		159	

MB ID	Image	MB ID	Image	MB ID	Image
90		125		160	
91		126		161	
92		127		162	
93		128		163	
94		129		164	
95		130		165	
96		131		166	
97		132		167	
98		133		168	
99		134		169	
100		135		170	
101		136		171	
102		137		172	
103		138		173	
104		139		174	

MB ID	Image	MB ID	Image	MB ID	Image
105		140		175	
106		141			

Custom Datums

A datum is a mathematical description of the earth's shape and orientation. Because the earth's shape is not uniform, there are many different local datums used in different parts of the world. These local datums provide a close approximation to the earth's surface in a particular area.

Each Earth coordinate system uses a specific datum to approximate the earth's surface. If two coordinate systems use different datums, then MapInfo Professional® must perform a datum transformation when it converts coordinates from one coordinate system to the other. MapInfo uses the Bursa-Wolfe datum transformation method, which is generally accurate to within 10 meters. (When MapInfo converts between two coordinate systems that use the same datum, no datum transformation is performed, and the results are generally accurate to within 0.1 meter.)

In this Appendix:

- ◆ **Defining Custom Datums** 623
- ◆ **Datum Conversion** 628

Defining Custom Datums

Most coordinate systems use one of MapInfo's predefined datums, listed in this appendix. If you need to use a datum that isn't in the list, and you know what the datum's mathematical parameters are, then you can define the coordinate system using a custom datum. MapInfo uses the following information to define a datum:

- An ellipsoid, also called a spheroid. This is an ellipse rotated around its minor axis to form a three-dimensional surface. The ellipsoid is described by two mathematical parameters: the length, in meters, of its semi-major axis (denoted by the letter *a*) and its degree of flattening (denoted by the letter *f*). MapInfo supports over 40 predefined ellipsoids, which are listed in the next table.
- Three shift parameters specifying the distance, in meters, to shift the ellipsoid along each of its axes. These parameters are usually denoted by *dX*, *dY*, and *dZ*. You may also see them denoted by *DX*, *DY*, and *DZ*, or by *u*, *v*, and *w*.
- Three rotation parameters specifying the angle, in arc-seconds, to rotate the ellipsoid around each of its axes. These parameters are usually denoted by *E_X*, *E_Y*, and *E_Z*. You may also see them denoted by *e_X*, *e_Y*, and *e_Z*, or by *e*, *y*, and *w*.
- A scale correction factor specifying the amount, in parts per million, to adjust the size of the ellipsoid. This parameter is denoted by the letter *m*, or sometimes *k*.
- The longitude of the prime meridian, in degrees east of Greenwich. The prime meridian specifies which location on earth is assigned longitude 0°. Most datums use Greenwich as the prime meridian, so this parameter is usually zero. However, some datums use a different location as the prime meridian. For example, the NTF datum uses Paris as its prime meridian, which is 2.33722917 degrees east of Greenwich. If you use the NTF datum in a coordinate system, all longitudes in that coordinate system are relative to Paris instead of Greenwich.

You can define a custom datum in any coordinate system definition. Appendix F describes how to define a coordinate system. To define a custom datum in a coordinate system, you use datum number 9999 followed by the datum parameters, in this order:

```
9999, EllipsoidNumber, dX, dY, dZ, EX, EY, EZ, m, PrimeMeridian
```

Some datums specify only an ellipsoid and shift parameters (*dX*, *dY*, *dZ*), with no rotation parameters, scale correction, or prime meridian. In those cases, you can use datum number 999 instead of 9999, to simplify the definition:

```
999, EllipsoidNumber, dX, dY, dZ
```

The ellipsoid number must be chosen from the following list. Currently, there is no way to define a custom ellipsoid. If you need to use an ellipsoid that does not appear on this list, please notify MapInfo Technical Support so that we can add your ellipsoid to a future MapInfo release.

Two ellipsoids have been added. These are: Everest Pakistan #50, and ATS 77 (Average Terrestrial System) #51.

The ellipsoid names for Everest ellipsoids have been standardized according to NIMA specs to conform to the most current standards used in the GIS and mapping communities.

The name changes are summarized in this table:

Ellipsoid #	Old Name	New Name/NIMA Designation
11	Everest (1830)	Everest (India 1830)
17	Everest (Kertau)	Everest (W. Malaysia and Singapore 1948)
39	Everest (Timbalai)	Everest (Brunei and East Malaysia (Sabah and Sarawak))
48	Everest (West Malaysia)	Everest (West Malaysia 1969)
40	Everest (Kalianpur)	Everest (India 1956)

The additions and the new names are reflected in this table.

Number	Ellipsoid	a	1/f
9	Airy 1930	6377563.396	299.3249646
13	Airy 1930 (modified for Ireland 1965)	6377340.189	299.3249646
51	ATS7 77	6378135.0	298.257
2	Australian	6378160.0	298.25
10	Bessel 1841	6377397.155	299.1528128
35	Bessel 1841 (modified for NGO 1948)	6377492.0176	299.15281
14	Bessel 1841 (modified for Schwarzeck)	6377483.865	299.1528128
36	Clarke 1858	6378293.639	294.26068
7	Clarke 1866	6378206.4	294.9786982
8	Clarke 1866 (modified for Michigan)	6378450.0474844 81	294.9786982
6	Clarke 1880	6378249.145	293.465
15	Clarke 1880 (modified for Arc 1950)	6378249.145326	293.4663076
30	Clarke 1880 (modified for IGN)	6378249.2	293.4660213
37	Clarke 1880 (modified for Jamaica)	6378249.136	293.46631
16	Clarke 1880 (modified for Merchich)	6378249.2	293.46598
38	Clarke 1880 (modified for Palestine)	6378300.79	293.46623
39	Everest (Brunei and East Malaysia (Sabah and Sarawak))	6377298.556	300.8017
11	Everest (India 1830)	6377276.345	300.8017

Number	Ellipsoid	a	1/f
40	Everest (India 1956)	6377301.243	300.80174
50	Everest (Pakistan)	6377309.613	300.8017
17	Everest (W. Malaysia and Singapore 1948)	6377304.063	300.8017
48	Everest (West Malaysia 1969)	6377295.664	300.8017
18	Fischer 1960	6378166.0	298.3
19	Fischer 1960 (modified for South Asia)	6378155.0	298.3
20	Fischer 1968	6378150.0	298.3
21	GRS 67	6378160.0	298.247167427
0	GRS 80	6378137.0	298.257222101
5	Hayford	6378388.0	297.0
22	Helmert 1906	6378200.0	298.3
23	Hough	6378270.0	297.0
31	IAG 75	6378140.0	298.257222
41	Indonesian	6378160.0	298.247
4	International 1924	6378388.0	297.0
49	Irish (WOFO)	6377542.178	299.325
3	Krassovsky	6378245.0	298.3
32	MERIT 83	6378137.0	298.257
33	New International 1967	6378157.5	298.25
43	NWL 10D	6378135.0	298.26
42	NWL 9D	6378145.0	298.25
44	OSU86F	6378136.2	298.25722
45	OSU91A	6378136.3	298.25722
46	Plessis 1817	6376523.0	308.64
52	PZ90	6378136.0	298.257839303
24	South American	6378160.0	298.25
12	Sphere	6370997.0	0.0
47	Struve 1860	6378297.0	294.73

Number	Ellipsoid	a	1/f
34	Walbeck	6376896.0	302.78
25	War Office	6378300.583	296.0
26	WGS 60	6378165.0	298.3
27	WGS 66	6378145.0	298.25
1	WGS 72	6378135.0	298.26
28	WGS 84	6378137.0	298.257223563

The shift and rotation parameters describe the ellipsoid's orientation in space, as compared to the WGS 84 datum. It's important to make sure that these parameters have the correct signs (positive or negative). Usually, a document describing a local datum will list the parameters required to convert coordinates from the local datum to WGS 84. (This is the same as saying that the parameters were derived by subtracting the local datum from WGS 84.) In that case, you can use the parameters exactly as they appear in the document. However, if you have a document that lists parameters for converting coordinates in the opposite direction — from WGS 84 to the local datum — then you must reverse the signs of the shift, rotation, and scale correction parameters.

It's also very important to list the parameters in the correct order. Some documents list the rotation parameters with E_z first, like this: E_z , E_y , E_x . In those cases, you must reverse the order of the rotation parameters when defining the custom datum. This is especially easy to overlook when your document uses Greek letters to denote the parameters. If the document lists the parameters in order as w , y , e , then you must reverse their order in the custom datum definition.

Here's an example of a local datum description (we'll call it LD-1) as it might appear in a technical article:

LD-1 ellipsoid: International

a	6378388.0 m
f	1 / 297.0

Converting from WGS 84 to LD-1

DX	93.5 m
DY	103.5 m
DZ	123.3 m
e_x	-0.25
e_y	0.11
e_z	0.07
m	-2.1 ppm

This datum uses the International ellipsoid, which is number 4 in the ellipsoid table above. The other parameters describe a conversion from WGS 84 to the local datum, so we must reverse their signs. No prime meridian is listed, so we can assume that Greenwich is used. The custom datum definition in MapInfo would look like this:

```
9999, 4, -93.5, -103.5, -123.3, 0.25, -0.11, -0.07, 2.1, 0
```

You can insert this string of numbers in place of the datum number in any line in the MAPINFOW.PRJ file. For example, you could define the following coordinate systems using this custom datum:

Note: Strings must be entered on a single line.

```
"Longitude / Latitude (LD-1)", 1, 9999, 4, -93.5, -103.5, -123.3, 0.25, -0.11, -0.07, 2.1, 0
"UTM Zone 30 (LD-1)", 8, 9999, 4, -93.5, -103.5, -123.3, 0.25, -0.11, -0.07, 2.1, 0, 7, -3, 0, 0.9996, 500000, 0
```

Here's another sample local datum description, called LD-2 this time:

LD-2 ellipsoid: Krassovsky

a	6378245.0 m
f	1 / 298.3

Converting from LD-2 to WGS 84

u	+24 m
v	-123 m
w	-94 m
w	+0.13
y	+0.25
e	-0.02
m	+1.1 · 10 ⁻⁶

This datum uses the Krassovsky ellipsoid, which is number 3 in the ellipsoid table above. We do not need to reverse the signs of the parameters, since they describe a conversion from the local datum to WGS 84. However, the rotation parameters are listed with w first, so we must reverse their order in the custom datum definition:

```
9999, 3, 24, -123, -94, -0.02, 0.25, 0.13, 1.1, 0
```

Here's a final example, LD-3, that provides only the ellipsoid and shift parameters:

LD-3 ellipsoid: Clarke 1880

a	6378249.145 m
f	1 / 293.465

WGS 84 minus local datum LD-3

dX	-7 m
dY	36 m
dZ	225 m

This datum uses the Clarke 1880 ellipsoid, which is number 6 in the ellipsoid table above. We do not need to reverse the signs of the parameters or worry about the order of the rotation parameters (since they aren't present). In this case, you can use datum number 999 instead of 9999 in the custom datum definition. These two definitions are equivalent, and you can use either one:

```
999, 6, -7, 36, 225
9999, 6, -7, 36, 225, 0, 0, 0, 0, 0
```

As with the other custom datum definitions, you would insert one of these definitions in place of the datum number in a MAPINFOW.PRJ line, as follows:

```
"Longitude / Latitude (LD-3)", 1, 999, 6, -7, 36, 225
"UTM Zone 30 (LD-3)", 8, 999, 6, -7, 36, 225, 7, -3, 0, 0.9996, 500000, 0
```

Datum Conversion

When converting coordinates from one datum to another, MapInfo has used the Molodensky (3-parameter) and Bursa-Wolf (7-parameter) methods. These are general-purpose methods that can convert coordinates from any datum to any other datum.

After the NAD 83 datum was introduced, NOAA developed a program called NADCON, which stands for North American Datum CONVersion. This is a very specialized program that converts coordinates only from NAD 27 to NAD 83 and vice versa. For this specialized task, it's much more accurate than the Molodensky general-purpose method; NADCON is accurate to about 0.1 meter, and Molodensky is accurate to only 10–30 meters. Most U.S. government agencies, including the Census Bureau, have standardized on NADCON for converting between NAD 27 and NAD 83.

Beginning with MapInfo 4.1.2, the NADCON algorithm is used to convert coordinates between NAD 27 and NAD 83 if those coordinates lie within the areas covered by NADCON (United States, Puerto Rico, and the Virgin Islands). If the coordinates lie outside those areas, or if they use datums other than NAD 27 or NAD 83, MapInfo uses the Molodensky or Bursa-Wolfe conversion methods.

Due to the file access required, the NADCON conversion method can be slightly slower than the Molodensky method. If you want to turn off the NADCON conversion, add a "NADCON" entry to the registry. The registry entry should have this path:

```
HKEY_LOCAL_MACHINE\Software\MapInfo\MapInfo\Common\NADCON
```

If this entry is set to zero, then the Molodensky conversion method will be used instead of NADCON.

If using the 16-bit version of MapInfo, add this line to the [MAPINFO COMMON] section in MAPINFO.INI to turn off the NADCON conversion:

```
NADCON=0
```

Sample Data Copyrights

In this Appendix:

- ♦ Africa 631
- ♦ Asia 631
- ♦ Europe 632
- ♦ North America 633
- ♦ World 635

Africa

Source: MapInfo Corporation From National Imagery and Mapping Agency (NIMA)

Data: Country and Surrounding country boundaries

Source: <http://data.geocomm.com> (Free off the internet) All countries appended to one table and thinned for size purposes)

Asia

Australia

Source: Copyright and Intellectual Property in the attached data sets rests with one of the following: The Australian Government represented by the Australian Bureau of Statistics; The Government of New South Wales represented by The Land Information Centre. MapInfo Australia Pty Ltd and PSMA Australia Ltd.

Data: Locations of the state boundaries and capitals and over 4000 major and minor cities. Map of major rivers and major roads.

Local government area boundary for Manly.

Tasmania area boundaries, feature points and water boundaries.

Map of New South Wales.

Sydney feature points, rivers, suburbs, towns, census collection district and postcode boundaries, and customer database.

Component street table and grid surrounding for Sydney. Streetworks samples

Source: MapInfo from Digital Chart of the World

Data: Generalized map of major highways

Source: SPOT Image Corporation © CNES 1995

Data: Raster map of Sydney

Source: MapInfo Corporation from National Imagery and Mapping Agency (NIMA)

Data: Country boundary

Source: Hervey Bay City Council, 2000

Data: Point Vernon and Hervey Bay, Australia

China

Source: MapInfo from Digital Chart of the World

Data: Over 5,000 major and minor cities and major highways.

Source: MapInfo Corporation from National Imagery and Mapping Agency (NIMA)

Data: Country and surrounding country boundaries.

Japan

Source: GisNET data licensed to MapInfo by GISdata Limited. © GDC Ltd 1993

Data: Water, highway, rivers, lakes and major railroads.

Source: MapInfo from Digital Chart of the World.

Data: 142 major and minor cities including all prefecture capitals.

Source: MapInfo Corporation from National Imagery and Mapping Agency (NIMA)

Data: Country boundary.

India

Source: Risk Management Solutions, Inc.

Data: State, country and district boundaries.

Source: MapInfo from Digital Chart of the World

Data: Major and minor cities and state capitals.

Europe

Austria, Belgium, Denmark, Deutschland, Espana, France, Italy, Netherlands, Norway, Portugal, Sweden, Switzerland, United Kingdom

Source: 2001 Tele Atlas B.V. 's-Hertogenbosch. All Rights Reserved.

Data: StreetPro Austria, Belgium, Denmark, Deutschland, Espana, France, Italy, Netherlands, Norway, Portugal, Sweden, and Switzerland.

Source: GisNET data licensed to MapInfo by GISdata Limited. © GDC Ltd 1993

Data: Water and highway/roadway maps.

Source: MapInfo Corporation from National Imagery and Mapping Agency (NIMA)

Data: Country Boundaries (Austria, Belgium, Denmark, Deutschland, Espana, France, Italy, Netherlands, Norway, Portugal, Sweden, Switzerland, Europe and United Kingdom.)

Great Britain

Source: 2001 Tele Atlas B.V. 's-Hertogenbosch. All Rights Reserved. This product includes mapping data licensed from Ordnance Survey (R). (c) Crown 2001. License number 100020348

Data: StreetPro Great Britain

North America

Canada

Source: Portions (c) 2004 GDT-Canada, Inc.

Data: (Prince Edward Island) Airports, Census subdivisions, Major Primary and Secondary Highways, Institutions, Large Areas land use, Parks, Road Buffers, Streets, Transportation points, Urban Agglomeration, Province, Railways, Utility lines and Water areas.

Source: MapInfo from Digital Chart of the World

Data: Over 3000 major and minor cities and generalized map of major highways.

Source: MapInfo Corporation

Data: Country and Province boundaries and surrounding water.

Mexico

Source: MapInfo Corporation

Data: Surrounding water and country boundary.

Source: MapInfo from the Bureau of Transportation Statistics

Data: State boundaries.

Source: MapInfo from Digital Chart of the World

Data: Generalized map of major highways and locations of all state capitals, major and minor cities.

United States, DC

Source: Tele Atlas (GDT, Inc) Portions (c) 2004 Tele Atlas, Inc. (GDT, Inc.)

Data: Postal code boundaries.

Source: MapInfo Canada

Data: 2000 Demographic data Blockgroup.

Source: Tele Atlas (GDT, Inc) Portions (c) 2004 Tele Atlas, Inc. (GDT, Inc.)

Data: StreetPro and 5 digit postal codes

Source: © MapInfo Corporation 2001. Aerial Photography used with permission of RSC Group, LLC 2001. All rights reserved.

Data: 5 mile by 5 mile area of 1m and 3m ground resolution raster images.

Source: MapInfo Corporation

Data: Shields in StreetPro. Listing of NPA/NXXs covered in DC. Competitive, Local Exchange Carriers (CLEC), Personal Communications Services (PCS) markets, cellular telephone service areas as defined by the FCC, Local Exchange Carriers (LEC), Local Access Transport Areas

(LATAs), Competitive Local Exchange Carriers (CLEC), rate center locations and wire center serving boundaries, Point Of Presence (POP) locations for long distance telephone carriers. Area Codes. POPINFO and ObstacleInfo.

Point file showing wireless (Cellular, Paging, PCS and SMR) switch locations.

Records of hurricanes between 1988 - 1996

Gas, electric utilities and cable franchise areas.

StreetPro - component tables.

Wireless samples for Sprint, ATT, Bell Atlantic, PGNT_P, PGMT_P, Nextel and GTE.

Current hazardous waste notifiers, Superfund Cleanup and National Priority List sites as defined by the EPS.

United States

Source: 1997- 1998 Schlosser Geographic Systems, Inc. ©

Data: Orthophoto Image of Seattle Airport.

Source: Tele Atlas (GDT, Inc) Portions (c) 2004 Tele Atlas, Inc. (GDT, Inc.)

Data: Postal code boundaries and Postal code points.

Source: MapInfo Canada

Data: 1990 Demographics by states and counties.

Source: MapInfo Corporation

Data: Sample customer database in various database formats. State boundaries with the states of Alaska and Hawaii inset.

Source: MapInfo from Digital Chart of the World

Data: Location of the state capitals and the location of 8875 cities. Point elevation data in feet and meters.

Source: MapInfo from NOAA

Data: Annual temperature and rainfall.

Source: MapInfo from the Bureau of Transportation Statistics

Data: A very generalized version of the Roadnet interstate data

Source: MapInfo from the US Census Bureau

Data: Updated County boundaries from Census 2000 including Puerto Rico. Map containing the location of 125 major cities and locations of 208,857 points of interest and landmarks.

Source: MapInfo from USGS

Data: MapInfo grid file of Washington DC – East and West

Source: Public Domain - OSU

Data: MapInfo grid file of Mt. St. Helens before and after eruption. MapInfo grid file of Crater Lake, Oregon

Source: Sure!MAPS ® RASTER © HTI 1995

Data: Raster image of Alaska, DC, Big Bend TX, Florida, Gulf Coast, Mid-Atlantic, Mississippi River, North Central, Northeastern US, Northern US Northwestern US, Rockies, Southwestern US. Seamless raster of 50 US states.

World

Source: MapInfo Corporation

Data: Military Grid Reference System 84 NL to 80 SL, North & South Polar Regions. Grid of latitude and longitude at 15 degree increments.

Source: MapInfo from Digital Chart of the World

Data: Location of world capitals and point locations for major and minor cities.

Source: MapInfo Corporation from National Imagery and Mapping Agency (NIMA)

Data: World Boundaries.



New and Enhanced MapBasic Statements and Functions

These are the new and enhanced statements and functions available for the MapInfo Professional 7.8 product.

Sections in this Appendix:

New statements

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MGRSToPoint Statement

Purpose

Converts a string representing an MGRS coordinate to an object value representing a point.

Syntax

```
MGRSToPoint (string)
```

Return Value

Object

Example

```
dim x,y As Float
dim obj as Object
dim s_mgrs As String
dim obj2 as Object

x = -74.669
y = 43.263
obj = CreatePoint(x, y)

s_mgrs = PointToMGRS$(obj)

obj2 = MGRSToPoint(s_mgrs)
```

PointToMGRS Statement

Purpose

Converts an object value representing a point to a string representing an MGRS coordinate.

Syntax

```
PointToMGRS$ (inputobject)
```

Return Value

String

Example

```
dim x,y As Float
dim obj as Object
dim s_mgrs As String
dim obj2 as Object

x = -74.669
y = 43.263
obj = CreatePoint(x, y)

s_mgrs = PointToMGRS$(obj)

obj2 = MGRSToPoint(s_mgrs)
```

Objects Pline Statement

Purpose

Splits a single section polyline into two polylines.

Syntax

```
Objects Pline Split At Node index
[IntoTable name]
[Data   column_name = expression]
[ , column_name = expression ... ] ]
```

Return Value

Object

Description

If an object is a single section polyline, then two new single section polyline objects are created in the output table. The **Node** index should be a valid MapBasic index for the polyline to be split. If **Node** is a start or end node for the polyline, the operation is cancelled and an error message is displayed.

The optional **Data** clause controls what values are stored in the columns of the output objects. The **Data** clause can contain a comma-separated list of column assignments. Each column assignment can take one of the forms listed in the following table:

Assignment	Effect
<i>col_name</i> = <i>col_name</i>	Does not alter the value stored in the column.
<i>col_name</i> = <i>value</i>	Stores a specific value in the column. If the column is a character column the value can be a string; if the column is a numeric column, the value can be a number.

The **Data** clause can contain an assignment for every column in the table. If the **Data** clause only specifies assignments for some of the columns, blank values are assigned to those columns that are not listed in the **Data** clause.

If you omit the **Data** clause entirely, all columns are blanked out of the target objects, storing zero values in numeric columns and blank values in character columns.

Example

You would typically split a polyline through the graphical user interface, but an equivalent MapBasic syntax might appear as follows.

```
Objects Pline Split At Node 12 Into Table WORLD
Data Country=Country,Capital=Capital,...
```

Save MWS statement

Purpose

This statements allows you to save the current workspace as an XML-based MWS file for use with MapXtreme 2004 applications. These MWS files can be shared across platforms in ways that workspaces cannot.

Syntax

```
Save MWS Window ( window_id [ , window_id ... ] ) Default default_window_id As filespec
```

window_id is an Integer window identifier for a Map window

default_window_id is an Integer window identifier for the Map window to be recorded in the MWS as the default map.

Description

MapInfo Professional enables you to save the maps in your workspace to an XML format for use with MapXtreme 2004 applications. When saving a workspace to MWS format, only the map windows and legends are saved. All other windows are discarded as MapXtreme 2004 applications cannot read that information. Once your workspace is saved in this format, it can be opened with the Workspace Manager utility that is included in the MapXtreme 2004 installation or with an application developed using MapXtreme 2004. The file is valid XML so can also be viewed using any XML viewer or editor. MWS files created with MapInfo Professional 7.8 can be validated using schemas supplied with MapXtreme 2004.

Note: You will not be able to read files saved in MWS format in MapInfo Professional 7.8.

In MapInfo Professional, you can set the visibility of a modifier theme without regard to its reference feature layer, so you can turn the visibility of the main reference layer off but still display the theme. In MapXtreme2004, the modifier themes (Dot Density, Ranges, Individual Value) are only drawn if the reference feature layer is visible. To ensure that modifiers marked as visible in MapInfo Professional display in tools like Workspace Manager, we force the visibility of the reference feature layer so that its modifier themes display.

What is Saved in the MWS

The following information is included in the MWS workspace file:

- Tab files' name and alias
- Coordsys information
- Map center and zoom settings
- Layer list with implied order
- Map size as pixel width and height
- Map resize method
- Style overrides
- Raster layer overrides
- Label and label edit information
- Individual value themes
- Dot density themes

- Graduated symbol themes
- Bar themes
- Range themes
- Pie themes
- Grid themes as MapXtreme 2004 grid layers with a style override
- Themes and label expressions based upon a single attribute column.

What is Not Saved to the MWS

The following information is not saved in the MWS workspace file:

- Any non-map windows (browsers, charts, redistricters, 3D map windows, Prism maps)
- Distance, area, or XY and military grid units
- Snap mode, autoscroll, and smart pan settings
- Printer setup information
- Any table that is based on a query
- Any theme that is generated from a complex expression

Note: A complex expression includes any operator or multiple referenced tables.

- Any queries
- Export options
- Line direction arrows
- Whether object nodes are drawn or not
- Hot links for labels and objects

WFS Refresh Statement

Purpose

The WFS Refresh Table statement refreshes a WFS table from the server.

Syntax

```
WFS Refresh Table alias
```

Example

```
WFS Refresh Table watershed
```

Create Cartographic Legend Statement

The Create Cartographic Legend statement has a new clause that creates the small or large legend sample size.

Purpose

The Create Cartographic Legend statement allows you to create and display cartographic style legends as well as theme legends for an active map window.

Syntax

The new clause in the syntax is indicated in **bold**.

```
Create Cartographic Legend
  [ Style Size {Small | Large}
```

The full syntax is described in the MapBasic Reference Guide, Version 7.8.

Export Statement**Purpose**

Exports a table to another file format. The new file format is Comma delimited files (*.CSV).

Syntax 1 (for exporting MIF/MID files, DBF files, ASCII text files or CSV files)

```
Export table
  Into file_name
  [Type
    { "MIF" |
      "DBF" [ Charset char_set ] |
      "ASCII" [ Charset char_set ] [ Delimiter "d " ] [ Titles ] } ]
    "CSV" [Charset char_set ] [ Titles ] } ]
  [ Overwrite ]
```

Syntax 2 (for exporting DXF files)

```
Export table
  Into file_name
  [ Type "DXF" ]
  [ Overwrite ]
  [ Preserve
    [ AttributeData ] [ Preserve ] [ MultiPolygonRgns [ As Blocks ] ] ]
  [ { Binary | ASCII [ DecimalPlaces decimal_places ] } ]
  [ Version { 12 | 13 } ]
  [ Transform
    ( MI_x1 , MI_y1 ) ( MI_x2 , MI_y2 )
    ( DXF_x1 , DXF_y1 ) ( DXF_x2 , DXF_y2 ) ]
```

table is the name of an open table; do not use quotation marks around this name

file_name is a String specifying the filename to contain the exported data; if the file name does not include a path, the export file is created in the current working directory

char_set is a String that identifies a character set, such as "WindowsLatin1"; see the separate CharSet discussion for details

d is a character used as a delimiter when exporting an ASCII file

decimal_places is a small integer (from 0 to 16, default value is 6), which controls the number of decimal places used when exporting floating-point numbers in ASCII

MI_x1, *MI_y1*, etc. are numbers that represent bounds coordinates in the MapInfo table

DXF_x1, *DXF_y1*, etc. are numbers that represent bounds coordinates in the DXF file

Description

The Export statement copies the contents of a MapInfo table to a separate file, using a file format which other packages could then edit or import. For example, you could export the contents of a table to a DXF file, then use a CAD software package to import the DXF file. The Export statement does not alter the original table.

Further details are available in the MapBasic Help System and in the MapBasic *Reference Guide*.

LegendInfo()

The LegendInfo() function has a new LEGEND_INFO_STYLE_SAMPLE_SIZE attribute that returns the legend size information.

Purpose

Returns information about a legend.

Syntax

```
LegendInfo( window_id, attribute )
```

The new attribute is:

```
LEGEND_INFO_STYLE_SAMPLE_SIZE
```

This attribute returns 0 for small legend sample style or 1 for large legend sample style.

The full syntax is described in the MapBasic Reference Guide, Version 7.8.

Example

```
LegendInfo(FrontWindow() LEGEND_INFO_STYLE_SAMPLE_SIZE)
```

Objects Snap Statement

Purpose

Cleans the objects from the given table, and optionally performs various topology-related operations on the objects, including snapping nodes from different objects that are close to each other into the same location and generalization/thinning.

New for MapBasic 7.8: The settings specified in the Objects Snap statement are written to the input table's metadata when the Objects Snap statement is executed. These settings become the default values for the table when the Set Values for Node Snap and Thinning dialog box is opened.

For more information about this statement, see the *MapBasic Reference Guide*.

PrintWin Statement

The MapBasic PrintWin statement has been enhanced so that a MapInfo window can be printed to a file.

Purpose

Prints an existing window.

Syntax

```
PrintWin [ Window window_id ] [ Interactive ] [ File output_filename ]
[ Overwrite ]
```

Description

The **PrintWin** statement prints a window.

If the statement includes the optional **Window** clause, MapBasic prints the specified window; otherwise, MapBasic prints the active window.

The window_id parameter represents a window identifier; see the **FrontWindow()** and **WindowInfo()** functions for more information about obtaining window identifiers.

If you include the **Interactive** keyword, MapInfo Professional displays the Print dialog. If you omit the **Interactive** keyword, MI Pro prints the window automatically, without displaying the dialog.

Example

```
PrintWin Window FrontWindow() File "c:\output\file.plt"
```

Register Table Statement

When opening an Excel spreadsheet, the user can now specify how each column is imported. For example, the user might want a 'Date' column in Excel to be a Text column in MapInfo Professional. The MapBasic Register Table statement has been enhanced to support this new feature.

Syntax

When the **Interactive** keyword is specified for type XLS, it instructs the interface to display the Set Field Properties window when importing Excel files. The following illustrates the changes to the Register Table syntax that support this new feature.

```
Register Table source_file
Type "XLS" [ Titles ] [ Range range_name ] [ Interactive ]
```

The full syntax is described in the MapBasic Reference Guide, Version 7.8.

Set Cartographic Legend Statement

The Set Cartographic Legend statement now allows you to control the sample legend sizes that appear in Cartographic Legend windows.

Purpose

The Set Cartographic Legend statement allows you to set redraw functionality on or off, refresh, set the orientation to portrait or landscape, select small or large sample legend sizes, or change the frame order of an existing cartographic legend.

Syntax

The change from the previous syntax is indicated in **bold**.

```
Set Cartographic Legend
  [ Window legend_window_id ]
  [ Refresh ]
  [ Portrait | Landscape ]
  [ Align]
  [ Style Size {Small | Large}]
  [ Frame Order { frame_id, frame_id, frame_id, ... } ]
```

The full syntax is described in the MapBasic Reference Guide, Version 7.8.

Shade Statement

The MapBasic Shade statement now allows for circle/square dot density thematics with user-defined size.

Purpose

Creates a thematic map layer and adds it to an existing Map window.

Syntax

The MapBasic Shade statement now allows for circle/square dot density thematics with user defined size. The following illustrates the changes to the Density and Width parts of the MapBasic syntax that support this new feature.

```
Shade [ Window window_id ]
      { layer_id | layer_name }
      With expr
      Density dot_value {Circle | Square}
      Width dot_size
      [ Color color ]
```

The full syntax is described in the MapBasic Reference Guide, Version 7.8. For backwards compatibility, the older MapBasic syntax (version 7.5 or earlier) is still supported.

Description

For **Circle** dot style, the *dot_size* can be 2 to 25 pixels in width. For **Square** dot style, the *dot_size* can be 1 to 25 pixels.

The keyword **Width** is followed by *dot_size*. This specifies how large the dots should be, in terms of pixels.

The optional **Color** clause is used to set the color of the dots.

Example

The following example creates a dot density map using the States table's Num_HH_90 column (which in this case indicates the number of households per state, circa 1990). The resultant dot density map will show many 4-pixel dots; each dot representing 60,000 households.

```
shade window 176942288 7 with Pop_1990 density 600000 circle width 4 color  
255
```

TableInfo()

The MapBasic TableInfo() variable includes a new value for the TAB_INFO_TYPE attribute to support Web Feature Service (WFS).

Purpose

Returns information about an open table.

Syntax

TableInfo(*table_id* , *attribute*)

The new return value for the TAB_INFO_TYPE attribute is:

```
TAB_TYPE_WFS
```

This return value indicates that the table is from a Web Feature Service.

The full syntax is described in the MapBasic Reference Guide, Version 7.8.

Glossary of Terms

GL

Alias

The name assigned to an expression or a column when you are working in the Select Columns field in the SQL Select dialog box. This name appears as the column title for that expression or column in a Browser.

Application

A computer program used for a particular kind of work, such as word processing. Application is often interchangeable with the word program.

ASCII

The acronym for American Standard Code for Information Interchange. ASCII is a standard code used in most microcomputers, computer terminals, and printers for representing characters as numbers. It not only includes printable characters, but also control codes to indicate carriage return, backspace, and so forth.

Axis

Used in a graph, these are graduated lines bordering the plot area of a graph. Location coordinates are measured relative to the axes. By convention the X-axis is horizontal, the Y-axis is vertical.

Bar Chart Map

A type of thematic map that displays a bar chart of thematic variables for each record in a table from which the map is based.

Base Map

Usually the dominant or underlying layer in a given map. *(These are typically the data layers that MapInfo® offers as ready products.)* Users usually layer their own data on top of these base maps or use these base maps to geocode or to make new layers. Examples are joining industry data to postal code boundaries for analysis and then combining arrangements of the postal codes into new territory layers.

Base Table

A permanent table, which is part of a map, as opposed to a query table, which is temporary. You can edit the contents of base tables, and you can change their structure (by editing, deleting, reordering columns and adding or deleting graphic objects). See [Query Table on page 656](#).

Bitmap

A screen image displayed as an array of dots or bits. Software usually generates either bit-mapped (raster) or object-oriented (vectedored) files. MapInfo can work with both.

Boundary Region

In GIS a boundary is a region on a map enclosed by a border. Cambria County, Manitoba, and Argentina would all be represented as boundaries on a map. Note that a single boundary could encompass several polygons. Thus, Indonesia is a single boundary but consists of many polygons.

Browser

A window for viewing a table (or database, spreadsheet or text file) in tabular form.

Buffer

A type of proximity analysis where areas or zones of a given distance are generated around selected map objects. Buffers are user-defined or can be generated for a set of objects based on those objects' attribute values. The resulting buffer zones form region objects representing the area that is within the specified buffer distance from the object.

Cadastral

A map set used to graphically define the cadastre or land ownership in a given area. A tax map is an example of a cadastral map. The land registration, assessment roles, and tax maps comprise the cadastre.

Cartesian

A coordinate system using an x,y scale not tied to any "real-world" system. Most CAD drawing uses this method of registering objects (e.g., a drawing of a ball-bearing assembly, floor plans). If a drawing uses Cartesian coordinates, one corner of the drawing probably has coordinates 0, 0.

Cartesian Coordinates

The conventional representation of geometric objects by x and y values on a plane.

Cartographic Legend

A MapInfo legend window that enables you to display cartographic information for any map layer in the Map window.

Cartography

The art and science of making maps. In GIS it is also the graphic presentation and visual interpretation of data.

Centroid

Usually the center of a map object. For most map objects, the centroid is located at the middle of the object (the location halfway between the northern and southern extents and halfway between the eastern and western extents of the object). In some cases, the centroid is not at the middle point because there is a restriction that the centroid must be located on the object itself. Thus, in the case of a crescent-shaped region object, the middle point of the object may actually lie outside the limits of the region; however, the centroid is always within the limits of the region.

In MapInfo, the centroid represents the location used for automatic labeling, geocoding, and placement of thematic pie and bar charts. If you edit a map in Reshape mode, you can reposition region centroids by dragging them.

Check Box

A small square box that appears in a dialog box. You can click in the check box or on the text in order to select the option. Check boxes are generally present when multiple options can be selected at one time.

Command

A word or phrase, usually found in a menu, that displays a dialog box and/or carries out an action.

Conflict Resolution

When conflicts exist between the data residing on a remote database and new data that you want to upload to the remote database via a MapInfo linked table. The conflict resolution process is invoked whenever an attempt to save the linked table detects a conflict in an update.

Control Points

The points on a raster image whose coordinates serve as a reference for associating earth coordinates with any location on the image. See [Registration on page 656](#).

Coordinate

An x,y location in a Cartesian coordinate system, or a Latitude, Longitude location in an earth coordinate system. Coordinates represent locations on a map relative to other locations. Earth coordinate systems may use the equator and the Greenwich prime meridian as fixed reference points. Plane coordinate systems describe a two-dimensional x,y location in terms of distance from a fixed reference and are usually in the first quadrant so that all coordinates are positive numbers.

Coordinate System

A coordinate system is used to create a numerical representation of geometric objects. Each point in a geometric object is represented by a pair of numbers. Those numbers are the coordinates for that point. In cartography, coordinate systems are closely related to projections. You create a coordinate system by supplying specific values for the parameters of a projection. See [Cartesian Coordinates on page 647](#), [Projection on page 655](#), and [Spherical Coordinates on page 657](#).

Cosmetic Layer

The topmost layer of a Map window. Objects may be placed in this layer such as map titles and graphic objects. It is always displayed, and all objects placed in the Cosmetic Layer must be saved to a new or existing layer.

Data Aggregation

A process that occurs when combining separate map objects into a single object. MapInfo calculates what the column values for the new object should be, based on sums or averages of the values of the original objects.

Data Disaggregation

A process that occurs when splitting a map object(s) into smaller parts where MapInfo splits the data associated with the map object(s) into smaller parts to match the new map objects.

Data Sources

An ODBC data source is an SQL database and the information you need to access that database. For example, an SQL Server data source is the SQL Server database, the server on which it resides, and the network used to access that server.

Database

Any organized collection of data. The term is often used to refer to a single file or table of information in MapInfo.

Decimal Degree

The decimal representation of fractions of degrees. Many paper maps express coordinates in degrees, minutes, seconds (e.g., 40_30i10i), where minutes and seconds are fractions of degrees. 30 minutes equal half a degree, and 30 seconds equal half a minute. MapInfo, however, expresses coordinates in decimal degrees (e.g., 72.558 degrees), where fractions of degrees are expressed as decimals. Thus, the longitude: 40 degrees, 30 minutes, would be expressed in MapInfo as 40.5 degrees.

Default

The value or option used in the absence of explicit specification. Often the original setting or value for a variable.

Degrees Longitude, Degrees Latitude, Decimal Degrees

Degrees (longitude and latitude) are coordinates used to represent locations on the surface of the earth. Longitude, or X-coordinate, represents a location's east-west position, where any location west of the prime meridian has a negative X value. Latitude, or Y-coordinate, represents a location's north-south position, where any location south of the equator has a negative Y value.

Derived Column

In a table created through the SQL Select, a derived column is one created by using an expression. The column is derived in the sense that it isn't just a copy of the data in one of the tables being accessed by the SQL Select command.

Derived Field

The same as a derived column.

Deselect

The process of undoing a selection. The object or area you deselect will not be affected by subsequent commands. Performed by selecting another area, by clicking in a blank area, or by executing the Unselect All command.

Digitizer, Digitizing Tablet

An electronic device that lets you trace a paper map into a GIS or CAD package. The digitizer consists of a table (or tablet) onto which you attach a paper map. You then can trace the map by moving a hand-held, mouse-like device known as a cursor, or puck, across the surface. Digitizing a map produces vector data as the end result.

Districts Browser

A special browser that displays when redistricting. It differs from other Browser windows in the following respects: one row can only be selected at one time, one row is always selected, and the selected row becomes the target district into which you can add other objects.

Dot Density Map

A type of thematic map that carries information by showing a large number of tiny dots, wherein each dot represents some specific unit quantity. For example, for a population dot density map each dot might represent 10,000 people.

Drawing Toolbar

A MapInfo window containing twelve buttons that access tools for drawing and modifying objects on your map or layout.

Edit Handle

The small boxes that appear at the four corners of the minimum bounding rectangle of an object in an editable layer of a Map window or in a Layout window.

Export

The process whereby a program saves information in a file to be used by another program.

Expression

A statement containing two parts: 1) column names and constants (i.e., specific data values), and 2) functions (e.g., area) and operators (e.g., +, -, >), in order to extract or derive information from a database. Expressions are used in *Select*, *SQL Select*, *Update Column*, *Create Thematic Map*, and *Label with Column*.

Field

A field in a table corresponds to a column in a Browser. A field contains a specific type of information about an object, such as, name, abbreviation, land area, price, population, and so forth. The record for each object consists of that object's values for each of the fields in the database.

File

A collection of information that has been given a name and is stored on some electronic medium such as a tape or disk. A file can be a document or an application.

Fill Pattern

The design and color used to fill a closed object.

Font

A character set based on a particular style used for text characters.

Generalization

The process of simplifying a data set to a size that can be easily manipulated and represented. For example, a river may have many twists and turns; however, if a map covers a very large area, the river may be represented as a straight line. Similarly, in a map of a very large area, a city might be represented as a point marker.

Geocode

The process of assigning X and Y coordinates to records in a table or database so that the records can be displayed as objects on a map.

Geographic Information System (GIS)

An organized collection of computer hardware and software designed to efficiently create, manipulate, analyze, and display all types of geographically or spatially referenced data. A GIS allows complex spatial operations that are very difficult to do otherwise.

Graduated Symbols Map

A type of thematic map that shows symbols (point objects) in a variety of sizes to indicate which objects have higher or lower numerical values.

Graph window

A window that displays numerical data in the form of a graph.

Graticule

A grid of horizontal (latitude) and vertical (longitude) lines displayed on an earth map, spaced at a regular distance (e.g., every five degrees, every fifteen degrees). Used to establish a frame of reference.

Grid Surface Map

A type of thematic map that displays data as continuous color gradations across the map. This type of thematic map is produced by an interpolation of point data from the source table. A grid file from the data interpolation is generated and is displayed as a raster image in a Map window.

Heads-Up Digitizing

A method of digitizing where the user creates vector objects by tracing over a raster image displayed on the screen. Thus, heads-up digitizing does not require a digitizing tablet.

Help Button Bar

A bar located at the top of the Help Window that contains buttons you use to move to Help topics.

Hot Views

MapInfo technology that automatically updates all the windows you have open for a particular table when you make a change in any one of the windows. For example, if an item is selected in a Map window, it will be selected in all other Map windows and Browsers you have open for that table.

Import

The process whereby a program loads a file that is the output of another program.

Individual Values Map

A type of thematic map that shades records according to individual values.

Join

The process of creating a relational link between two tables (databases).

Jump

Text graphics or parts of graphics that provide links to other Help topics or more information on the current Help topic.

Latitude

The horizontal lines on a map that increase from 0 degrees at the Equator to 90 degrees at both the North (+90.0 degrees) and South (-90.0 degrees) poles. Used to describe the North-South position of a point as measured usually in degrees or decimal degrees above or below the equator.

Layer

A layer is a basic building block of MapInfo maps and consists of a table with graphic and text settings like style override, labeling, and zoom layering. Maps are made of one or more superimposed layers (e.g., a layer of street data superimposed over a layer of county or postal code boundaries) which you can design to convey geographical or statistical information. Typically, each map layer corresponds to one open table. Cosmetic Layers contain map objects that represent temporary map annotations (e.g., text objects). Cosmetic Layers contain map objects that represent temporary map annotations (e.g., labels). See [Cosmetic Layer on page 649](#) and [Table on page 658](#).

Layout Window

A window where you arrange and annotate the contents of one or several windows for printing.

Legend Window

A window that displays the key to the different colors, shapes, or fill patterns used on the map. A legend can also include a scale. See [Cartographic Legend on page 647](#) and [Theme Legend on page 659](#).

Line, Line Object

A map object defined by a set of sequential coordinates that may represent the generalized shape of a geographic feature (e.g., street centerlines, railroads, cables). A MapInfo street map is a collection of thousands of line objects.

Linked Table

A linked table is a special kind of MapInfo table that is downloaded from a remote database and retains connections to its remote database table. You can perform most operations on a linked table that you do for a regular MapInfo table.

Longitude

The vertical lines on a map, running from the North to South poles, used to describe the east-west position of a point. The position is reported as the number of degrees east (to -180.0 degrees) or west (to +180.0 degrees) of the prime meridian (0 degrees). Lines of longitude are farthest apart at the Equator and intersect at both poles, and therefore, are not parallel.

Longitude/Latitude

MapInfo's default coordinate system for representing geographic objects in a map.

Main Toolbar

A window containing buttons for choosing tools, accessing dialog boxes, and showing or hiding windows.

Map Scale

A statement of a measure of the map and the equivalent measure on the earth. Often expressed as a representative ratio of distance, such as 1:10,000. This means that one unit of distance on the map (e.g., one inch) represents 10,000 of the same units of distance on the earth.

The term *scale* must be used carefully. Technically, a map of a single city block is *large-scale* (e.g., 1:12,000), while a map of an entire country is *small-scale* (e.g., 1:1,000,000). A 1:1,000,000 map is considered small-scale because of the small numeric value obtained when you divide 1 by 1,000,000.

Map Segment

In a street map, a segment is a single section of the street. In urban maps, segments are generally one block long. Address ranges are stored at the segment level.

MapBasic

The programming language used to customize and/or automate MapInfo. To create MapBasic applications, you need the MapBasic compiler, which is a separate product. However, you do not need the MapBasic compiler to run a compiled MapBasic application.

Map window

A window that allows you to view a table as a map.

Meridian

A line or a portion of a line running from the North to the South pole. A longitudinal line.

Minimum Bounding Rectangle (MBR)

For any given map object, the smallest rectangle that completely encompasses the object.

Native Projection

The projection in which a map's coordinate points are stored. MapInfo allows you to display maps in other projections, but not as fast as displaying maps in their native projection.

Node

An end-point of a line object, or an end-point of a line segment which is part of a polyline or region object.

Non-Earth Map

A map in which objects are not explicitly referenced to locations on the earth's surface. Floor plans are typical examples.

ODBC Drivers

An ODBC driver is a dynamic-link library (.DLL) file that MapInfo uses to connect to an SQL database. Each type of SQL database requires a different ODBC driver.

ODBC Table

An ODBC table is a table residing in a remote SQL database.

Outer Join

A type of multi-table join where all the records in the specified tables are included in the result table, even records that do not match the join criteria. MapInfo does not perform outer joins.

Pack

The process of compressing MapInfo tables so that they use less disk space.

Pie Chart Map

A type of thematic map that displays a pie chart of thematic variables for each record in the table from which the map is based.

Pin Map, Push-Pin Map

A type of map named after the practice of inserting push-pins into a wall map. A pin map features point objects. Geocoding a database is one way of creating a pin map.

Pixel

The acronym for picture element. The smallest dot that can be displayed on a computer screen. If a screen is described as having a resolution of 1,024 x 768, the screen shows 1,024 pixels from right to left, and 768 pixels from top to bottom. Each character, object, or line on the screen is composed of numerous pixels.

Point, Point Object

A map object defined by a single X,Y coordinate pair. Each point object is represented by a symbol style (e.g., circle, square, triangle, etc.).

Point Size

A unit of measurement equal to 1/72 of an inch. Used to measure character size.

Pointer

An arrow-shaped cursor on the screen that can be manipulated by a mouse.

Polygon, Polygon Object

A simple bounded region, simple in the sense that it does not consist of more than one polygon (where a boundary can consist of more than one polygon). The Polygon tool creates a single polygon.

Polygon Overlay

A spatial operation that merges overlapping polygons from two layers to analyze those intersected areas or to create a third layer of new polygons.

Polyline, Polyline Object

A linetype object made up of many line segments. It contains more than two nodes, that is, more than its end points. The Polyline tool creates a single polyline. In contrast, the Line tool only draws a single straight line (that is, a line defined by two nodes).

Projection

A mathematical model that transforms the locations of features on the earth's surface to locations on a two-dimensional surface, such as a paper map. Since a map is an attempt to represent a spherical object (the earth) on a flat surface, all projections have some degree of distortion. A map projection can preserve area, distance, shape or direction but only a globe can preserve all of these attributes. Some projections (e.g., Mercator) produce maps well suited for navigation. Other projections (e.g., equal-area projections, such as Lambert) produce maps well suited for visual analysis.

Query Table

A temporary table produced as the result of a Select, SQL Query, or by choosing objects in a Map window or records in a Browser and mapping, graphing, or browsing that selection. You cannot make edits and structural changes on query tables, but you can edit a selected set of rows in your source table through a query table. See [Selection on page 657](#) and [Base Table on page 647](#).

Ranged Map

A type of thematic map that displays data according to ranges set by the user. The ranges are shaded using colors or patterns.

Raster Image

A type of computerized picture consisting of row after row of tiny dots (pixels). Raster images are sometimes known as bitmaps. Aerial photographs and satellite imagery are common types of raster data found in GIS. A computer image can be represented in raster format or in vector format. See [Scanning on page 656](#) and [Vector Image on page 659](#).

Record

All the information about one object in a database or table. A record in a table corresponds to a row in a Browser.

Redistricting

The process of assigning map objects to groups. As you assign map objects, MapInfo automatically calculates totals for each group and displays the totals in a special Districts Browser. This process is sometimes known as load-balancing.

Region, Region Object

An enclosed area defined by one or more polygons. If a region contains one or more lakes or islands, each lake or island is a separate polygon. A region is an object created with the Polygon tool.

Registration

Usually the first stage of the digitizing process or when opening a raster image for the first time in MapInfo. Before you can digitize a paper map or work with a raster image, you must point to several control points across the map, and enter their coordinates (e.g., longitude, latitude). After you have registered the map, MapInfo can associate a longitude, latitude position with any point on the map surface; this allows MapInfo to perform area and distance calculations, and overlay multiple map layers in a single map. CAD systems as well as GIS systems utilize this process. See [Control Points on page 648](#).

Scale Bar

A map element that graphically depicts the map scale (e.g., 0 — 5 — 10 km).

Scanning

The process of inputting data into a raster format using an optical device called a scanner.

Scroll Bar

Bars along the right and bottom sides of each window that allow you to scroll the window view. Clicking on the shaded area moves one window screen at a time.

Selection

A data item or set of data items chosen for inspection and/or analysis. Regardless of the kinds of windows on the screen, selections can be made using the Select and SQL Select Query commands in MapInfo's Query menu. In Browsers and Map windows, items can be placed in the selection set by clicking on them individually. Map windows also have special tools for selecting multiple items on a spatial basis.

Snap To Nodes

A feature that helps in drawing, moving and positioning map objects. In Snap mode (**S** key) the cursor snaps to a node of a map object when it comes within a certain distance.

Spatial Analysis

An operation that examines data with the intent to extract or create new data that fulfills some required condition or conditions. It includes such GIS functions as polygon overlay or buffer generation and the concepts of contains, intersects, within or adjacent.

Spherical Coordinates

Latitude and longitude values that represent objects on the surface of the globe.

SQL Query

The selection of information from a database according to the textual attributes and object relationships of the items. In MapInfo, queries are created with the *SQL Select* and *Select* commands or with MapBasic commands in the MapBasic window.

Standard Deviation

A measurement of the variation of a set of data values around the mean.

Standard Toolbar

A window containing buttons for quick access to the most commonly used menu commands such as Cut, Copy, and Paste.

Statistics Window

A window containing the sum and average of all numeric fields for the currently selected objects/records. The number of records selected is also displayed. As the selection changes, the data is re-tallied, and the statistics window updates automatically.

StatusBar

A bar at the bottom of the screen that displays messages that help in using MapInfo. The StatusBar also displays messages that pertain to the active window. In a Map window, the StatusBar indicates what layer is editable, the zoom display of the map, and the status of Snap and Digitizing modes. In a Browser window, the StatusBar indicates the number of records currently displaying and the total number of records. In a Layout window, the StatusBar indicates the zoom display as a percentage of the actual size of the map.

Structured Query Language (SQL)

A standard language used for analyzing information stored in relational databases. MapInfo's database engine is based on the SQL standard.

Subselect

A select statement that is placed inside the Where Condition field of the SQL Select dialog box. MapInfo first evaluates the subselect and then uses the results of the subselect to evaluate the main SQL Select statement.

Symbol, Symbol Object

A small, relatively simple shape (e.g., square, circle, star, push-pin) used to graphically represent a point object (e.g., a customer location).

Table

A table is made up of data in rows and columns. Each row contains information about a particular geographic feature, event, etc. Each column contains a particular kind of information about the items in the table. You can display tables with graphic information stored in them as maps. See [Base Table on page 647](#) and [Query Table on page 656](#). See also [Layer on page 652](#).

Table Row

In a table, a row contains all the information for a single item. It corresponds to a record in a table.

Target District

The district that is selected in a Districts Browser to be affected by subsequent redistricting operations.

Text Cursor

A blinking vertical bar that shows the position where text can be edited, inserted, or deleted.

Thematic Layer

A layer containing the thematic settings for a map layer. Thematic layers are drawn directly over the map layer on which the thematic settings are based. They are also drawn in a particular order, depending on the number of thematic layers you have and the type of thematic map objects you are creating.

Thematic Map

A type of map that uses a variety of graphic styles (e.g., colors or fill patterns) to graphically display information about the map's underlying data. Thus, a thematic map of sales territories might show one region in deep red (to indicate the region has a large number of customers), while showing another region in very pale red (to indicate the region has relatively few customers).

Thematic Shading

Map objects — points, lines, regions — that have been shaded, using a pattern and/or color, according to some point of information about the object, or theme (population, size, annual rainfall, date, and so forth).

Thematic Variable

The data values displayed on a thematic map. A thematic variable can be a field or expression.

Theme Legend

MapInfo's original style legend that allows you to display legends for thematic maps and graphs. MapInfo automatically creates a theme legend window for a thematic map. Customize its display through the Modify Thematic Map dialog box. See [Cartographic Legend on page 647](#).

Toolbars

MapInfo windows that contain a variety of buttons used to access tools and commands for mapping and drawing. There are four Toolbars: the Standard Toolbar provides tools for commonly performed tasks, the Main Toolbar provides primary tools (e.g., Zoom-in, Select, Info, etc.) and the Drawing Toolbar contains all drawing tools. The Tools Toolbar contains the Run MapBasic Program and the Show/Hide MapBasic Window buttons. All four Toolbars may be reshaped and hidden.

Transformation

The process of converting coverage coordinates from one coordinate system to another through programmatic translation. The transformation of CAD generated Cartesian coordinates into earth coordinates is an example.

Ungeocode

The process of removing X and Y coordinates from records in a table or database. Can also describe a table that has not been geocoded, e.g., an ungeocoded table.

Vector Image

A coordinate-based data structure commonly used to represent map features. Each object is represented as a list of sequential x,y coordinates. Attributes may be associated with the objects. A computer image can be represented in vector format or in raster format. See [Raster Image on page 656](#).

Weighted Average

An average that gives more weight to one value over another when averaging. A method of averaging that uses a separate column of information to define the relative importance of each data value. The formula for a weighted average is:

$$\text{SUM}(\text{DATA} * \text{WEIGHT}) / \text{SUM}(\text{WEIGHT})$$

where DATA is the column of data values and WEIGHT is the column of weights. If WEIGHT contains all 1's (or other non-zero values) this reduces to a simple average.

Window

In MapInfo, Map windows, Browser windows, Graph windows and Layout windows are the major types of windows. They display the data stored in tables. The Toolbars, map legends, and the Info tool window are other types of windows.

Workspace

A saved configuration of open MapInfo tables and windows.

Zoom Layering

A setting that determines the range (e.g., 0–3 miles, 2–5 miles, etc.) at which a layer is visible in a Map window.

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