



# MapInfo Professional Version 8.0

**User Guide (Unabridged)**

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# Table of Contents

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<b>Chapter 1: Introduction</b> . . . . .	<b>19</b>
<b>What is MapInfo Professional and What Does it Do?</b> . . . . .	<b>20</b>
Mapping at a Glance . . . . .	20
Reviewing the MapInfo Professional Features . . . . .	21
Ensuring Your Success . . . . .	22
<b>Getting Support</b> . . . . .	<b>26</b>
Using the Status Bar . . . . .	26
Using the Help System . . . . .	26
Getting Technical Support . . . . .	27
Customer Service - Your Non-Technical Support . . . . .	29
Getting MapInfo Professional Training . . . . .	29
Other Resources . . . . .	30
<b>What's New in MapInfo Professional 8.0</b> . . . . .	<b>31</b>
New Major Features of MapInfo Professional . . . . .	31
Mapping - New Features and Enhancements . . . . .	46
Custom Sort Order for Individual Value Thematic Legends . . . . .	54
Creating a Bi-Variant Layer Using Transparent Patterns . . . . .	55
Alignment of Thematic Legends and Legend Frames Added . . . . .	58
Choice of Thematic Legend Swatch Sizes Added . . . . .	61
WFS/WMS Enhancements . . . . .	62
Datum Enhancements . . . . .	69
Printing, Importing, and Exporting Enhancements . . . . .	69
Database Enhancements . . . . .	74
Raster Enhancements . . . . .	77
New Tools and Tool Enhancements . . . . .	79
Digitizing Enhancement . . . . .	89
Sample Data Enhancements . . . . .	91
<b>Chapter 2: Installing and Configuring MapInfo Professional</b> . . . . .	<b>97</b>
<b>System Requirements for MapInfo Professional</b> . . . . .	<b>98</b>
Handling Database Connectivity . . . . .	98
<b>Before You Install MapInfo Professional 8.0</b> . . . . .	<b>99</b>
Navigating the MapInfo Professional 8.0 CD Browser . . . . .	99

---

<b>Installing MapInfo Professional</b> .....	<b>100</b>
Typical Workstation Installation .....	101
Custom Workstation Installation .....	101
Network Installation .....	104
Setting Up Client Workstations .....	105
<b>Setting your Database Connection Preferences</b> .....	<b>105</b>
<b>Modifying or Removing MapInfo Professional</b> .....	<b>106</b>
Controlling Advanced System Settings .....	106
Controlling the Location of Application Data Files During Installation .....	108
Installing Data .....	109
Installing Related Programs, Hardware, and Resources .....	110
Troubleshooting your Installation .....	112
Removing MapInfo Professional from your System using Control Panel .....	112
<b>Setting the MapInfo Professional Preferences</b> .....	<b>113</b>
Accessing the Preferences .....	113
Setting the Preferences .....	114
Setting your System Preferences .....	114
Setting your Map Window Preferences .....	116
Setting your Legend Window Preferences .....	120
Setting the Startup Preferences .....	121
Setting your Address Matching Preferences .....	122
Setting your Directory Preferences .....	122
Setting your Output Setting Preferences .....	124
Setting your Printer Preferences .....	126
Setting your Style Preferences .....	128
<b>Starting up and Leaving MapInfo Professional</b> .....	<b>128</b>
Starting MapInfo Professional .....	128
Using the Startup Workspace .....	129
Opening a Table .....	129
Exiting MapInfo Professional .....	130
<b>Chapter 3: The Basics of MapInfo Professional</b> .....	<b>133</b>
<b>A Tour of the MapInfo Professional Desktop</b> .....	<b>134</b>
Working with Toolbars .....	134
Using Workspaces .....	138
<b>Data - Where MapInfo Professional Begins</b> .....	<b>139</b>
What Is a Database and Other Basic Terminology .....	140
Opening Tables and Files .....	141

---

<b>Reviewing the Windows in MapInfo Professional</b> . . . . .	<b>147</b>
Displaying Data in a Map Window . . . . .	148
Displaying Data in a Browser Window . . . . .	149
Displaying Data in a Graph Window . . . . .	149
Displaying Data in a Layout Window . . . . .	150
Other Windows for Displaying Data . . . . .	150
<b>Understanding Layers and Objects</b> . . . . .	<b>151</b>
What is a Layer? . . . . .	151
Map Objects as Part of Layers . . . . .	152
Managing a Map's Layers . . . . .	152
Understanding the Cosmetic Layer . . . . .	158
Making the Layers "Editable" . . . . .	159
Selecting Objects in a Layer . . . . .	160
Getting Layer Information . . . . .	160
Working with Thematic Layers . . . . .	161
Working with Raster and Grid Layers in Layer Control . . . . .	162
Working with Seamless Layers . . . . .	164
<b>Saving and Exporting Your Work</b> . . . . .	<b>168</b>
Saving a Workspace . . . . .	168
Closing a Table . . . . .	170
Saving a Table or Saving a Copy of a Table . . . . .	171
Exporting Your Data to a New Format . . . . .	172
<b>Using the Tools in the Tool Manager</b> . . . . .	<b>174</b>
What are the MapInfo Professional Tools? . . . . .	174
Accessing and Loading the Tool Manager Tools . . . . .	176
Adding (Registering) a Tool in the Tool Manager . . . . .	177
Editing the Tool Title and Description . . . . .	177
Removing a Tool from the Tool Manager . . . . .	178
Using the Tools Toolbar . . . . .	178
<b>Using the Tool Manager Tools</b> . . . . .	<b>179</b>
Using the Spider Graph Tool . . . . .	179
Using the Distance Calculator Tool . . . . .	180
<b>Using the Log Viewer of the Universal Translator</b> . . . . .	<b>182</b>
<b>Using the Synchronize Windows Tool</b> . . . . .	<b>184</b>
<b>Using the COGOLine (Create Line by Length) Tool</b> . . . . .	<b>185</b>
<b>Using the Search and Replace Tool to Update Multiple Column Entries</b> . . . . .	<b>186</b>
<b>Third-Party Tools</b> . . . . .	<b>187</b>
GeoTracker Geographic Utility . . . . .	187

---

<b>Chapter 4: Putting Your Data on the Map</b> .....	<b>189</b>
<b>How Do I Get My Data on the Map?</b> .....	<b>190</b>
When Do I Geocode vs. Create Points? .....	190
<b>Creating a .tab File from your Data</b> .....	<b>190</b>
Creating .tab Files from your Excel (.XLS) Data .....	191
Creating .tab Files from your Access Data .....	192
Creating .tab Files from your dBase Data .....	197
Creating .tab Files from your Lotus 1-2-3 Data .....	197
Registering Your ASCII Data .....	197
Importing GML File Data into .tab Files .....	198
Displaying Your Remote DBMS Data .....	199
Displaying and Importing Data from a Web Map Service .....	200
<b>Geocoding - Assigning Coordinates to Records</b> .....	<b>204</b>
What Should I Ask First? .....	204
Understanding the Geocoding Process .....	205
Modes of Geocoding .....	206
Methods of Geocoding .....	208
Finding an Exact Street Match .....	209
Placing Geocoded Points .....	210
Matching Street Names .....	212
Matching Address Numbers .....	212
Matching to Region .....	213
After Geocoding .....	214
Displaying your Coordinate Data in a Browser .....	217
Selecting Records Not Geocoded .....	218
Locating Newly Geocoded Points .....	218
Result Codes .....	219
Ungeocoding a Table .....	219
<b>Resolving Geocoding Issues</b> .....	<b>220</b>
Spelling Errors in Your Data Records .....	220
Incorrect Address Number in Your Data Records .....	220
Abbreviations FileIncompatible Abbreviations .....	221
Ambiguous Address Produces More Than One Location .....	223
Solving Problems of Space-Delimited Simple Substitution .....	224
Resolving Simple Truncation .....	224
Resolving Space-Delimited Truncation .....	225
Resolving Simple Substitution .....	225
Handling Legitimate Spaces .....	226

---

Handling Special Characters . . . . .	226
Adding Lines to the Abbreviation File . . . . .	227
Correcting Spelling Errors in Street Names . . . . .	227
Resolving Incorrect Address Ranges . . . . .	228
Geocoding Post Office Boxes . . . . .	228
Correcting Inaccurate Town Names . . . . .	229
Correcting Geocoding Errors Using Result Codes . . . . .	229
<b>Putting Latitude/Longitude Coordinates on a Map . . . . .</b>	<b>231</b>
Creating Points from an Excel or Lotus Table . . . . .	233
Creating Points, Longitude/Latitude . . . . .	234
Creating Points in a Projection . . . . .	234
Converting Coordinate Information with the Degree Converter Tool . . . . .	235
Dispersing Points Located in the Same Place . . . . .	236
Creating Points for Intersections . . . . .	238
<b>Displaying Your Data on the Map . . . . .</b>	<b>239</b>
<b>Printing Your Results . . . . .</b>	<b>239</b>
Setting Up the Page . . . . .	240
Printing Your Map . . . . .	240
Graph/Browser/3DMap Printing Options . . . . .	241
3D Map Print Options . . . . .	243
Advanced Printing Options . . . . .	243
Overriding the Default Printer . . . . .	245
Troubleshooting Print Problems . . . . .	245
<b>Chapter 5: Enhancing Your Data . . . . .</b>	<b>249</b>
<b>Working with MapInfo Tables . . . . .</b>	<b>250</b>
Accessing StreetPro Data . . . . .	250
Adding to a Table . . . . .	250
Updating a Table . . . . .	252
Appending Rows to a Table . . . . .	253
Parsing Data from One Column to Multiple Columns . . . . .	254
Placing Graphic Information in Visible Columns . . . . .	256
Creating a New Table . . . . .	257
Editing a Table . . . . .	258
Copying and Renaming a Table . . . . .	259
Deleting a Table . . . . .	259
Packing a Table . . . . .	259
Collecting Data into the Table using Update Column . . . . .	260
Browsing a Table . . . . .	262
<b>Creating a Report of your Data . . . . .</b>	<b>263</b>

---

<b>Chapter 6: Accessing Remote Data</b> .....	<b>265</b>
<b>Working with Remote Tables and Databases</b> .....	<b>266</b>
<b>Working with Remote Spatial Databases</b> .....	<b>266</b>
Prerequisite 1 – Storing Coordinate Values in a Remote Table .....	267
Prerequisite 2 – Creating a Spatial Index Column .....	270
Prerequisite 3 – Creating a MapInfo_MapCatalog .....	270
Prerequisite 4 – Making a Remote Table Mappable .....	272
Supporting Oracle Spatial .....	276
<b>Accessing Remote Databases using ODBC</b> .....	<b>277</b>
Creating New Data Sources (ODBC) .....	277
DBMS Tables and Linked Tables .....	278
<b>Opening a DBMS Table</b> .....	<b>279</b>
Downloading DBMS Tables .....	284
Entering SQL Queries with the Expert Button .....	285
Creating Live Remote DBMS Access .....	285
Saving a DBMS Table .....	287
Disconnecting from a Remote Database .....	290
<b>Working with DBMS Tables</b> .....	<b>290</b>
Live Access Performance with Large DBMS Tables .....	290
When Is a DBMS Table Read-Only? .....	291
When Is a DBMS Spatial Object Read-Only? .....	291
<b>Chapter 7: Drawing and Editing Objects</b> .....	<b>293</b>
<b>Understanding the Drawing and Editing Tools</b> .....	<b>294</b>
Using the Drawing Tools .....	294
Using the Drawing and Editing Commands .....	295
<b>Drawing Objects</b> .....	<b>295</b>
Using the Ruler Window as You Draw .....	296
Object Styles .....	296
Printing Fill Patterns .....	297
<b>Drawing Polygons and Polylines</b> .....	<b>297</b>
Converting a Polyline to a Region .....	297
<b>Drawing Symbols</b> .....	<b>298</b>
Changing a Symbol Style on a Map .....	298
Supported Fonts for Symbols .....	299
Working with Custom Symbols .....	299
<b>Entering and Working with Text on the Map</b> .....	<b>305</b>



---

<b>Editing Objects</b> .....	<b>305</b>
Positioning and Sizing your Map Objects .....	306
Changing your Map Object Attributes .....	309
Reshaping Map Objects .....	310
Using “Snap To” to Select Nodes and Centroids.....	311
Setting Snap Preferences for a Visible Snap Area .....	312
Autotracing Existing Objects .....	313
Smoothing and Unsmoothing Lines.....	314
Converting Regions to Polylines .....	314
Editing Street Maps (StreetPro).....	314
<b>Chapter 8: Selecting and Querying Data</b> .....	<b>319</b>
<b>Selecting your Data in MapInfo Professional</b> .....	<b>320</b>
Characteristics of Selections .....	321
Selecting from the Screen .....	322
Selecting Tools .....	322
Other Search Methods .....	326
Unselecting Objects or Records .....	326
<b>Querying Your Data in MapInfo Professional</b> .....	<b>327</b>
Selecting and Using Queries .....	328
Creating Expressions .....	328
Using Select to Create Queries .....	330
Interactively Selecting Objects .....	332
Using SQL Select to Query Data .....	333
Saving Queries .....	336
Using Templates for Queries .....	336
Deriving Columns .....	337
Creating Column Aliases .....	337
Aggregating Data .....	340
Grouping and Ordering Your Data .....	342
Joining Tables Using SQL Select .....	342
Performing Outer Joins .....	345
Using the Instr Function to Find Data .....	347
Selecting Records from One Table that are Not in Another .....	348
Selecting Even or Odd Records from a Table .....	348
Finding Duplicate Values in a Column .....	349
Calculating the Distance to a Fixed Point .....	351
Selecting Data from a StreetPro Table .....	351
Entering SQL Queries using the Expert Button .....	352

---

<b>Chapter 9: Creating Thematic Maps, Legends, and Other Maps</b> . . . . .	<b>355</b>
<b>MapInfo in Action.</b> . . . . .	<b>356</b>
Can You Give Me an Example? . . . . .	356
<b>Using Thematic Mapping to Analyze Information</b> . . . . .	<b>358</b>
Planning Your Thematic Map . . . . .	359
Methods of Thematic Mapping . . . . .	361
<b>Types of Thematic Maps</b> . . . . .	<b>362</b>
Individual Map Values . . . . .	363
Ranged Maps . . . . .	364
Graduated Symbol Maps . . . . .	367
Dot Density Maps . . . . .	368
Bar Chart Maps . . . . .	370
Pie Chart Maps . . . . .	371
<b>Working with Thematic Maps and Legends</b> . . . . .	<b>372</b>
Modifying a Thematic Map . . . . .	372
Saving Your Thematic Settings . . . . .	372
<b>Updating Columns using Thematic Mapping</b> . . . . .	<b>373</b>
<b>Bivariate Thematic Mapping</b> . . . . .	<b>376</b>
Displaying Attributes of a Symbol . . . . .	377
Example of Bivariate Thematic Mapping . . . . .	377
Using an Inflection Point to Show Distinction . . . . .	378
<b>Working with Legends</b> . . . . .	<b>380</b>
What are Cartographic Legends? . . . . .	380
What are Thematic Legends? . . . . .	382
<b>Working with Grid Surface Maps</b> . . . . .	<b>382</b>
<b>Working with 3D and Prism Maps</b> . . . . .	<b>390</b>
Creating a 3DMap . . . . .	391
Manipulating a 3DMap . . . . .	394
Working with Prism Maps . . . . .	394
<b>Chapter 10: Buffering and Working with Objects</b> . . . . .	<b>399</b>
<b>Buffering Your Data.</b> . . . . .	<b>400</b>
Understanding Buffers . . . . .	400
Creating a Buffer . . . . .	400
Buffer Methods . . . . .	406
Types of Buffers . . . . .	406

---

<b>Editing Objects using the Set Target Model</b> .....	<b>408</b>
Aggregating and Disaggregating Data .....	410
Combining Objects with Set Target .....	410
Splitting Objects .....	412
<b>Creating Territories by Combining Objects</b> .....	<b>414</b>
Combining Selected Objects .....	415
Combining Objects Using Column .....	416
Creating a Voronoi Polygon .....	417
Grouping Objects using Multipoint and Collection Object Types .....	420
<b>Creating and Manipulating Objects</b> .....	<b>424</b>
Enclosing Objects .....	424
Checking Regions .....	425
Cleaning Objects .....	427
Snapping Nodes and Thinning Objects .....	428
Disaggregating Objects .....	431
Erasing Objects .....	432
Overlaying Nodes .....	432
<b>Chapter 11: Graphing Your Data</b> .....	<b>435</b>
<b>Identifying the Right Type of Graph</b> .....	<b>436</b>
Graphing Terms .....	436
3D Graphs .....	436
Area Graphs .....	437
Bar Graphs .....	437
Bubble Graphs .....	437
Column Graphs .....	438
Histogram Graphs .....	438
Line Graphs .....	438
Pie Graphs .....	438
Scatter Graphs .....	438
Surface Graphs .....	438
<b>Graphing Your Data</b> .....	<b>439</b>
Creating a Graph using the Graph Wizard .....	439
Editing a Graph .....	440
<b>Working with Multi-Table and Multi-Variable Graphs</b> .....	<b>445</b>
Selections in Graphs and Their Tables .....	449
Saving a Graph .....	450
Using Graph Templates .....	450
Using Graphs From Earlier Versions of MapInfo Professional .....	451

---

<b>Chapter 12: Stylizing Your Map for Presentations and Publishing</b> . . . . .	<b>453</b>
<b>Changing a Map's Style</b> . . . . .	<b>454</b>
Changing a Region's Style . . . . .	454
Changing a Line's Style . . . . .	455
Changing a Symbol's Style. . . . .	456
Changing the Text Style . . . . .	457
<b>Labeling Your Map.</b> . . . . .	<b>458</b>
Designing Your Labels . . . . .	458
Choosing the Label Content. . . . .	459
Using AutoLabeling . . . . .	460
Labeling Interactively . . . . .	464
Using Text Objects as Labels. . . . .	465
Removing Labels . . . . .	467
Saving Labels . . . . .	468
<b>Working with Layouts</b> . . . . .	<b>468</b>
What is a Layout Window? . . . . .	468
Working in the Layout Window . . . . .	469
Before You Create a Layout. . . . .	470
Creating a Layout . . . . .	473
Using Legends in a Layout. . . . .	475
Moving Frames in a Layout Window . . . . .	476
Aligning Objects in a Layout Window . . . . .	476
Setting the Map Scale for a Layout Window. . . . .	478
Cloning a Map View . . . . .	480
<b>Creating a Cartographic Legend</b> . . . . .	<b>481</b>
What is a Cartographic Legend? . . . . .	481
Creating a Cartographic Legend . . . . .	481
Using the Legend Wizard . . . . .	486
Saving Legend Attributes to Metadata . . . . .	490
Changing a Cartographic Legend. . . . .	490
<b>Printing and Exporting Your Results.</b> . . . . .	<b>497</b>
Printing Your Project. . . . .	497
Exporting a Layout . . . . .	499
<b>Chapter 13: Registering Raster Images</b> . . . . .	<b>501</b>
<b>Working with Raster Images.</b> . . . . .	<b>502</b>
Understanding Raster Images in MapInfo Professional . . . . .	502
Raster Image Details . . . . .	503
Color Options for Raster Images . . . . .	503

---

<b>Opening a Raster Image</b> .....	<b>504</b>
Opening Unregistered Raster Images .....	504
Opening Georeferenced Raster Images .....	505
Opening Registered Raster Images .....	505
Registering the Coordinates of a Raster Image .....	506
Transferring Vector Map Coordinates Directly to a Raster Map .....	508
Modifying Control Points for Raster Images .....	510
<b>Printing/Exporting Translucent Images</b> .....	<b>512</b>
<b>Chapter 14: Working with Coordinate Systems and Projections</b> .....	<b>515</b>
<b>Working with Coordinate Systems</b> .....	<b>516</b>
Elements of a Coordinate System .....	516
Understanding Coordinate Systems .....	517
<b>Building Blocks of a Coordinate System</b> .....	<b>521</b>
Coordinate Systems, Projections, and their Parameters .....	521
Projection Types .....	522
Datums Table .....	525
Units .....	534
Coordinate System Origin .....	534
Standard Parallels (Conic Projections) .....	535
Oblique Azimuth (Hotine Oblique Mercator) .....	535
Scale Factor (Transverse Mercator) .....	535
False Easting and False Northing .....	535
Range (Azimuthal Projections) .....	535
About Polyconic Coordinate Systems .....	536
Examples of Projection Entries in the MAPINFOW.PRJ File .....	536
<b>Adding Projections to the MAPINFOW.PRJ File</b> .....	<b>538</b>
Using the New Projection in a Coordinate System .....	539
Entering a New Coordinate System (Example) .....	540
<b>Understanding Affine Transformations</b> .....	<b>541</b>
Description of an Affine Transformation .....	541
<b>Frequently Asked Questions</b> .....	<b>544</b>
<b>Using Earth and Non-Earth Maps</b> .....	<b>545</b>
<b>Using the Ocean and Grid Tables</b> .....	<b>547</b>
<b>Chapter 15: Specialized Topics in MapInfo Professional</b> .....	<b>549</b>
<b>Embedding MapInfo Professional Maps</b> .....	<b>550</b>
What You Should Know First .....	550
OLE Terms .....	551

---

MapInfo Map Tools and Menu Commands . . . . .	551
OLE Tools. . . . .	552
Menus and Commands Available While Using the MapInfo Map. . . . .	553
Limitations of OLE . . . . .	555
Working with Embedded Maps. . . . .	555
Sharing Documents with Embedded Maps . . . . .	558
MapInfo Map Objects vs. Data Map Objects . . . . .	558
Using MapInfo Tables with Data Map. . . . .	559
<b>Internet Connectivity and MapInfo Professional . . . . .</b>	<b>559</b>
What are Active Objects?. . . . .	560
Creating Active Objects . . . . .	561
Using the HotLink Tool. . . . .	561
HTML Image Maps. . . . .	564
HTML Landing Pages. . . . .	565
<b>Redistricting — Grouping Map Objects into Districts . . . . .</b>	<b>566</b>
What is Redistricting and How Can I Use It? . . . . .	566
Using the Districts Browser . . . . .	567
Setting up the Target District . . . . .	567
Using Redistricting . . . . .	568
Options in Redistricting. . . . .	572
Saving New Districts. . . . .	572
Exiting the Redistricter . . . . .	572
<b>Creating Expressions . . . . .</b>	<b>573</b>
Constructing Simple Expressions. . . . .	573
Constructing Complex Expressions . . . . .	574
Entering Specific Values (Constants). . . . .	574
Character Strings . . . . .	574
Numbers. . . . .	575
Dates . . . . .	575
Operators - Mathematical Operators . . . . .	575
Operators - String Operators . . . . .	575
Operators - Comparison Operators . . . . .	576
Operators - Geographic Operators. . . . .	578
Operators - Logical Operators . . . . .	580
Operator Precedence. . . . .	584
Functions . . . . .	585

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<b>Working with the MapBasic Window</b> .....	<b>602</b>
Accessing the MapBasic Window .....	602
Examples of MapBasic Programs .....	603
Street Characteristics of MapInfo Data .....	608
<b>Digitizing Maps with MapInfo Professional</b> .....	<b>608</b>
Digitized Maps vs. Raster Images .....	608
Digitizing Requirements .....	608
Setting Up the Digitizing Equipment .....	609
Entering Control Points .....	610
Digitizer Mode .....	613
Digitizing Your Map .....	614
Tracing Existing Objects .....	614
Digitizing Trouble Shooting Tips .....	615
Limitations of Digitizing .....	617
<b>Web Map Service</b> .....	<b>617</b>
Understanding GetFeatureInfo Support in Web Map Service .....	617
<b>Understanding WMS Error Messages</b> .....	<b>619</b>
<b>Web Feature Service</b> .....	<b>620</b>
Opening a Web Feature Service .....	621
Selecting a WFS Layer .....	623
Controlling WFS Maximum Features .....	626
Changing a WFS Coordinate System .....	626
Changing WFS Styles .....	627
Handling Retrieved WFS Data .....	627
Refreshing a WFS Layer .....	627
Adding a WFS Server .....	627
<b>Appendix A: Directory of MapInfo Professional Shortcuts</b> .....	<b>633</b>
<b>Shortcuts for File Menu Items</b> .....	<b>634</b>
<b>Shortcuts for Edit Menu Items</b> .....	<b>634</b>
<b>Shortcut to Tools Menu Items</b> .....	<b>634</b>
<b>Shortcuts to Objects Menu Items</b> .....	<b>635</b>
<b>Shortcuts for Query Menu Items</b> .....	<b>635</b>
<b>Shortcuts for Options Menu Items</b> .....	<b>635</b>
<b>Shortcuts for Map Menu Items</b> .....	<b>636</b>
<b>Shortcut for Layout Menu Item</b> .....	<b>636</b>
<b>Shortcuts for Window Menu Items</b> .....	<b>636</b>
<b>Shortcuts by Keystroke</b> .....	<b>637</b>

---

<b>Appendix B: Elements of a Coordinate System</b> . . . . .	<b>639</b>
<b>Projections and Their Parameters</b> . . . . .	<b>640</b>
Projection . . . . .	641
<b>Projection Datums</b> . . . . .	<b>643</b>
Units . . . . .	651
Coordinate System Origin . . . . .	652
Standard Parallels (Conic Projections) . . . . .	652
Oblique Azimuth (Hotine Oblique Mercator) . . . . .	652
Scale Factor (Transverse Mercator) . . . . .	652
False Northings and False Eastings . . . . .	652
Range (Azimuthal Projections) . . . . .	653
Polyconic Projection . . . . .	653
<b>Datum Enhancements</b> . . . . .	<b>653</b>
<b>For More Information on Projections</b> . . . . .	<b>655</b>
Contact Information . . . . .	655
<b>Appendix C: Registering SPOT Images</b> . . . . .	<b>657</b>
<b>Registering SPOT Image Files</b> . . . . .	<b>658</b>
Gathering Coordinate System and Control Point Information . . . . .	658
SPOTView™ Settings . . . . .	659
Geopot™ Settings . . . . .	660
Coordinate System Information (SPOTView™ Only) . . . . .	660
Control Point Information . . . . .	661
<b>Appendix D: MapInfo Map Interchange Format</b> . . . . .	<b>663</b>
<b>MIF File Header</b> . . . . .	<b>664</b>
MIF File Header Version . . . . .	664
Charset . . . . .	667
Delimiter . . . . .	668
Unique . . . . .	668
Index . . . . .	668
CoordSys Clause . . . . .	668
Transform Clause . . . . .	670
Columns . . . . .	670
<b>MIF Data Section</b> . . . . .	<b>671</b>
<b>Pen Styles</b> . . . . .	<b>674</b>
<b>Brush Styles</b> . . . . .	<b>675</b>



---

<b>Symbol Styles</b> .....	<b>676</b>
Symbol Clause-MapInfo 3.0 Syntax .....	676
Symbol Clause – TrueType Font Syntax .....	677
Symbol Clause – Custom Bitmap File Syntax .....	677
<b>Font Styles for Symbols</b> .....	<b>678</b>
<b>Colors for Symbols</b> .....	<b>678</b>
MID File .....	679
<b>Appendix E: Fill Patterns Used in MapInfo Professional</b> .....	<b>681</b>
<b>MapInfo Professional Fill Pattern Table</b> .....	<b>682</b>
<b>Appendix F: Custom Datums</b> .....	<b>687</b>
<b>Defining Custom Datums</b> .....	<b>688</b>
<b>Datum Conversion</b> .....	<b>693</b>
<b>Appendix G: Sample Data Copyrights</b> .....	<b>695</b>
<b>Africa</b> .....	<b>696</b>
<b>Asia</b> .....	<b>696</b>
Australia .....	696
Streetworks samples .....	696
China .....	697
Japan .....	697
India .....	697
<b>Europe</b> .....	<b>697</b>
Austria, Belgium, Denmark, Deutschland, Espana, France, Italy, Netherlands, Norway, Portugal, Sweden, Switzerland, United Kingdom .....	697
Great Britain .....	698
<b>North America</b> .....	<b>698</b>
Canada .....	698
Mexico .....	698
United States, DC .....	698
United States .....	699
<b>World</b> .....	<b>700</b>
<b>Appendix H: New and Enhanced MapBasic Statements and Functions</b> .....	<b>701</b>
<b>Enhanced MapBasic Functions and Statements</b> .....	<b>719</b>
Enabling Transparent Patterns on Same Layer .....	728
Export Windows to Additional Formats .....	728

---

<b>Appendix I: Data and Settings Management</b> .....	<b>731</b>
<b>Data and Settings Management – Application Data Files</b> .....	<b>732</b>
Registry Changes .....	733
A Glossary for Upgrading Applications .....	733
<b>List of Changes by Version</b> .....	<b>734</b>
<b>Appendix J: New Thematic Templates</b> .....	<b>739</b>
<b>Region Ranges Theme Templates</b> .....	<b>740</b>
Sequential Red-Light Purple RGB .....	740
Sequential Red-Light Purple HSV .....	740
Sequential Green-Light Yellow .....	740
Sequential Green-Light Blue .....	741
Sequential Brown-Light Yellow .....	741
Sequential Blue-Light Yellow RGB .....	741
Sequential Blue-Light Yellow HSV .....	742
Sequential Blue-Light Purple .....	742
Five Diverging Yellow-Gray .....	742
Five Diverging Red-Green .....	743
Five Diverging Red-Blue .....	743
Five Diverging Brown-Green .....	743
Five Diverging Brown-Blue .....	744
<b>Region Individual Values Theme Templates</b> .....	<b>744</b>
Region IndValue Qualitative Pastel .....	744
Region IndValue Qualitative Light and Dark .....	745
<b>Point Ranges Theme Templates</b> .....	<b>745</b>
Sequential Red RGB .....	745
Sequential Red HSV .....	745
Sequential Green HSV .....	746
Sequential Blue HSV .....	746
Five Sequential Spectral .....	746
Five Diverging .....	747
Five Cities .....	747
<b>Grid Elevation</b> .....	<b>747</b>
Grid Elevation in Meters and Feet .....	747
<b>Appendix K: Equivalent MapBasic/ MI SQL Functions, Operators</b> .....	<b>749</b>
<b>Equivalent MapBasic and MapInfo SQL Functions</b> .....	<b>750</b>
<b>Equivalent MapBasic and MapInfo SQL Operators</b> .....	<b>754</b>
<b>Appendix GL: Glossary of Terms</b> .....	<b>757</b>
<b>Index</b> .....	<b>768</b>



# 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 8.0 on page 31** 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? . . . . . 20**
- ◆ **Getting Support . . . . . 26**
- ◆ **What's New in MapInfo Professional 8.0 . . . . . 31**

## What is MapInfo Professional and What Does it Do?

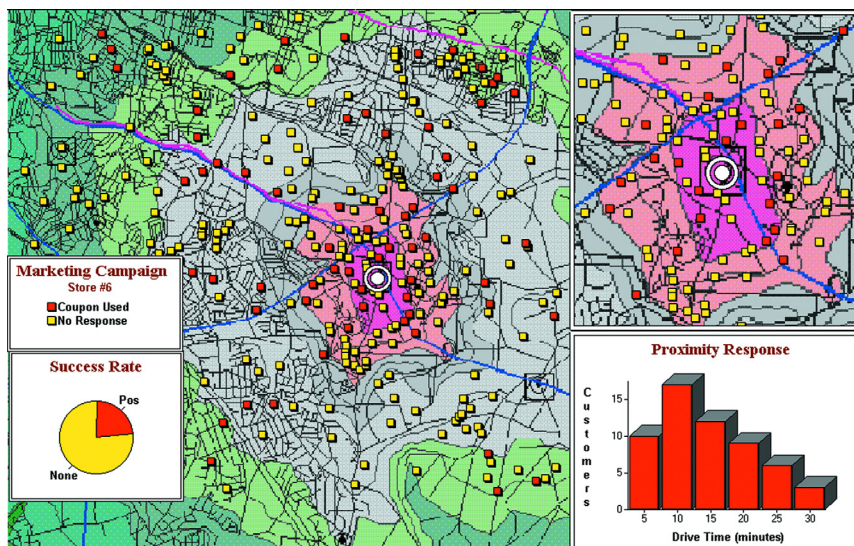
With MapInfo Professional, the power of computer mapping is at your complete disposal. You can display your data as points, as thematically shaded regions, as pie or bar charts, as districts, etc. You can perform geographic operations such as redistricting, combining and splitting objects, and buffering.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

Figure: Thematic Map Example



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 100**. Read through **Organization of the MapInfo Professional Unabridged User Guide on page 23** 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 133** 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 features MapInfo Professional offers:

- Direct opening of files created with dBASE or FoxBASE, delimited ASCII, comma delimited CSV files, ESRI 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. Now with one-step saving to native format available.
- Multiple views of your data in Map, Browser, and Graph windows. Hot Views allow you to open multiple views of the same data and update them when you change 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 data selections 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.
- 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 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](http://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](mailto: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](mailto: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 27](#) for details on contacting your local support center.

## Organization of the MapInfo Professional Unabridged User Guide

We have organized this User 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 and Configuring 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 8.0.

**Appendix I: Data and Settings Management** covers the application data files necessary for using MapInfo Professional. You can also find a history of major changes to MapInfo Professional in this appendix.

**Appendix J: New Thematic Templates** shows you the new thematic templates we have prepared for the MapInfo Professional 8.0 release. These templates have been designed to show your maps to their best advantage.

**Appendix K: Equivalent MapBasic/ MI SQL Functions, Operators** lists the equivalent MapBasic and MapInfo SQL functions and operators so you can create meaningful label and thematic expressions.

## MapInfo Professional Documentation Set

We have updated our *MapInfo Professional 8.0 User Guide (Abridged)* and *MapInfo Professional 8.0 User Guide (Unabridged)* to include the new features of MapInfo Professional and integrated issues and features from version 7.8. The *User Guide (Unabridged)* is an online version of this document and contains more detail about the MapInfo Professional product and exists only in .PDF format. If you cannot find information you are looking for in the *Abridged* version, please refer to the MI\_UG.PDF file on your Installation CD.

We have updated the *MapInfo Professional 8.0 Help System* and changed its look-and-feel to resolve some of the consistency and usability issues of the past. We have tried to preserve the search and indexing functions that were most useful from the old help system to ensure that information is not lost and your way of accessing it is intact. You can let us know what you think by contacting us at [documentation@mapinfo.com](mailto:documentation@mapinfo.com)!

We have updated the *MapBasic® User Guide* and the *MapBasic® Reference* to include new and enhanced MapBasic statements and functions. You can review a summary of these changes in [Appendix H: New and Enhanced MapBasic Statements and Functions](#).

## 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.
  - printing.pdf* contains MapInfo Professional *Printing Guide*.
  - supplement.pdf* contains a detailed list of the changes in the 8.0 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

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Everyone here 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.

### Using the Status Bar

The Status Bar along the lower edge of your window 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 displays 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.

- Quick Access to the MapInfo website: Click the underlined MapInfo Corporation name at the bottom of each topic page to go to the MapInfo website. From here you have access to product information, upcoming events, tech tips, and a complete set of documentation.

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. You can change the size of the Help window to work the way you want to.

## 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](mailto: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](mailto: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](mailto: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](mailto: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](mailto: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>

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## What's New in MapInfo Professional 8.0

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We are happy to bring you the latest in features and enhancements for MapInfo Professional 8.0!

### New Major Features of MapInfo Professional

There are several new features in Microsoft XP Logo Certified MapInfo Professional 8.0. 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.

- **Support for Windows 2003 Server with Terminal Services and Citrix Added**
- **Support for Saved Queries added to MWS (XML) Files**
- **Label and Theme Expression Support for MWS (XML) Files Added**
- **Now Providing Support for Oracle Workspace Manager**
- **Proxy Server Settings Available in Web Services Preference Options**

#### Support for Windows 2003 Server with Terminal Services and Citrix Added

We have added support for Windows 2003 Server with Terminal Services to allow any member of the group *Users* to be able to use MapInfo Professional via a Terminal Services session. The Terminal Services feature is essential to the operation of the Citrix Access Infrastructure.

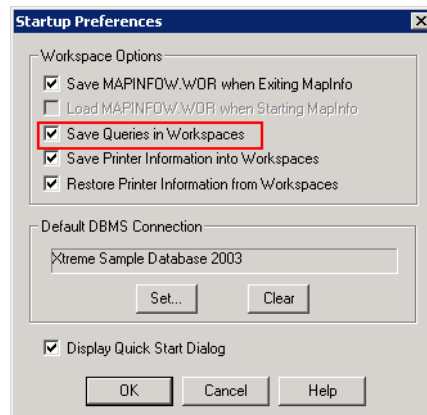
We have modified our installation process to ensure that MapInfo Professional operates successfully in a Terminal Services environment. When the installer detects that the user is installing locally in a system running Windows 2003 Server with Terminal Services, the installer adds the necessary files and components to that machine. Once the user connects for the first time to the Terminal Services computer and runs MapInfo Professional, a user configuration process begins to copy the per-user files needed to run MapInfo Professional.

#### Support for Saved Queries added to MWS (XML) Files

To enhance the usability of MapInfo's native XML workspace files (.mws files) we have added new SQL Query capabilities. You can write MapBasic SQL queries that are saved to a workspace file as MapInfo SQL language queries and the map definitions based on those queries, to an MWS file. In MWS they are saved as MapXtreme Views in a MapInfoSQLDataSourceDefinition element in the DataSourceDefinitionSet. SQL Queries, and the MWS map definition layers based on them, are written to the MWS if you select **SAVE QUERIES IN WORKSPACE** in the **OPTIONS > PREFERENCES > STARTUP** dialog box. Only queries referenced by a Map window are written to the MWS. To see this new functionality:

1. Select the **SAVE QUERIES IN WORKSPACE** option in the **OPTIONS > PREFERENCES > STARTUP** dialog box.



**Figure: Startup Preferences with Save Queries in Workspaces Selected**

If you do not select this checkbox and the map selected from the **SELECT MAPPER WINDOWS** dialog box has only one layer based on a query, the query is not saved, and the application writes a map definition with an empty layer list.

2. Create and execute a SQL query.

**Note:** Only SQL statements created using the **QUERY > SELECT**, **QUERY > SQL SELECT**, or the MapBasic Select statements can be saved in workspaces.

3. Create a Map window based on your SQL query.
4. Select **FILE > SAVE WORKSPACE** and select the **MAPINFO WORKSPACE FORMAT (\*.MWS)** as the output format.

**Note:** MapInfo Professional cannot map selections with Group By, so Group By clauses are ignored. MapInfo Professional only translates the Order By clause.

**Important:** MapInfo Professional cannot support subselects in queries. The operators **ANY** and **ALL** are not supported in the MapXtreme 2004 versions of MI SQL and subselects are not either.

### Label and Theme Expression Support for MWS (XML) Files Added

We have added label and thematic expression support for the MWS (XML-based) workspace files in MapInfo Professional. When saving themes and label expressions to a MWS file, we translate the expressions into the MapInfo SQL language supported by MapXtreme 2004.

**Note: Important:** Not all MapBasic functions and operators work the same in MapInfo SQL and not all functions and operators are translatable. See **Appendix K: Equivalent MapBasic/ MI SQL Functions, Operators** for a list of the equivalent MapBasic/MapInfo SQL functions and operators to assist you in using this feature effectively.

### Caveats for Label Expressions

- If MapInfo Professional 8.0 cannot translate the label expression when writing MWS, MapInfo Professional replaces the entire label expression with the default. The default label expression is the same table field (column) used by the **LAYER CONTROL LABEL PROPERTIES** dialog box. No error message is generated in this case.
- The resulting label string may not be exactly the same in MapXtreme as it was in MapInfo Professional (particularly for functions that take formatting arguments). Our goal is to translate MapBasic to the equivalent MI SQL, as closely as possible.

## Caveats for Thematic Expressions

- If MapInfo Professional 8.0 cannot translate the thematic expression when writing MWS, MapInfo Professional skips the thematic layer and the thematic layer is not part of the MWS map definition. No error message is generated in this case.
- Themes based on computed columns are not supported.

## How To Tell if the Label Expressions were Translated?

To see the results of the edited label text, look for the StringToken element in the XML. We have included an example below (edited to make it easier to read). The two line label **YUKON TERRITORY** is saved as a string expression with embedded calls to the SQL function Char() for the new line:

```
<LabelSelectionCondition>
  <LabelProperties>
    <LabelVisibility visible="true"/>
    <LabelText justification="right">
      <StringTokenList>
        <StringToken>
          <StringValueExpression>
            <MapinfoStringExpression>'Yukon'+Char(10)+'Territory'
          </MapinfoStringExpression>
          </StringValueExpression>
        </StringToken>
      </StringTokenList>
    </LabelText>
  </LabelProperties>
```

## How To Tell if the Thematic Expressions were Translated?

We have included an example below (with much deleted to make it easier to read). The expression result **Round(Total\_Area, 100)** is saved as a numeric expression with embedded calls to the SQL function Round() for the new line:

```
<LayerList>
  <FeatureLayer id="id3" name="USA" alias="USA id5"
    volatile="unknown">
    <Visibility visible="true">
      <VisibleRange enabled="false">
        <ZoomRange uom="mapinfo:length mi" minInclusive="true"
          maxInclusive="false">0 0</ZoomRange>
      </VisibleRange>
    </Visibility>
    <DataSourceRef ref="id1" />
    <FeatureStyleModifierThemeList>
      <FeatureStyleRangeTheme id="id4" name="Ranges by
        Round(Total_Area,
        100)" alias="Ranged Theme id6">
        <RangeValueExpression>
          <NumericValueExpression>
            <MapinfoNumericExpression>Round(Total_Area, 100)
          </MapinfoNumericExpression>
          </NumericValueExpression>
        </RangeValueExpression>

        [ RangedTheme Bin information deleted... ]

      </FeatureStyleRangeTheme>
    </FeatureStyleModifierThemeList>
  </FeatureLayer>
```

## Now Providing Support for Oracle Workspace Manager

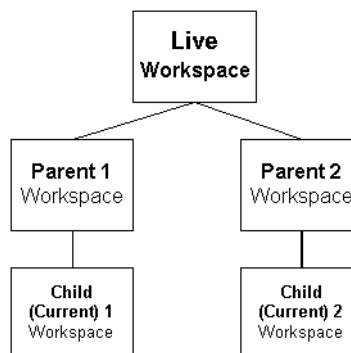
The Oracle Workspace Manager is a new feature in Oracle9i or later that allows you to version-enable tables in an Oracle database. The versioning infrastructure is managed by Oracle Workspace Manager. Once a table is version-enabled, all of the rows in the table can support multiple versions of the data. Oracle uses workspaces to store variations in the data.

MapInfo Professional supports Oracle Workspace Manager technology and makes it easy for you to maintain versions of the same database table data in different workspaces. In Version 8.0, you can manage these workspaces independently of their source tables. Using MapInfo Professional you can enable and disable Oracle table versioning, open Oracle tables and create Oracle workspaces from them, and merge and refresh table changes to and from Oracle workspaces. This can be useful in developing “what if” scenarios, allowing you to verify data prior to validation, and maintaining a persistent history of changes for regulatory and exploratory purposes.

### *What is an Oracle Workspace?*

An Oracle Workspace is a virtual environment that users can share to make changes to the data in the database. When you create an Oracle workspace, you can open version-enabled tables into that workspace. You create the workspace to maintain your own version of the data until you want to merge that data into its parent workspace. Each child (current) workspace contains a snapshot of the information in the parent, as it currently exists. Current workspaces can merge row changes up to its parent workspace, or current workspaces can refresh data from its parent workspace.

**Figure: Oracle Workspace Hierarchy**



A workspace can contain rows from one or more version-enabled tables. Users can then change the entries in these workspaces for scenario planning, transaction history maintenance, or data verification purposes. Using the Oracle Workspace, you can always see a transactionally consistent view of the entire database. You can see changes made in your child (current) workspace and you can see the rest of the data in the database as it existed either when the workspace was created or when it was most recently refreshed with changes from the parent workspace.

### *Enabling Versioning for an Oracle Table*

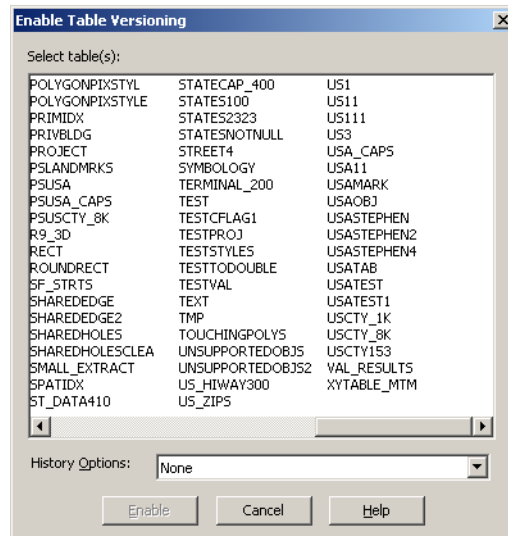
To create different versions of a table in different workspaces, you version-enable the table. Using the **ENABLE TABLE VERSIONING** dialog box, you can select an Oracle table for version-enabling. Tables must have a primary key to enable versioning and once the table is versioned, the primary key value cannot change. If the table you select does not contain a primary key, it cannot be version-enabled.

**Note:** Only tables in an Oracle9i or later database can be versioned. MapInfo Professional does not support table versioning for any other databases.

To version-enable a table:

1. Open an Oracle connection using the **OPEN DBMS CONNECTION** option. If a connection has already been established, go to the next step. If there is more than one eligible connection, a dialog box displays to allow you to choose a connection.
2. Click **TABLE > ORACLE WORKSPACE TOOLS > ENABLE VERSIONING**. The **ENABLE TABLE VERSIONING** dialog box displays to allow you to select a connection.

**Figure: Enable Table Versioning**



3. Select the Oracle table(s) you want to enable versioning for. In this dialog box you can select the versioning options for the table(s) you selected. Options include: **NONE**, **WITH OVERWRITE** and **WITHOUT OVERWRITE**. Tables must contain a primary key to be version-enabled.

The History options allow Oracle to specify how to track table and timestamp changes made to all rows in a version-enabled table. Additionally Oracle can save a copy of either all changes or only the most recent changes to each row. These are the options:

- When you select **NONE**, no table changes are tracked. (This is the default setting.)
- When you select the **OVERWRITE** option, Oracle creates a history record that shows only the most recent changes to the same version of the table. Oracle does not maintain a history of changes to the version and subsequent row changes in the same version overwrite earlier changes.
- When you select the **WITHOUT OVERWRITE** option, Oracle creates an extensive history record that shows all of the changes to the same version of the table. Using this option the database can maintain a history of changes to the version and subsequent changes to a row in the same version do not overwrite earlier changes.

4. When you have completed your choices, click the **ENABLE** button.

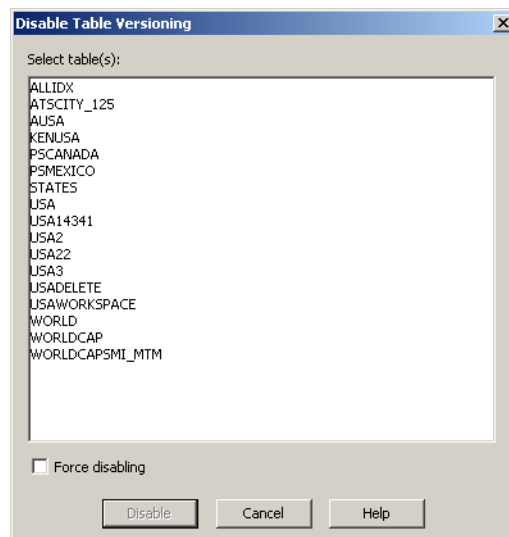
### **Disabling Oracle Table Versioning in MapInfo Professional**

You can select a table or tables for which to disable versioning.

To disable table versioning:

1. Open an Oracle connection using the **OPEN DBMS CONNECTION** option. If a connection has already been established, go to the next step. If there is more than one eligible connection, a dialog box displays to allow you to choose a connection.
2. From the **TABLE** menu, select **ORACLE WORKSPACE TOOLS** and then **DISABLE VERSIONING**. The **DISABLE TABLE VERSIONING** dialog box displays.

Figure: Disable Table Versioning



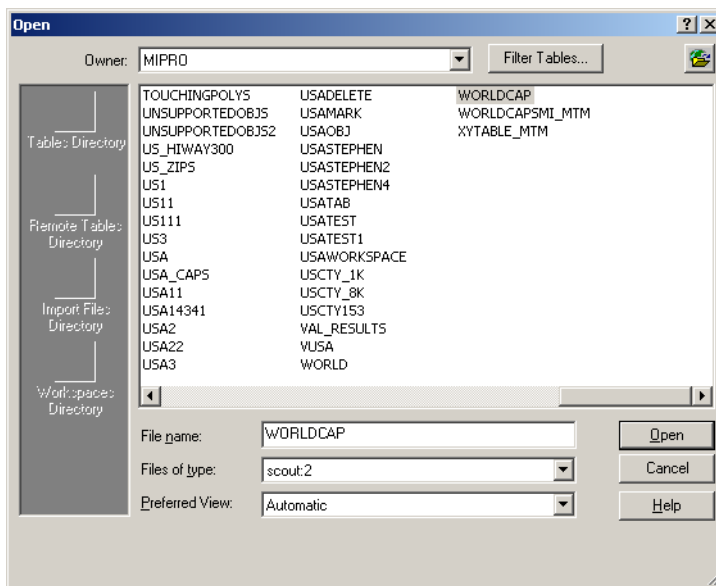
3. Select the table(s) you want to disable versioning for in the **SELECT TABLES** list.  
If you are concerned that there may be existing workspaces that contains a modified version of the table you are disabling, leaving the **FORCE DISABLING** checkbox cleared ensures that these tables are left intact.  
  
If you select this check box, data in workspaces (other than the LIVE workspace) is discarded before versioning is disabled. This checkbox is cleared by default to prevent accidental loss of data.
4. Click the **DISABLE** button.

### ***Opening a Version-Enabled Oracle Table in MapInfo Professional***

To open a version-enabled Oracle table:

1. Open an Oracle connection using the **OPEN DBMS CONNECTION** option. If the connection has already been established, go to the next step. If there is more than one eligible connection, a dialog box displays to allow you to choose a connection.
2. Make sure that the table you want to open has been version-enabled. Follow the instructions in the **Enabling Versioning for an Oracle Table** section to accomplish this. If the table is already version-enabled, go to the next step.
3. Open an Oracle table using the **OPEN DBMS TABLE** button on the **DBMS** toolbar. The **OPEN DBMS TABLE** dialog box displays.

Figure: Open (DBMS Tables)



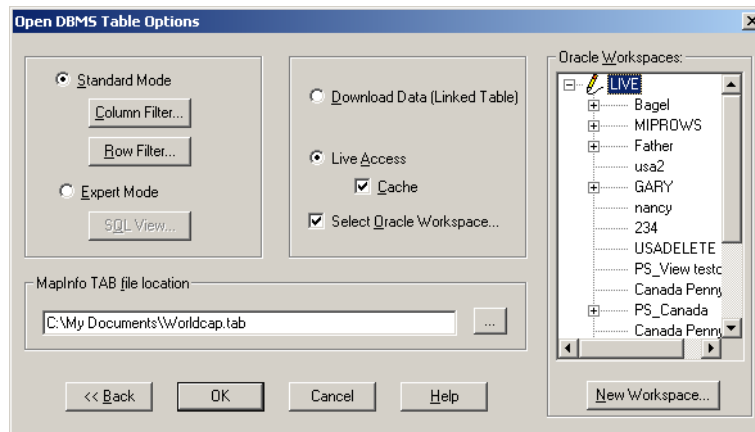
4. To display only version-enabled tables, click the **FILTER TABLES** button to display the **FILTER TABLES** dialog box.


Figure: Filter Tables



5. To display only version-enabled tables in the **OPEN** dialog box, click the **VERSION ENABLED** radio button and click **OK**. Only the version-enabled tables display.
6. Navigate to the table you want open and select it. Click **OPEN** to display the **OPEN DBMS TABLE OPTIONS** dialog box.
7. Click the **LIVE ACCESS** or the **DOWNLOAD DATA (LINKED TABLE)** radio button and the **SELECT ORACLE WORKSPACE** check box to display the **ORACLE WORKSPACES** list.

Figure: Open DBMS Table Options with Select Oracle Workspace Selected



The  icon beside a workspace in this list is used to indicate that the workspace contains a modified version of the table.

**Note:** The **SELECT ORACLE WORKSPACE** checkbox is only visible when you have an Oracle9i or later DBMS connection open. This checkbox is only enabled if the table you selected in the previous step is version-enabled.

8. Select the **SELECT ORACLE WORKSPACE** checkbox to display the list of existing Oracle workspaces.
9. Select the workspace you want to use from the list. The name of the table and the workspace you selected displays in the **MAPINFO TAB FILE LOCATION** field. You can keep this name or you can change the name by typing over it in this field. You use the **ELLIPSIS** button at the end of this field to change the save location of the workspace to a new directory. We suggest this naming convention to make it easy to remember where the workspace came from.

**Note:** For your convenience, you can create a new workspace from here by clicking the **NEW WORKSPACE** button and following the directions in **Creating a Workspace** below.

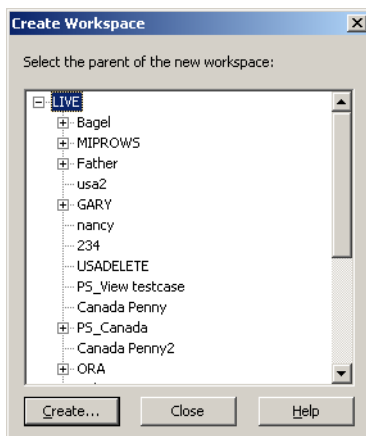
When you make changes to a table in the workspace, the database management system keeps track of the original value that was in the workspace, when it was created, and what the changes are. You can open as many tables in an Oracle workspace as you like. You can also open tables from different workspaces. When you have made and saved changes to the table, there is a new version of the table. When merging (updating values from a current workspace to a parent workspace) or refreshing (updating the current workspace from the parent workspace) conflicts can occur so you must indicate which data should be maintained. In MapInfo Professional, you can only merge or refresh changes to and from one table at a time.

### Creating a Workspace

To create a workspace:

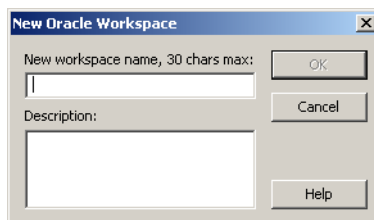
1. Open an Oracle connection using the **OPEN DBMS CONNECTION** option. If an Oracle connection is already open, go to the next step. If there is more than one eligible connection, a dialog box displays to allow you to choose a connection.
2. From the **TABLE** menu, select **ORACLE WORKSPACE TOOLS** and **CREATE WORKSPACE** to display the **CREATE WORKSPACE** list.

Figure: Create Workspace



3. Select the parent workspace for the new workspace you want to create from the list and click the **CREATE** button. The **NEW ORACLE WORKSPACE** dialog box displays.

Figure: New Oracle Workspace



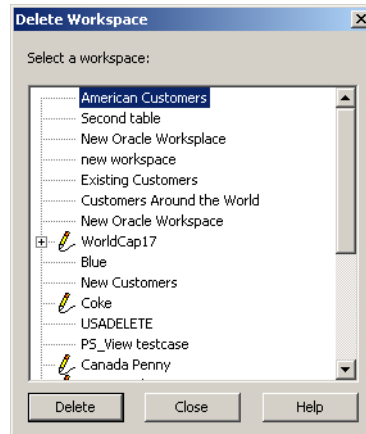
4. Type the name of the new workspace in the **NEW WORKSPACE NAME** field, making sure that the name does not exceed 30 characters. This name is case-sensitive. Enter an optional description of the workspace if necessary.
5. Click **OK** to create the workspace.


***Deleting an Oracle Workspace in MapInfo Professional***

To delete an Oracle workspace in MapInfo Professional:

1. Open an Oracle connection using the **OPEN DBMS CONNECTION** option. If a connection has already been established, go to the next step. If there is more than one eligible connection, a dialog box displays to allow you to choose a connection.
2. Click **TABLE > ORACLE WORKSPACE TOOLS > DELETE WORKSPACE**. The **DELETE WORKSPACE** dialog box displays.



**Figure: Delete Workspace**

The  icon beside indicates that the workspace contains modified table(s).

3. Select the workspace you want to delete from the list and click the **DELETE** button. A confirmation dialog box displays.
4. Press **DELETE** to delete the workspace.

To disable table versioning , see [Disabling Oracle Table Versioning in MapInfo Professional](#).

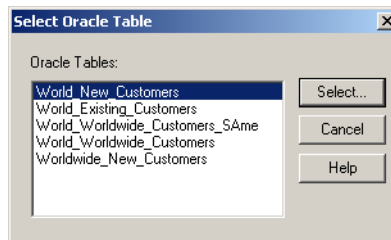
### **Merging a Table to its Parent Workspace**

Merging allows you to update changes you have made in the current workspace to its parent workspace.

**Important:** Oracle Workspace Manager technology is only available to Oracle9i databases or later.

To merge an open Oracle table in the current workspace its parent workspace:

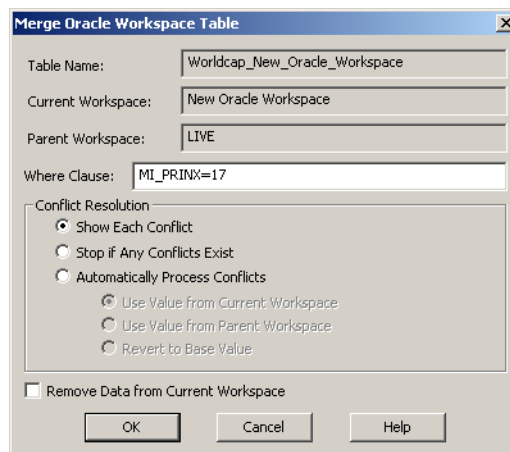
1. Open an Oracle connection using the **OPEN DBMS CONNECTION** option. If there is more than one eligible connection, a dialog box displays to allow you to choose a connection.
2. Select **TABLE > ORACLE WORKSPACE TOOLS > MERGE TABLE** to display the **SELECT ORACLE TABLE** dialog box.

**Figure: Select Oracle Table**

*This dialog box only displays if more than one version-enabled table (opened from an other than LIVE workspace) exists. If this dialog box does not display, simply move on to the next step.*

3. Select the Oracle table you want to merge and click **SELECT**. The **MERGE ORACLE WORKSPACE TABLE** dialog box displays.

Figure: Merge Oracle Workspace Table



Use this dialog box to specify the merge options.

4. If you want to update a specific row only, enter a where clause in the **WHERE CLAUSE** field to identify the row you want. A valid where clause might look something like this:

```
MI_PRINX=17 or MI_PRINX=19 or MI_PRINX>25
```

**Note:** Do not include the word *where* in the **WHERE CLAUSE** field.

5. To remove the data from the workspace, click the **REMOVE DATA FROM CURRENT WORKSPACE** check box.

When you select this checkbox, the edited data for the table in the current workspace is removed. This option is permitted only if the workspace has no current workspaces (that is, it is a leaf workspace). If you do not select this checkbox, (which is the default) data is not removed from the table in the current workspace.

6. If there are conflicts between the workspace being merged and the parent workspace, the merge operation cannot be completed until the conflicts are resolved. You must resolve conflicts prior to merging the changes. You can use this dialog box to select a conflict resolution method:

- Click **SHOW EACH CONFLICT** to show the details of each conflict individually and resolve each one based on the information that is changing. When you select this option, a new dialog box displays so you can choose, individually, which rows are used for update.

**Note:** Due to the limitations in Oracle9i, the **SHOW EACH CONFLICT** option is not enabled. This option is enabled for Oracle 10g and later.

- Click **STOP IF ANY CONFLICTS EXISTS** to end the merge process if conflicts exist.
- Click **AUTOMATICALLY PROCESS CONFLICTS** and select one of these upload options:
  - a. Click **USE VALUE FROM CURRENT WORKSPACE** to update the row values from the current workspace to the parent workspace.
  - b. Click **USE VALUE FROM PARENT WORKSPACE** to leave the existing row values in the parent workspace in tact and copy it to the current workspace.
  - c. Click **REVERT TO BASE VALUE** to return to the original (base) table values. This causes the base rows to be copied to the current workspace but not to the parent workspace, which resolves the conflict. When the current workspace is merged, the base rows are copied to the parent workspace as well.

**Note:** The base values are ignored for insert-insert conflicts where base rows do not exist. In this case, you must choose **USE VALUE FROM CURRENT WORKSPACE** or **USE VALUE FROM PARENT WORKSPACE** from the **AUTOMATICALLY PROCESS CONFLICTS** options.

7. Click **OK** and one of the following happens:
  - If you selected **STOP IF ANY CONFLICTS EXIST** and the system encounters a conflict, the merge process comes to an end
  - If you selected **AUTOMATICALLY PROCESS CONFLICTS**, the system completes the merge process based on your selection
  - If you selected **SHOW EACH CONFLICT** and there are conflicts that require individual resolution, a new dialog box displays. Review the conflicts and click **NEXT** to move through them, selecting the conditions that resolve the specified row of data. When all conflicts are resolved, click **FINISH** to begin the process. A confirmation dialog box displays. Click **YES** to confirm the changes you have made and complete the merge process or click **NO** to reject your changes and cancel the merge process.

**Note:** For more information about the conflict resolution process, see [Resolving Conflicts in Oracle Workspaces](#).

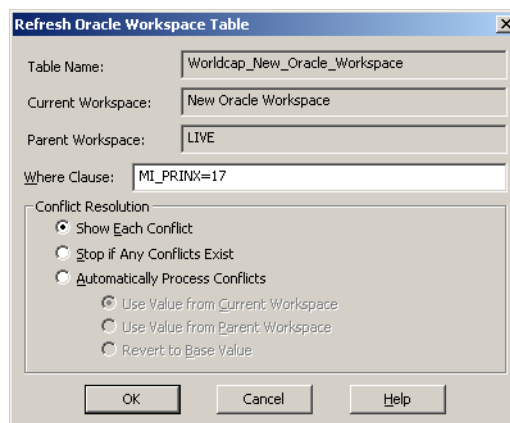
### Refreshing a Table from its Parent Workspace

Refreshing the table allows you to update a table in your current workspace with changes made in the parent workspace.

To refresh an opened Oracle table with changes made in the parent workspace:

1. Open an Oracle connection using the **OPEN DBMS CONNECTION** option. If a connection is already established, move on to the next step. If there is more than one eligible connection, a dialog box displays to allow you to choose a connection.
2. Select **TABLE > ORACLE WORKSPACE TOOLS > REFRESH TABLE** to display the **SELECT ORACLE TABLE** dialog box.
3. Select the table to refresh from in the version-enabled tables list and click **SELECT**. The **REFRESH ORACLE WORKSPACE TABLE** dialog box displays.

Figure: Refresh Oracle Workspace Table



4. If you want to update a specific row only, enter a where clause in the **WHERE CLAUSE** field to identify the row you want to update. A valid where clause might look something like this:

```
MI_PRINX=17 or MI_PRINX=19 or MI_PRINX>25
```

**Note:** Do not include the word *where* in the **WHERE CLAUSE** field.

5. You must resolve conflicts prior to refreshing the workspace with changes. You can use this dialog box to select a conflict resolution method. Click:
  - **SHOW EACH CONFLICT** to show the details of each conflict individually and resolve each one based on the information that is changing. When you select this option, a new dialog box displays so you can choose which rows are used for update on an individual basis.

**Note:** Due to limitations in Oracle9i, the **SHOW EACH CONFLICT** option is not enabled. This option is only available for Oracle 10g users and later.

- **STOP IF ANY CONFLICTS EXIST** to end the refresh process if it encounters conflicts.
- **AUTOMATICALLY PROCESS CONFLICTS** to select one of these upload options:
  - a. **USE VALUE FROM CURRENT WORKSPACE** to update the row values from the current workspace to the parent workspace.
  - b. **USE VALUE FROM PARENT WORKSPACE** to copy the value from the parent workspace to the current workspace.
  - c. **REVERT TO BASE VALUE** to return to the original (base) values, which causes the base rows to be copied to the current workspace but not to the parent workspace, which resolves the conflict. When the current workspace is merged, the base rows are copied to the parent workspace as well.

**Note:** The base values are ignored for insert-insert conflicts where base rows do not exist. In this case, you must choose **USE VALUE FROM CURRENT WORKSPACE** or **USE VALUE FROM PARENT WORKSPACE** from the **AUTOMATICALLY PROCESS CONFLICTS** options.

6. Click **OK** and one of the following happens:
  - If you selected **STOP IF ANY CONFLICTS EXIST** the process comes to an end without refreshing
  - If you selected **AUTOMATICALLY PROCESS CONFLICTS**, the system completes the refresh process based on your selection
  - If you selected **SHOW EACH CONFLICT** and there are conflicts that require individual resolution, a new dialog box displays. Review the conflicts and click **NEXT** to move through them, selecting the conditions that resolve the specified row of data. When all conflicts are resolved, click **FINISH** to begin the process. A confirmation dialog box displays. Click **YES** to confirm the changes you have made and complete the refresh process or click **NO** to reject your changes and cancel the refresh process.

For more information about the conflict resolution process, see [Resolving Conflicts in Oracle Workspaces](#).

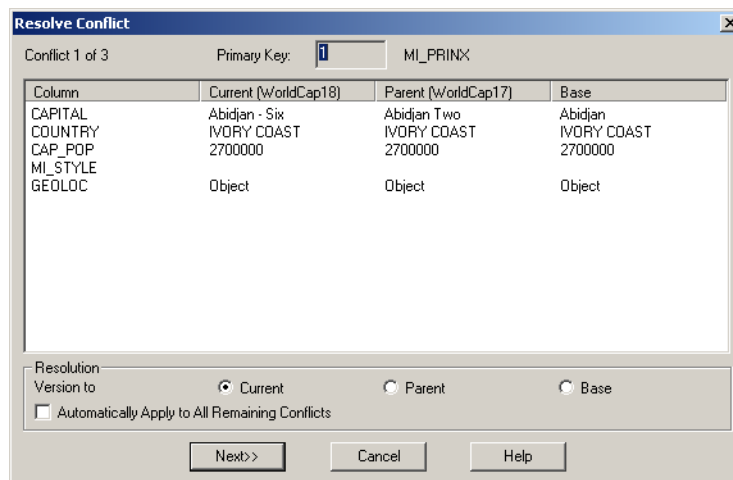
### ***Resolving Conflicts in Oracle Workspaces***

Use the Resolving Conflicts dialog box to resolve conflicts that occur in Oracle workspaces when you are attempting to merge or refresh conflicting data. When you attempt to merge or refresh conflicting data in **SHOW EACH CONFLICT** mode, you can indicate how the conflict is to be resolved for individual rows. The **RESOLVE CONFLICT** dialog box allows you to indicate which value is to be kept. The process for resolving conflicts in the merge and refresh processes is the same.

To resolve conflicts after selecting the **SHOW EACH CONFLICT** option:

1. Open an Oracle connection using the **OPEN DBMS CONNECTION** option. If there is more than one eligible connection, a dialog box displays to allow you to choose a connection.
2. Use the instructions in either merging or refreshing processes to select the **SHOW EACH CONFLICT** button and click **OK**. When conflicts arise, the **RESOLVE CONFLICT** dialog box displays.

Figure: Resolve Conflicts



Use this dialog box to compare the values that are present for each conflict and choose the value that should be used.

3. Review the row entries that are in conflict and do one of the following:
  - Select the **CURRENT** button to accept the entry in the **CURRENT** field to resolve the conflict
  - Select the **PARENT** button to accept the entry in the **PARENT** field to resolve the conflict
  - Select the **BASE** button to revert to the original value (Base value) to resolve this conflict

**Note:** When there is an insert-insert conflict there is no Base value and the **BASE** button is disabled.

4. Do one of the following:
  - If you decide that the rest of the conflicts should be resolved using the same criteria you just selected, select the **AUTOMATICALLY APPLY TO ALL REMAINING CONFLICTS** check box and click **FINISH** to process the rest of the conflicts.
  - Click **NEXT** to move on to the next conflict and repeat this process.
5. When all conflicts are resolved, click **FINISH** to begin the merge or refresh process. A confirmation dialog box displays.
6. Click **YES** to commit the changes you have made or click **NO** to reject your changes.

### Proxy Server Settings Available in Web Services Preference Options

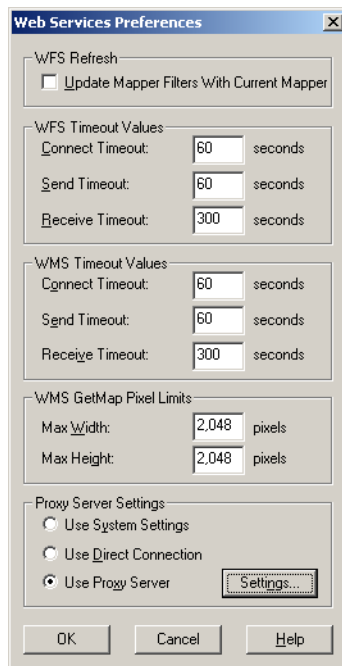
In response to customer requests, we have added two new preference dialog boxes to enable you to configure MapInfo Professional for use with a proxy server. In addition, authentication requests from a proxy server are now handled correctly. These changes were necessary so users could take advantage of new features such as the Web Feature Service and Web Map Service. These additions allow you to configure the MapInfo Professional for use with an alternate proxy server.

**Note:** By default, MapInfo Professional uses your system LAN settings as the default proxy server settings. To set the Web Services Preferences to use a different proxy server, you must know the IP address and port number of the alternate proxy server.

To set up your web service preferences to use a different proxy server than those provided in your system LAN settings:

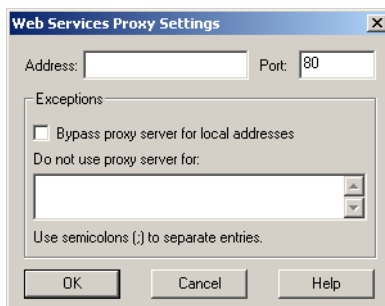
1. From the **OPTIONS** menu, click **PREFERENCES** and then **WEB SERVICES**. The **WEB SERVICES PREFERENCES** dialog box displays.

Figure: Web Services Preferences



2. In the **PROXY SERVER SETTINGS** box, click the **USE PROXY SERVER** button and click the **SETTINGS** button. The **WEB SERVICES PROXY SETTINGS** dialog box displays.

Figure: Web Services Proxy Settings



Use the options in this dialog box to configure the Proxy Server for your Internet and Intranet use.

3. Enter the IP address of your computer and the port number in the fields provided. If you do not know this information, check the IP Config settings or consult your system administrator.
4. To access local addresses without going through the proxy server, select the **BYPASS PROXY SERVER FOR LOCAL ADDRESSES** checkbox.
5. To exclude some non-local IP addresses from the proxy server, enter the IP addresses in the text area provided, using a semicolon to separate the addresses.
6. Click **OK** to save your entries.

As a result of these settings, you are prompted for a user name and password when you are attempting to access the Internet to use the Web Map Service or the Web Feature Service features.

## Mapping - New Features and Enhancements

This section contains the new and enhanced Mapping and Thematic Mapping features in MapInfo Professional 8.0.

### Mapping - New Features

- **Inserting Styles into Tables**
- **Support for Orthogonal Polygons Added**
- **New Find Features**
- **Support Added for Opening Shapefiles Containing M and Z Values**
- **Opening Comma Delimited Files in MapInfo Professional**
- **Object Size Enhancements**
- **Mouse Wheel Support for Browser Window**

### Mapping Enhancements

- **Option to Save as Native to Allow Data Editing when Opening Files**
- **MapInfo Places on Open Dialog Box Enhanced**
- **Layer Control Shows More Layer Information using ToolTips**

### Thematic Map Enhancements

- **Custom Sort Order for Individual Value Thematic Legends**
- **Creating a Bi-Variant Layer Using Transparent Patterns**
- **Alignment of Thematic Legends and Legend Frames Added**
- **Choice of Thematic Legend Swatch Sizes Added**

### Inserting Styles into Tables

There are two kinds of styles in MapInfo Professional. Global styles are set in the Style Preferences dialog box and persist every time you open MapInfo Professional. Session Styles are styles you create during an edit session and only exist for that session. Session styles apply regardless of the table being edited. This new feature allows you to define a table-based insert style that can be used to add new features to an editable table. The style information is saved as metadata in the table record and so persists beyond the session.

To insert a table-based style:


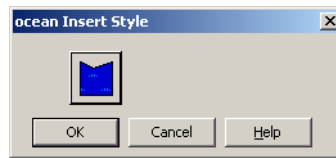
1. From the **FILE** menu, click **OPEN** and select a map to display.
2. Click  to display the **LAYER CONTROL** dialog box.
3. Make the layer you want to insert the style for editable by selecting the **EDITABLE** checkbox beside it. The **INSERT STYLE** button enables.
4. Click the **INSERT STYLE** button to display the **INSERT STYLE** dialog box.

Figure: Insert Style



If the layer you selected contains a region style, the **REGION STYLE** button displays as in this dialog box. It may also contain the **LINE STYLE** button and the **SYMBOL STYLE** button, depending upon the type of layer you are editing.

5. Click the button(s) in this dialog box to select the style options you want for this layer.
6. Click **OK** to save the style options you selected to the table.
7. Click **OK** in the **LAYER CONTROL** dialog box to display the styles on the current map.

To see this “persistent” quality of the insert style command, save the Map window and close MapInfo Professional. Then start MapInfo Professional again and display the map again.

### Support for Orthogonal Polygons Added

Previously, you could draw polyline segments that were in 45 degree increments when you held down the **SHIFT** key. We have added support for orthogonal (right angle) line segments when you press the **CTRL** key. This new functionality is similar to the current rules, in that it constrains to 45 degree increments, except using the **CTRL** key functionality, the 45 degree angle is relative to the slope of the last line segment rather than to a horizontal slope. This functionality works for Add Line, Add Polyline, the Ruler Tool, Custom Polyline and Custom Polygon tools, and the Add Polygon operations.

This functionality will be useful when you want to draw perpendicular lines at an angle rather than horizontal to the map.

**Note:** Snap and Autotrace functionality must be turned off for this feature to work, because when these features are activated, the **CTRL** and **SHIFT** keys have other purposes. The **SHIFT** and **CTRL** keys also do not operate when you are using the **POLYGON SELECT** tool.

To see this new functionality:

1. From the **FILE** menu, click **OPEN** and select a map to display.
2. Make a layer editable using the **LAYER CONTROL** dialog box.
3. Select the **POLYGON** tool from the **DRAWING** toolbar.

**Note:** This works with any of the Line, Polyline, the Ruler Tool, Custom Polyline and Custom Polygon tools as well, we are just using the Polygon tool as an example.

4. Click and draw a single line in any direction other than horizontal following these directions:
  - To draw the next segment perpendicular to the last segment, press **CTRL** while dragging the cursor.
  - To draw the next segment perpendicular to horizontal, press **SHIFT** while dragging the cursor.

Notice the difference in the way the angle draws between the **CTRL** and **SHIFT** created polygons in the next figure.



Figure: Example of Horizontal-Based Orthogonal Polygon vs. Previous Polyline-Based Polygon

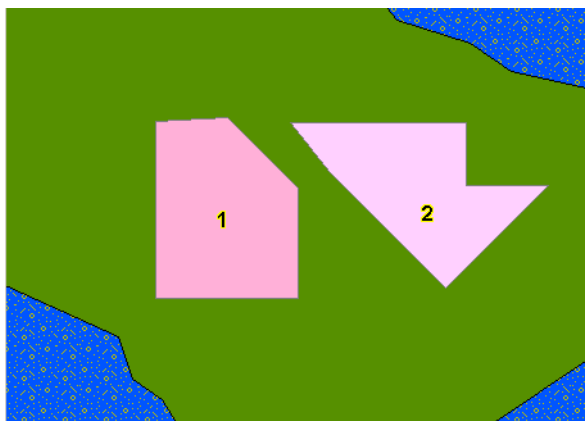


Figure 1 Shift Created Polygon. All angles are relative to the horizontal.

Figure 2 Ctrl Created Polygon. All angles relative to previously drawn polyline.

### New Find Features

We have added two new features to the Find capabilities of MapInfo Professional.

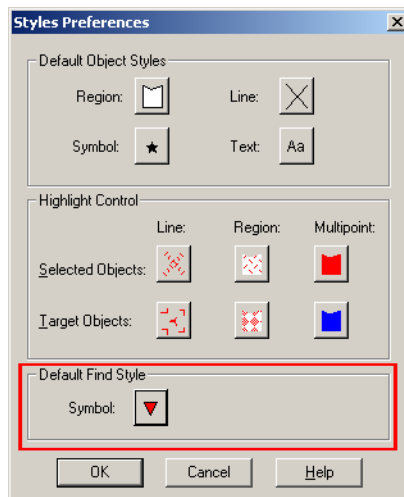
1. We have added a new box in the **STYLE PREFERENCE** dialog box so you can set a default find symbol preference globally. You can still set the symbol for a particular map in the first **FIND** dialog box.
2. When you perform a **QUERY > FIND SELECTION** to locate a selection on the map, we have added options to allow you to find it in the current window only or in all open windows.

### Setting the Default Find Symbol Style

To set a default find symbol preference:

1. From the **OPTIONS** menu, click **PREFERENCES** and then **STYLE** to display the **STYLE PREFERENCES** dialog box.

Figure: Style Preferences



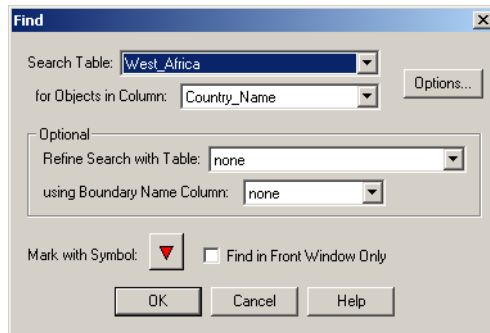
2. Click the **SYMBOL** button to display the **SYMBOL STYLE** dialog box.
3. Select the new symbol style using the options in this dialog box and click **OK** to save them.
4. Click **OK** again to leave the **PREFERENCES** dialog box.

### Changing the Find Symbol Style Locally

To see the change in the default Find Symbol style:

1. From the **FILE** menu, click **OPEN** and select a map to display.
2. From the **QUERY** menu, select **FIND** to display the **FIND** dialog box (first one).

**Figure: Find (first one)**



*This option is particularly helpful with busy or very low contrasting maps.*

**Note:** We have added two new custom symbols that can be used for the **FIND** feature. They are the Find-01 and Find-02 bitmaps. To access these bitmaps, click the **MARK WITH SYMBOL** button, select **CUSTOM SYMBOLS** from the **FONT** drop-down list and select the bitmaps.

**Figure: Find-01 and Find-02 Bitmaps**



### Find Selection in One Window or All Windows Options

In the last release, we added the ability to find a selection in the front window only. We have expanded this capability so you can find a selection in the current window or in all open windows.

The **FIND SELECTION IN CURRENT MAP WINDOW** command allows you to search and display a selection in the currently active Map window. You can not search for the selection in other types of windows (Browser or Layout, for example) using this command. You can access this option by pressing the **<CTRL G>**.

The **FIND SELECTION IN ALL WINDOWS** command allows you to locate the selection in all open windows (including a Browser window) that are currently open.

To access Find Selection in Current Map Window:

1. Perform the **QUERY > FIND** or **QUERY > FIND SELECTION**.
2. Choose **QUERY > FIND SELECTION > IN CURRENT MAP WINDOW**.

**Note:** Choosing the **IN CURRENT MAP WINDOW** option shortens the search time.

To access Find Selection in All Windows:

1. Perform the **QUERY > FIND** or **QUERY > FIND SELECTION**.
2. Choose **QUERY > FIND SELECTION > IN ALL WINDOWS**.

## Support Added for Opening Shapefiles Containing M and Z Values

We have added support for opening ESRI shapefiles containing M and Z values. These files are read-only as was previously true for all other shapefiles. MapInfo Professional discards M and Z values when you save these files as MapInfo tab files or if you copy them to a new Map window. If you attempt to save a file with M and/or Z values in them, the following message displays.

The new table created will not contain M/Z data from the original table.

Click **CONTINUE** to create the table without the M and Z values in it or click **CANCEL** to abandon the save process. Since opening these files is a new feature of MapInfo Professional 8.0, previous versions cannot open these files and the .tab files are versioned as 800.

**Note:** The Universal Translator discards the M and Z values when translating from shapefiles to .tab files, MIF files and MID files to MapInfo .tab and MIF\MID files.

You can label the PointZ or PointM layers only using these custom label expressions to show Z or M values at each point. However, you cannot save these values to a .tab file.

To label M and Z values of a shapefile:

1. Open a shapefile containing M and Z values.
2. Do one of the following to open the **LAYER CONTROL** dialog box:
  - From the **MAP** menu, select **LAYER CONTROL**
  - Click the **LAYER CONTROL** icon from the **MAIN** toolbar.
3. Select the **AUTO LABEL** checkbox for the M or Z layer shown in **LAYER CONTROL** dialog box.
4. Select the **LABELS** button to display the **LABEL OPTIONS** dialog box.
5. Select **EXPRESSION** from the **LABEL WITH** drop-down list and in the **EXPRESSION** dialog box, type the following:
  - for PointM layers: `ObjectGeography(obj, 9)`
  - for PointZ layers: `ObjectGeography(obj, 8)`
6. Click **OK** to complete expression.
7. Click **OK** to return to the **LABEL OPTIONS** dialog box and then click **OK** to return to the **LAYER CONTROL** dialog box.
8. Click **OK** to apply the labels.

Currently we do not support native mapfiles with Z and M values in them so you cannot save shapefiles with these values in them to native MapInfo tables.

**Note:** If you use `ExtractNodes()` function on a shapefile that contains Z or M values, the resulting object returned from the function will not have any Z or M values associated with it. No prompt displays to warn you of the loss of Z or M values.

You can use M and Z values to create a thematic map using a layer expression. In the next example, a PointZ-based shapefile can be used to creating a Grid thematic map using the layer expression `ObjectGeography(obj, 8)` instead of a field in the table in Step 2 of 3. This interpolates the grid based on the Z value contained for each point in the layer. If the Point objects contain M values, use the expression `ObjectGeography(obj, 9)`.

Figure: Create Thematic Map Step 2 of 3 (Grid Type)



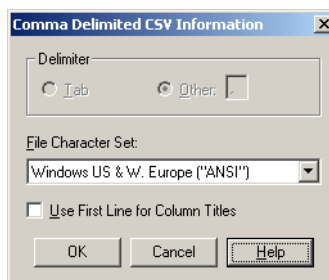
## Opening Comma Delimited Files in MapInfo Professional

As of this release, you can open .csv files from our **FILE > OPEN** dialog box as well.

To open a comma delimited file:

1. From the **FILE** menu, click **OPEN** to display the **OPEN** dialog box.
2. From the **FILES OF TYPE** dialog box, select **COMMA DELIMITED CSV (.CSV)** and go to the folder that contains the file you want to open and click it to select it.
3. Click **OPEN** to display the **COMMA DELIMITED CSV INFORMATION** dialog box.

Figure: Comma Delimited CSV Information



*The **DELIMITER** option buttons in this dialog box are disabled intentionally because commas are the only expected delimiters in this file format.*

4. Select the **FILE CHARACTER SET** for this file from the drop-down list and select the **USE FIRST LINE FOR COLUMN TITLES** checkbox if applicable.
5. Click **OK** to open the file.

## Object Size Enhancements

Several users made requests to increase the size of the allowed objects in MapInfo Professional:

- Increase the number of nodes permitted per object for regions, polylines, and multipoints
- Increase the number of polygons allowed in a multipolygon region and increase the number of polylines in a multiple segment polyline

Many customers use the contouring process to create signal coverage maps, which requires these object size changes to create highly detailed coverage areas. To accommodate this need, we have increased the limit on number of nodes and the number of polygons or polylines that can be stored in objects.

Theoretically, the size of an object is only limited by the amount of memory in the system, but for practical reasons, a limit is imposed to work within limits of file size and most system memory limits. For version 8.0, this size limit for objects is 1,073,741,823 bytes in memory. We selected this limit so that an object of this size can be saved into a MAP file. All MapInfo Professional files have a theoretical limit of 2GB, but due to header size and other required Map file contents, the actual size limit has to be a bit less.

We have increased the node limit to 134,217,724 nodes in any object. This is the actual number of nodes that can fit into this 2GB memory size limit. It will be difficult to reach this new node limit because memory allocation may prohibit it. It may not be possible to create a Map this size on a computer being used to accommodate an object this size; the program may throw an error when you try it.

- For regions, the theoretical maximum number of polygons in a multi-polygon region or collection is 20,648,881 polygons that can fit into the size limit for all objects given above.
- For polyline objects, the theoretical maximum number of segments in a multi-segment polyline is 24,403,223 that can fit into the size limit for all objects given above.
- For multipoint objects, the theoretical maximum number of nodes is 134,217,724 that can fit into the size limit for all objects given above.

### Mouse Wheel Support for Browser Window

When you are working in the Browser window, you can use the mouse wheel to scroll through the records. Roll the mouse button down to scroll down the list, and roll the mouse button up to scroll up the list. You can still use the **TAB** key to scroll right and the **<SHIFT TAB>** keys to scroll left in the Browser window.

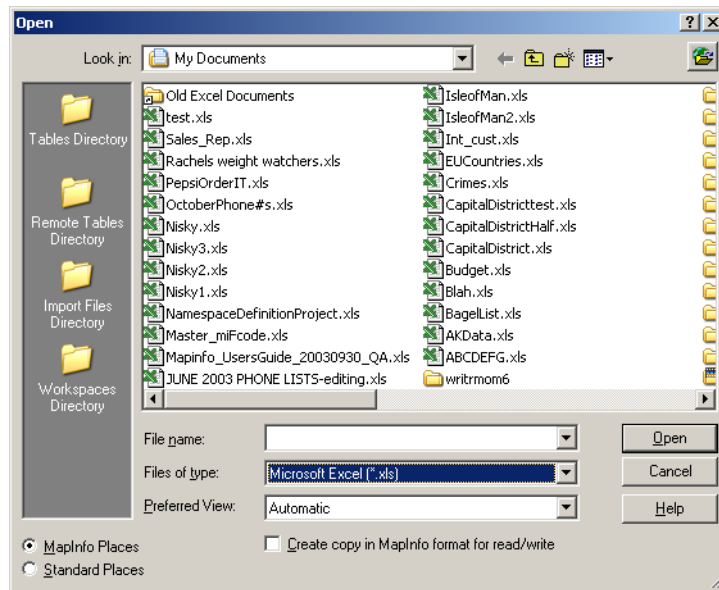
### Option to Save as Native to Allow Data Editing when Opening Files

Formerly, when you opened Comma Delimited, Lotus 1-2-3, ASCII, and Excel files, they were read-only. To edit these files, you would have to save a copy of the file to the native .tab format. We have added an option to do this automatically when you open these types of tables. This should simplify the process of opening and working with your files of these types.

To see this enhancement:

1. From the **FILE** menu, click **OPEN** to display the **OPEN** dialog box.
2. In the Files of type drop-down list, select Microsoft Excel (\*.xls), Delimited ASCII (\*.txt), Lotus 1-2-3 (\*.wk1, \*.wks, \*.wk3, \*.wk4), or Comma Delimited CSV (\*.csv) to display the list of available files of these types only.

Figure: Open (with Create copy in MapInfo format for read/write)



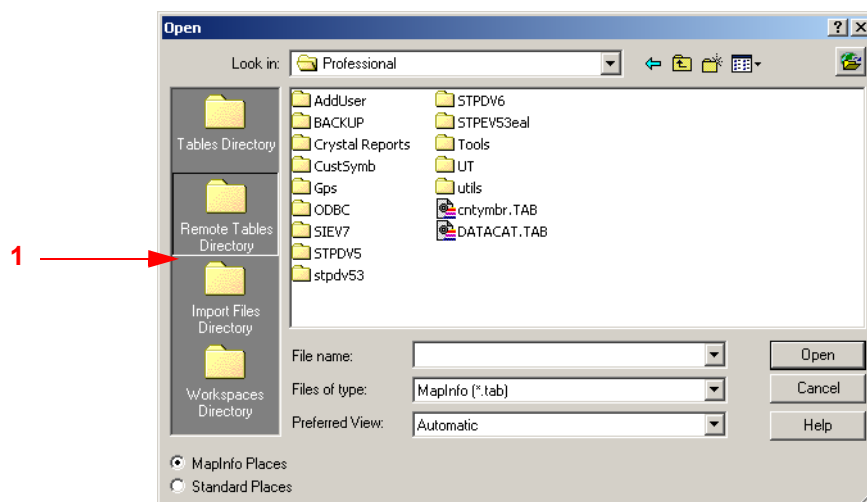
3. Select a file from the list and select the **CREATE COPY IN MAPINFO FORMAT FOR READ/WRITE** to open it in native (.tab) format.
- Note:** If you do not select the **CREATE COPY...** checkbox, the file opens read-only as before.
4. Click **OPEN** to open the file.

**CAUTION:** Keep in mind that these new files will not be updated with any edits you make to the original tables. The reverse is also true. While you can edit these tables in MapInfo Professional, your changes will not be reflected in the original data. When you open these files in this way, they are no longer linked to the original tables.

### MapInfo Places on Open Dialog Box Enhanced

The **OPEN** dialog box provides a quick way to look for maps you have created.

Figure: Open

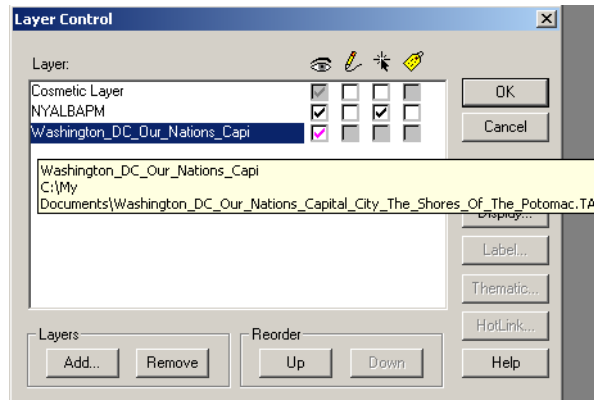


**1** The Places box. Select the **WORKSPACES DIRECTORY** option in the **PLACES** box, to display the **WORKSPACE (.WOR)** type in the **FILES OF TYPE** list. If you select any other entry in the **PLACES** box, **MAPINFO (.TAB)** displays in the **FILES OF TYPE** list.

## Layer Control Shows More Layer Information using ToolTips

Customers have asked us to make sure to display the entire name of a .tab file in the **LAYER CONTROL** dialog box. When you are working with files with long names, being able to see the whole file name is important. We have lengthened the field in the **LAYER CONTROL** dialog box to display longer filenames and we added a ToolTip to ensure that even longer filenames can be read.

**Figure: Layer Control (Showing ToolTip)**



Display of the ToolTips is controlled by a new preference entry in the **MAP WINDOW PREFERENCES** dialog box. Select the **SHOW TOOLTIPS IN LAYER CONTROL DIALOG** to display the ToolTip message or clear the checkbox to prevent ToolTips from showing in **LAYER CONTROL**. To access the **MAP WINDOW PREFERENCES** dialog box, select **OPTIONS > PREFERENCES > MAP WINDOW**.

## Custom Sort Order for Individual Value Thematic Legends

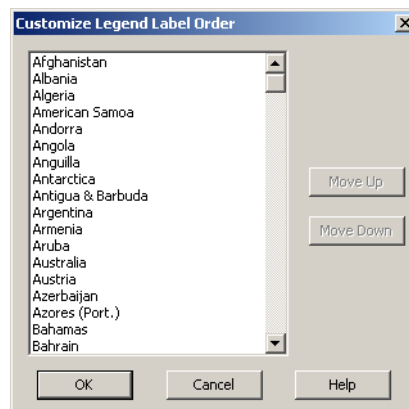
Customers have asked us to be able to change the sort order in the Legend list for Individual Value thematic maps. This allows you to control the look of your legend.

**Note:** This feature is only available for Individual Value thematic legends.

To customize the legend label order of an Individual Value thematic legend:

1. Create or modify your Individual Value Thematic map using the Thematic Wizard dialog boxes.
2. In the **MODIFY THEMATIC MAP** dialog box or the **THEMATIC WIZARD STEP 3 OF 3** dialog box, click the **CUSTOM** radio button in the **LEGEND LABEL ORDER** box.
3. Click the **ORDER** button to display the **CUSTOMIZE LEGEND LABEL ORDER** dialog box.

**Figure: Customize Legend Label Order**



4. Select an entry in the **LEGEND LABEL LIST** you want to move and use the **MOVE UP** or **MOVE DOWN** buttons to place it in the desired order.
5. Click **OK** to save this order.
6. Click **OK** in the current dialog box to display the new thematic map and the new legend.

### Important Notes for Creating and Merging Theme Templates:

When you are creating and merging theme templates:

- MapInfo Professional saves the custom label order only when the option to **SAVE INDIVIDUAL VALUE CATEGORIES** is selected in the **SAVE THEME TO A TEMPLATE** dialog box. This implies that when you create a theme based on a template, MapInfo Professional applies the custom label order only when the thematic expression creates the same categories as those in the template.
- When you are merging theme templates, the custom label order from the source template is applied to the current theme only when the option to **MERGE INDIVIDUAL CATEGORIES** is selected in the **MERGE A TEMPLATE TO A THEME** dialog box and the template and current theme have the same number of categories.

### Creating a Bi-Variant Layer Using Transparent Patterns

There are times when you need to create a thematic map that displays two different thematic variables at the same time. For example, if you are trying to show population growth and literacy at the same time, you might want to draw more than one theme on the same layer. Previously to create a map with this type of multi-thematic analysis, you needed to add a layer to the map view as many times you needed new themes.

We have added a new feature to allow you to use transparent pattern styles over the original layer, making the underlying layer(s) visible. This allows the thematic variable to retain the pattern but display transparently over another thematic variable.

**Note:** This new feature is applicable to Ranges theme and Individual Value theme maps only but can be used from the **CREATE THEMATIC MAP WIZARD** or the **MODIFY THEMATIC MAP WIZARD**.

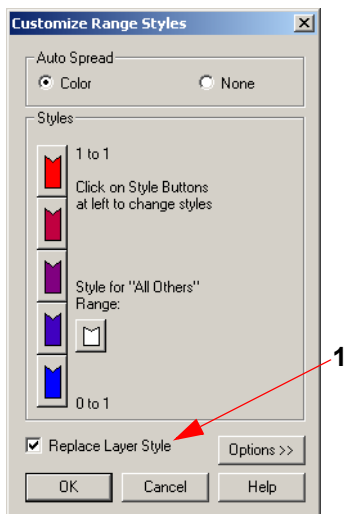
### Creating a Bi-Variant Layer Using a Ranges Theme

To create a Ranged theme in which you can see the underlying layer:

1. Do one of the following:
  - Create a thematic map (**MAP > CREATE THEMATIC MAP**) and select the **RANGES** type with a transparent style. Continue setting the options until you get to **CREATE THEMATIC MAP STEP 3 OF 3**.
  - Open and modify an existing map (**MAP > MODIFY THEMATIC MAP**) to display the **MODIFY THEMATIC MAP** dialog box.
2. From either dialog box, click the **STYLES** button to display the **CUSTOMIZE RANGE STYLES** dialog box.



Figure: Customize Range Styles

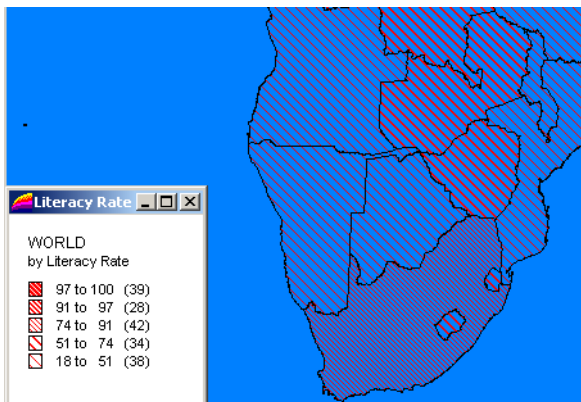


1 The **REPLACE LAYER STYLE** checkbox controls whether the layers under the Range theme should be drawn.

**Note:** The default behavior of the **REPLACE LAYER STYLE** checkbox is set in the **MAP WINDOW PREFERENCES** dialog box. See **Setting the Default Behavior of the Replace Layer Style Checkbox on page 58** for these details.

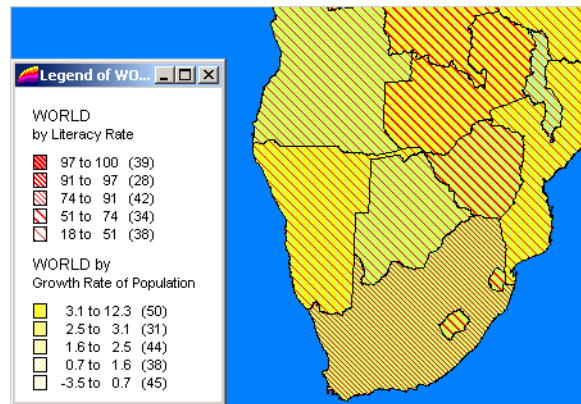
3. In the **CUSTOMIZE RANGE STYLES** dialog box, select the **REPLACE LAYER STYLE** checkbox to enable bi-variant layer support.  
When this checkbox is selected, the layer(s) under the theme are not drawn. When this checkbox is cleared, the layer(s) under the theme are drawn.
4. Click **OK** to display your first theme.

Figure: World by Literacy Rate (Demonstrating Replace Layer Style)



When there are other thematic layers beneath this one, you can see the bi-variant effect.

Figure: World by Population Growth Rate and Literacy Rate

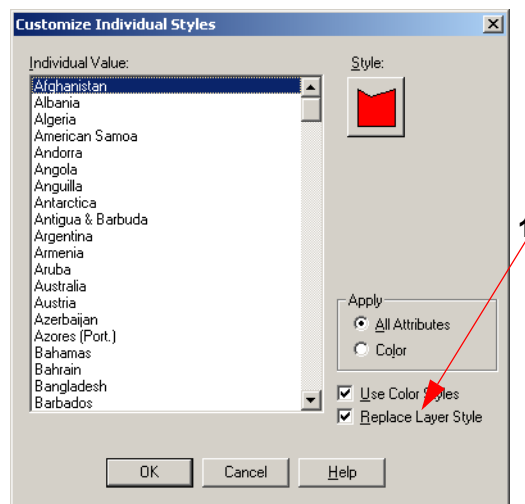


### Creating a Bi-Variant Layer Using an Individual Value Theme

To create a bi-variant layer using an individual value theme:

1. Do one of the following:
  - Create a thematic map (**MAP > CREATE THEMATIC MAP**) and select the **INDIVIDUAL VALUE** type. Set the options until you get to **CREATE THEMATIC MAP STEP 3 OF 3**.
  - Open and modify an existing map (**MAP > MODIFY THEMATIC MAP**) to display the **MODIFY THEMATIC MAP** dialog box.
2. From either dialog box, click the **STYLES** button to display the **CUSTOMIZE INDIVIDUAL STYLES** dialog box.

Figure: Customize Individual Styles



**1** The **REPLACE LAYER STYLE** checkbox controls whether the layers under the Individual Value theme should be drawn.

3. In the **CUSTOMIZE INDIVIDUAL STYLES** dialog box, select the **REPLACE LAYER STYLE** checkbox to enable bi-variant layer support.

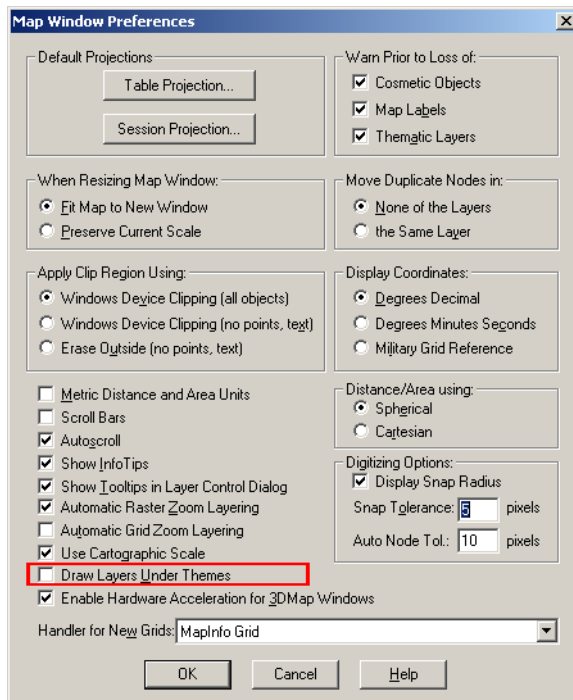
When this checkbox is selected, the layer(s) under the theme are not drawn. When this checkbox is cleared, the layer(s) under the theme are drawn.

## Setting the Default Behavior of the Replace Layer Style Checkbox

To set the default behavior of the Replace Layer Style checkbox:

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

Figure: Map Window Preferences with Draw Layers Under Themes Highlighted



2. Do one of the following:
  - Select the **DRAW LAYERS UNDER THEMES** checkbox to clear the **REPLACE LAYER STYLE** checkbox by default.
  - Clear the **DRAW LAYERS UNDER THEMES** checkbox to select the **REPLACE LAYER STYLE** checkbox by default.
3. Click **OK** to save this preference. This option sets the default behavior for the **REPLACE LAYER STYLE** checkbox in both the ranges and individual value theme dialog boxes.

## Alignment of Thematic Legends and Legend Frames Added

We have added new features to support customized thematic legends. As of this release, we provide tools to allow you to align frames in a thematic legend and align titles within frames in a thematic legend. Additionally you can align titles and labels in both cartographic and thematic frames.

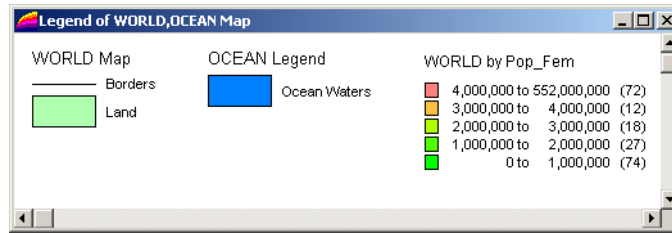
### Selecting Column Alignment Options within a Legend Window

Many times when you have created a multi-variable thematic map, your thematic legend can be complicated. As of this release, we provide you more control over your legend's display.

To change the frame display options for a thematic legend:

1. Create a thematic map and legend with several variables. Here is a thematic legend we created as an example:

Figure: Legend of World, Ocean

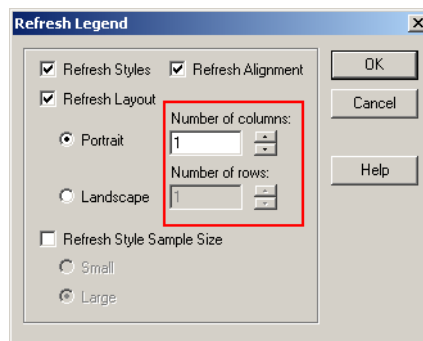


This legend is in landscape format and in a single row.

2. Click the legend window to make it active and click the **LEGEND** menu and click **REFRESH** to display the **REFRESH LEGEND** dialog box.

**Note:** You can also Right-click the **LEGEND** to display a shortcut menu and click **REFRESH** from that list. You can access the other Legend menu items this way.

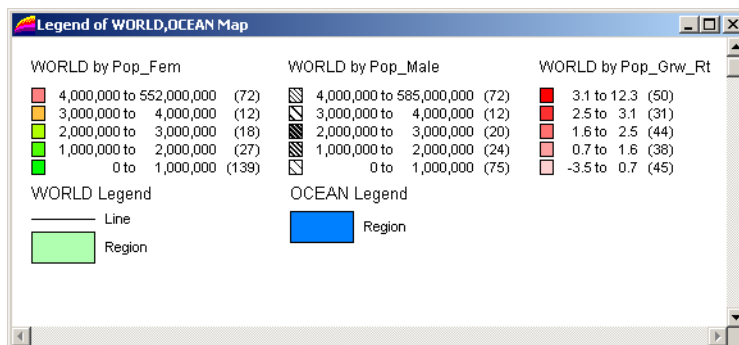
Figure: Refresh Legend



There are two new entry fields in this dialog box. **NUMBER OF COLUMNS** and **NUMBER OF ROWS**. When you select the **PORTRAIT** option, the **NUMBER OF COLUMNS** field is enabled. When you select the **LANDSCAPE** option, the **NUMBER OF ROWS** option enables.

3. Enter the number of columns or rows (between 1 and the number of frames) you want this legend to have in the field provided and click **OK**. In this example, we selected **LANDSCAPE** and **2** to indicate the landscape format and two rows. This is the result.

Figure: Legend of World, Ocean Map (Landscape, Two Rows)

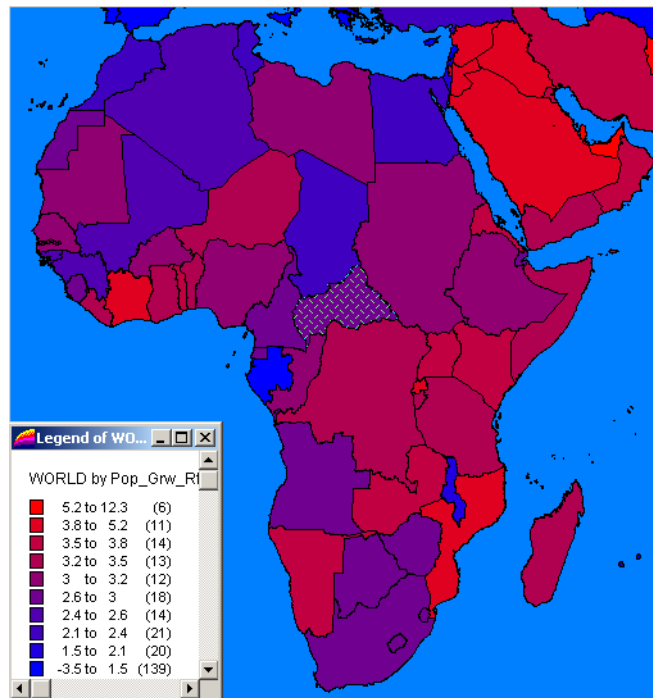


### Changing the Number of Columns in a Legend Frame

You can change the number of columns in a frame legend to control the legend frame display.

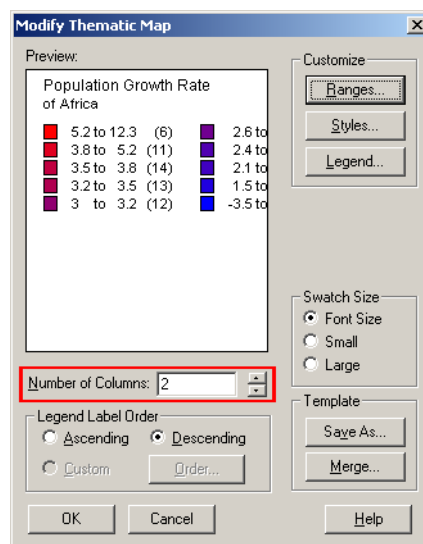
1. Create a thematic map and legend with several variables. We have created this example.

Figure: Population Growth Rate in Africa with Legend



2. From the **MAP** menu, click **MODIFY THEMATIC MAP**.

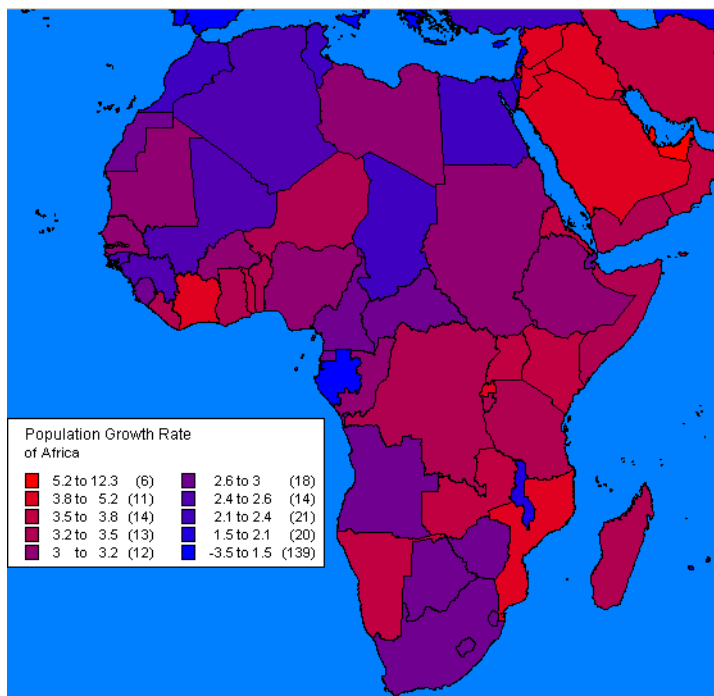
Figure: Modify Thematic Map



*We recommend you balance the columns evenly by selecting even numbers.*

3. Enter the number of columns (from 1 to the number of items in the frame) for this frame and click **OK**. We recommend you enter even numbers so the columns display evenly.

Figure: Population Growth Rate in Africa



### Choice of Thematic Legend Swatch Sizes Added

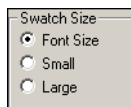
In response to customer requests, we added swatch size choices for thematic legend dialog boxes to give you a choice of swatch size for legends. This change is evident in the **CREATE THEMATIC MAP STEP 3 OF 3** dialog box and the **MODIFY THEMATIC MAP** dialog box.

To customize the swatch selection for a thematic map:

1. Do one of the following:
  - Create a thematic map (**MAP > CREATE THEMATIC MAP**) and select a thematic type. Continue setting the options until you get to **CREATE THEMATIC MAP STEP 3 OF 3**.
  - Open and modify an existing map (**MAP > MODIFY THEMATIC MAP**) to display the **MODIFY THEMATIC MAP** dialog box.

Whether the **CREATE THEMATIC MAP STEP 3 OF 3** or the **MODIFY THEMATIC MAP** dialog box displays, this box is part of the dialog box.

Figure: Swatch Size Box



Use these options to select the size of the swatches that display in your legend.

Font Size	
Small	
Large	

2. Select the swatch size you prefer for your legend in the **SWATCH SIZE** box and click **OK**.

**Note:** The **FONT SIZE** option means that the swatch size is defined by the label's font size. Previous versions of MapInfo Professional had no options for setting thematic map legend swatch size and defaulted to font size only.

## WFS/WMS Enhancements

We have added significantly to the functionality of the WFS and WMS features, including:

- **Table Properties Feature Gives You More Control Over WFS Tables**
- **Adding Column Indices to WFS Tables**
- **Changes for the Open WMS Table Dialog Box**
- **Web Services Preferences Provide Access to Timeout Values, Proxy Server**

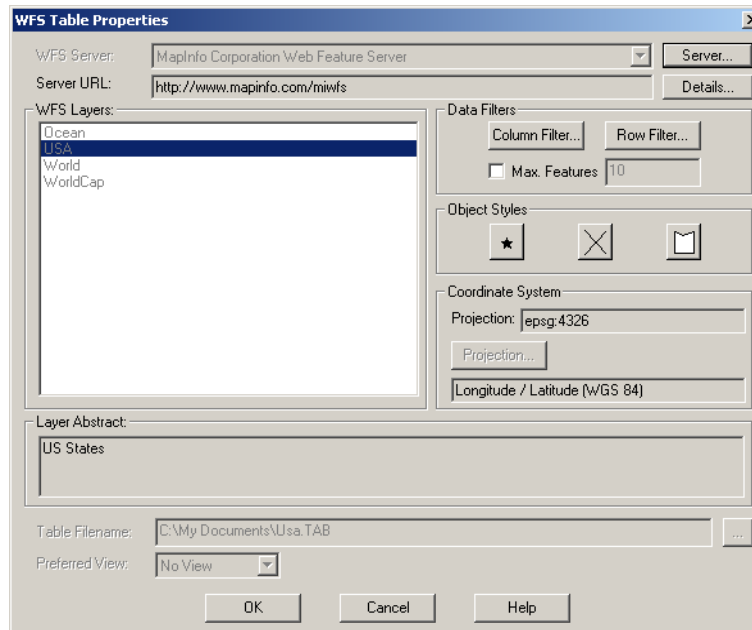
### Table Properties Feature Gives You More Control Over WFS Tables

We have added a new menu option, WFS Table Properties, to give you more control over refreshing your WFS table allowing you to change the original retrieval options and filters.

To refresh your currently selected WFS table using new retrieval options:

1. To access the **WFS TABLE PROPERTIES** dialog box, from the **TABLE** menu, click **WFS TABLE PROPERTIES**. If more than one WFS table is open, a **SELECT WFS TABLE** list displays. Click the table you want to refresh and click **SELECT**. The **WFS TABLE PROPERTIES** dialog box displays.

Figure: WFS Table Properties



Change the original retrieval options such as the **COLUMN FILTER**, the **ROW FILTER**, the number of **MAXIMUM FEATURES**, and change the styles of the refreshed table. You can change server time outs and the description by clicking the **SERVER** button.

**Note:** When you change the **COLUMN FILTER** options in this dialog box, you can also change the **PREFERRED VIEW** options. The **PREFERRED VIEW** drop-down list enables.

2. Make the changes you want to the column filter, the server time outs, and the object styles following the typical behavior for these entries.

**Note:** If the **PROJECTION** button is enabled, the projection of the selected WFS is unsupported and you can choose another projection from the list.

3. To change the **ROW FILTER** object display options, you have some additional choices to make.
  - a. If the original object display for the **ROW FILTER** was **SELECTION**, select from these options:
    - To retrieve the object specified in the row filter the same way, select **PREVIOUS SELECTION** from the **VALUE** field. This is the default option.
    - To retrieve the object specified in the row filter into the current selection, select the **SELECTION** option. In this case, you can use the object that was originally used in the spatial query, or the current mapper or current selection. If there is no current selection, this option does not display.
    - To retrieve the object specified in the row filter into the currently selected Map window, select the **CURRENT MAPPER** option. If there is no current Map window, this option does not display.
  - b. If the original object display for the **ROW FILTER** was a Map window, select from these options:
    - To refresh the row filter to display the object the way it did in the first retrieval, select **PREVIOUS MAPPER**. This is the default option.
    - If the original image was zoomed or panned, select **CURRENT MAPPER** to display all objects from the remote table. If there is no current Map, this option does not display.
    - To refresh the row filter option in a Selection window, select the **SELECTION** option. If there is no current selection, this option does not display.
4. Once these options are set, click **OK** to save these refresh options. **WFS TABLE REFRESH** will use the values that are set in **WFS TABLE PROPERTIES**.



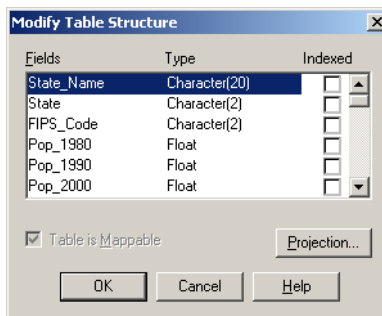
## Adding Column Indices to WFS Tables

You can now add an index to a WFS table so that you can perform Finds and other useful operations on WFS layers.

To create an index for a WFS table:

1. To open a WFS table, do one of the following:
  - From the **FILE** menu, click **WEB SERVICES** and **OPEN WFS**
  - Click the **OPEN WFS** button on the **STANDARD** toolbar
2. Select a WFS layer you want for the new .tab file and click **OK** to save it.
3. From the **TABLE** menu, select **MAINTENANCE** and then **TABLE STRUCTURE** to display the **MODIFY TABLE STRUCTURE** dialog box.

**Figure: Modify Table Structure**



4. Select the **INDEXED** checkbox beside the column you want to index and click **OK**. You should select a column you want to use to perform the Find or other operation you are interested in.

Indices will be automatically rebuilt whenever you refresh a WFS table because the data may be different after the refresh process.

**Note:** Once you create an index on a WFS table, MapInfo Professional 7.8 users will not be able to open it, even if you remove the index.

## Changes for the Open WMS Table Dialog Box

We have added two new features to the **OPEN WMS TABLE** dialog box.

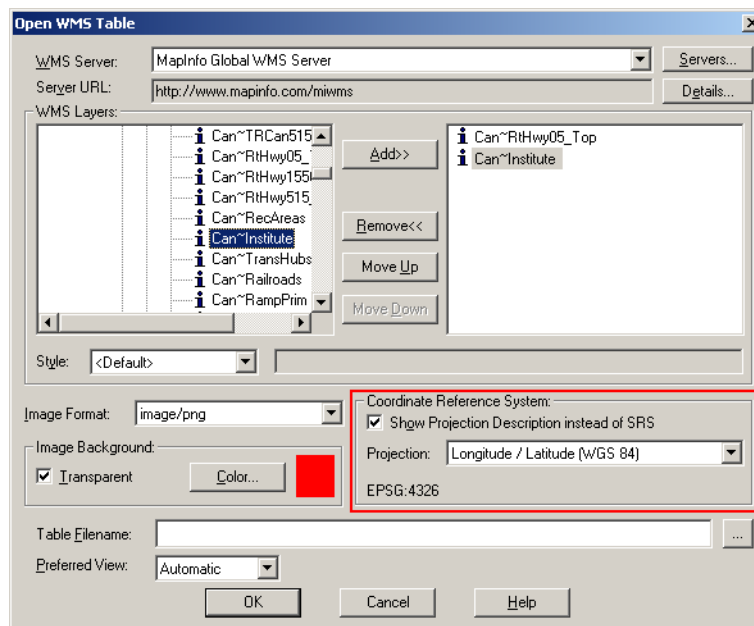
### *New Checkbox Allows Display of Projection Description*

We have added a new checkbox to the **COORDINATE REFERENCE SYSTEM** box in the **OPEN WMS TABLE** dialog box so MapInfo Professional displays the projection description rather than the SRS code. This should make it easier to select projection systems. To see this change:

1. Do one of the following:
  - Click the **OPEN WMS** button on the **MAIN** toolbar
  - From the **FILE** menu select **OPEN WEB SERVICE > OPEN WMS**
  - From the **TABLE** menu select **WMS TABLE PROPERTIES**.

The **OPEN WMS TABLE** or the **WMS TABLE PROPERTIES** dialog box displays.

Figure: Open WMS Table



The **SRS CODE** is still indicated when you select the **SHOW PROJECTION DESCRIPTION INSTEAD OF SRS** checkbox.

**Note:** Selecting the **SHOW PROJECTION DESCRIPTION INSTEAD OF SRS** checkbox may slow down performance.

2. Select the **SHOW PROJECTION DESCRIPTION INSTEAD OF SRS** checkbox to display the projection name. If you clear this checkbox, the SRS codes display instead.

## WMS Maps Display in Current Map Window's Coordinate System by Default

Many times, when you are retrieving a WMS map, you are adding it to enhance the detail of a Map window that you are already working on. We have changed the default behavior of the Projection drop-down box. Now, this list defaults to the projection that matches the front-most map window, if that projection is available in the list.

### ***But What if a WMS Definition Already Exists or I am not Working in a Map Window?***

- If you are retrieving a WMS map and there was a previous WMS definition (or you are modifying a WMS map), MapInfo Professional uses the coordinate system that matches the current projection (not necessarily the Map window's coordinate system).
- If there was no previous WMS definition, the current Map window's coordinate system is selected if it can be found in the Projection list.
- If the Map window's coordinate system is not in the Projection list or you are retrieving a WMS map when you are not working in a Map window, MapInfo Professional tries to default to EPSG:4326.
- Finally, if none of these projections are found, the first item in the **PROJECTION** list is selected.

## Web Services Preferences Provide Access to Timeout Values, Proxy Server

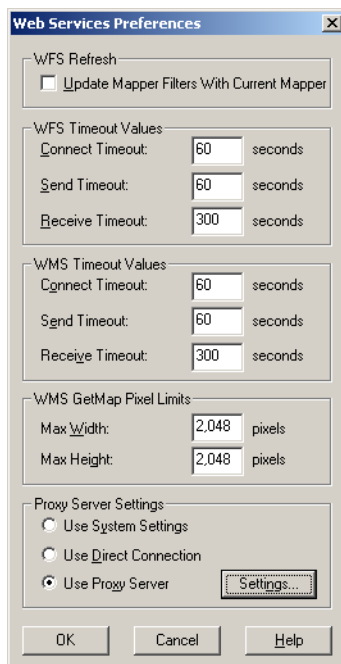
The Web Services Preferences dialog box provides access to settings for the Web Feature Service and Web Map Service timeout values, GetMap pixel limits, and Proxy Server settings in MapInfo Professional. These options allow you to control the waiting times to connect to the WFS and WMS maps and limit the size of the maps you receive.

**Note:** You can set per-server defaults based on particular WFS and WMS servers in the **OVERRIDE TIMEOUT VALUES** section of the **SERVER INFORMATION** dialog box.

To access the new Web Services Preferences dialog box:

1. From the **OPTIONS** menu, click **PREFERENCES** and then **WEB SERVICES** to display the **WEB SERVICES PREFERENCES** dialog box.

**Figure: Web Services Preferences**



2. Select the options in this dialog according to your needs.

## WFS Refresh

You use the **WFS REFRESH** option to retrieve updated GML information from the web feature service pertaining to the current layers.

### Update Mapper Filters with Current Mapper

Select this check box to use the current filter settings to refresh the Map window. If you select this checkbox and the table has already been refreshed, the current bounds of the front-most map window are used. If the checkbox is cleared and the table is refreshed, the bounds of the map window (at the initial WFS request) are used.

**Note:** The original map bounds are used, regardless of the current map window bounds.

### WFS Timeout Values

In this section you set the default WFS timeout values (in seconds) for the WFS servers you use. You can set per-server defaults based on particular WFS servers in the **OVERRIDE TIMEOUT VALUES** section of the **WFS SERVER INFORMATION** dialog box.

#### Connect Timeout

Indicates the amount of time (in seconds) allowed to establish an Internet connection request to a Web Feature server. If the request takes longer than this value, a timeout occurs. The default connect timeout is 60 seconds.

### Send Timeout

Indicates the amount of time (in seconds) allowed to send an Internet request to a Web Feature server. If the request takes longer than this value, a timeout occurs. The default send timeout is 60 seconds.

### Receive Timeout

Indicates the amount of time (in seconds) allowed to begin to receive a response from a request from a Web Feature server. The download can take longer than the timeout, but the response has to occur within the timeout setting. This default timeout is 300 seconds.

### WMS Timeout Values

In this section you set the default WMS timeout values (in seconds) for the WMS servers you use. You can set per-server defaults based on particular WMS servers in the **OVERRIDE TIMEOUT VALUES** section of the **WMS SERVER INFORMATION** dialog box.

### Connect Timeout

Indicates the amount of time (in seconds) allowed establish an Internet connection request to a Web Map server. If request takes longer than this value, a timeout occurs. The default connect timeout is 60 seconds.

### Send Timeout

Indicates the amount of time (in seconds) allowed to send an Internet request to a Web Map server. If the request takes longer than this value, a timeout occurs. The default send timeout is 60 seconds.

### Receive Timeout

Indicates the amount of time (in seconds) allowed to begin to receive a response from a Web Map server request. The download can take longer than the timeout, but the response has to occur within the timeout setting. The default receive timeout setting is 300 seconds.

### WMS GetMap Pixel Limits

The **GETMAP PIXEL LIMITS** option represents the maximum number of pixels (in width/height) that a map request is limited to. The GetMap request is designed to retrieve the highest resolution map image as is necessary to render the image on the screen, for a printer, or for an export file. This option prevents the request from going higher than the specified values. Different servers have different limits, so you can set the limit that works best for your environment.

**Note:** You can set per-server defaults for **GETMAP PIXEL LIMITS** in the **WFS SERVER INFORMATION** dialog box.

Unfortunately, servers do not report their limits to us, so if the GetMap request fails, it means that you have entered a value that is too large. Typically, large GetMap requests occur when you are printing or exporting windows containing WMS images. This happens because printing and exporting occurs at larger sizes and/or higher resolutions than on-screen display requires.

**Note:** You can also use this option to shorten the WMS map retrieval time, but remember that the resulting image will display at a lower resolution.

### Max Width

**MAX WIDTH** specifies the maximum number of pixels for a GetMap request in the X direction.

## Max Height

**MAX HEIGHT** represents the maximum number of pixels for a GetMap request in the Y direction.

## Proxy Server Settings

### Use System Settings

Click this option to use the LAN settings in the system registry. This is the default preference. You can review the current LAN settings by clicking **START > CONTROL PANEL > INTERNET OPTIONS > CONNECTIONS TAB > LAN SETTINGS**.

### Use Direct Connection

Click this option to override the system LAN settings and try to connect directly to the Internet (not through a proxy server).

### Use Proxy Server

Click this option to set and use the proxy server settings to connect to the Internet.

## Settings

Click this button to set the proxy server options. See [Proxy Server Settings Available in Web Services Preference Options](#) for these details.

- When you have completed your selections, click **OK** to save them.

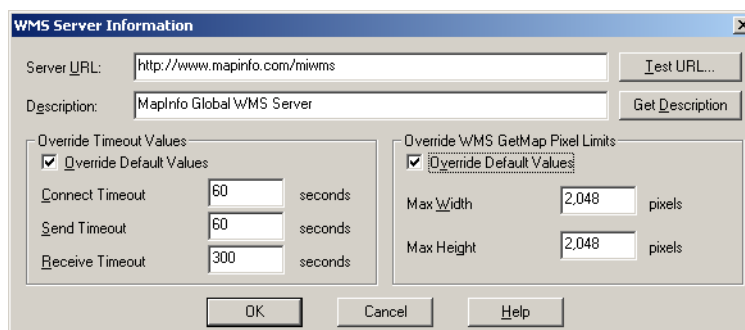
**Note:** The timeout values listed in the **WEB SERVICES PREFERENCES** dialog box can be overridden on a per server basis in the **WFS** or **WMS SERVER INFORMATION** dialog box.

### Overriding Default Timeout Values and GetMap Pixel Limits Locally

To override the default timeout and pixel limit values for a WFS or WMS server:

- Do one of the following:
  - Click the **OPEN WFS** or **OPEN WMS** button on the **MAIN** toolbar
  - From the **FILE** menu select **OPEN WEB SERVICE > OPEN WFS** or **OPEN WMS**
- Click the **SERVERS** button on the **OPEN WFS TABLE** or **OPEN WMS TABLE** dialog boxes to display the **WFS** or **WMS SERVER INFORMATION** dialog box.
- Double-click the server for which you want to change the default values from the list. The **WFS** or **WMS SERVER INFORMATION** dialog box displays.

**Figure: WMS Server Information with Overrides Checkboxes Selected**



- Select the **OVERWRITE DEFAULT VALUES** checkbox and/or the **OVERWRITE GETMAP PIXEL LIMITS** checkbox to enter the new overrides (in seconds and pixels) for this particular server in the fields that display.
- Click **OK** to save these values.

## Datum Enhancements

The following are the datum enhancements for this version:

- **Chinese Coordinate Systems**
- **Guernsey Grid Coordinate System**
- **Hellenic Geodetic Reference System**
- **Baltic Projections (Lithuanian and Latvian)**
- **New Zealand Geodetic Datum 2000**
- **New Belgian Coordinate System**
- **Additional British National Grid Coordinate System**

### Chinese Coordinate Systems

We have added a new Xian 1980 ellipsoid # 53 and added two new datums:

- Xian 1980 - #1017
- Beijing 1954 - #154

### Guernsey Grid Coordinate System

We have added a new transverse mercator coordinate system, Guernsey Grid, to the .PRJ file.

### Hellenic Geodetic Reference System

We have added a new datum called the Hellenic Geodetic Reference System # 153.

### Baltic Projections (Lithuanian and Latvian)

We have added a new datum called the Lithuanian Pulkovo 1942 # 1018.

### New Zealand Geodetic Datum 2000

We have added 28 new meridional circuits in terms of NZGD2000 on Transverse Mercator projections.

### New Belgian Coordinate System

We have added a new 7-parameter datum called the Belgian National System 1972 # 1019.

### Additional British National Grid Coordinate System

We have added a second British National Grid coordinate system that has tighter bounds than the original. The new coordinate system is called British National Grid (1 mm accuracy).

## Printing, Importing, and Exporting Enhancements

The following are the enhancements for printing, importing and exporting in MapInfo Professional for this release:

- **Improved Control of WMS Image Quality When Printing**
- **Warning Displays When Print Output is Too Large**
- **Importing GML 2.1 Files**

## Improved Control of WMS Image Quality When Printing

To improve your control of the image resolution for WMS map images, we have added the ability to globally and locally set the GetMap request pixel limits in MapInfo Professional. In this case, more pixels means higher resolution, but it also means slower access time. Because WMS servers are not required to specify pixel width and height limits in their capabilities documents, you will have to experiment with the pixel limits of a particular server to get the highest resolution you can. When you send a request that exceeds the server's pixel limit, the server usually issues an error indicating the maximum allowable image size. This will help you adjust the pixel limits for the server.

You can set a Web Services preference to set the pixel limits for all WMS images and you can override these limits by setting the per-server limits on an individual image basis. These options allow you to control the resolution of the WMS maps and limit the size of the maps you receive.

## Warning Displays When Print Output is Too Large

When you are printing a large map, it is possible for very high resolution or very large paper dimension print requests to exceed MapInfo Professional's internal pixel limitations, which cause the print to fail. If the printer width or height is larger than 32,767 pixels, MapInfo Professional does not allow you to print the file and displays this message:

```
Error: Unable to print because printer dimensions are too large. Try decreasing the print resolution or page size. Please consult the Printing Guide provided on the CD to maximize your printing capability.
```

If the printable size (pixel width or height) is between 28,000 and 32,767, MapInfo Professional prompts you to see if you want to continue and displays this message:

```
Warning: The output may get clipped because it is greater than 28,000 pixels. Please consult the Printing Guide provided on the CD to maximize your printing capability. Do you wish to continue.
```

You can click **YES** to continue or **NO** to change your print resolution settings. **NO** is the default setting.

## Large Format Printing Notes

We performed some testing on several newer HP Designjet large format plotters and can share these results.

- Maximum Pixels (32767) divided by printer resolution gives you the maximum width or height in paper size that you can print at that resolution.
- If you select the **OPTIMIZE FOR IMAGES** option and the **MAXIMUM QUALITY** option, the plotter cuts the output resolution down to 600 dpi.
- If you select **OPTIMIZE FOR DRAWINGS/TEXT** and you select the **MAXIMUM QUALITY** option, you can increase the output resolution to 1200 dpi.

For example: By setting a paper size of 50 x 50 inches and using the **OPTIMIZE FOR IMAGES** option with **MAXIMUM QUALITY** setting, you can successfully output an image of 30,000 pixels.

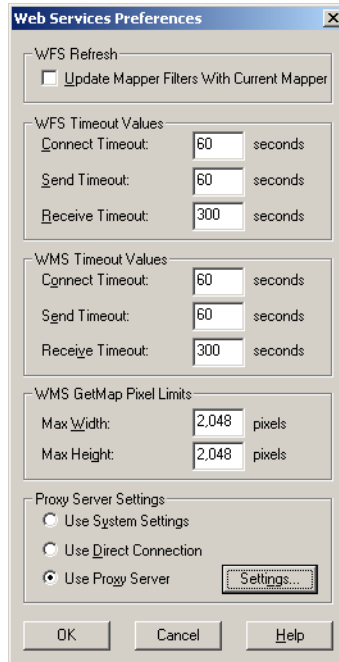
## Setting the GetMap Request Pixel Limit Globally

You can set the GetMap request pixel limit globally to affect the resolution of the WMS maps you receive. Remember that increasing the pixel limit also means the retrieval process will take longer, but will produce better quality images.

To set the GetMap request pixel limit globally:

1. From the **OPTIONS** menu, click **PREFERENCES** and then **WEB SERVICES** to display the **WEB SERVICES PREFERENCES** dialog box.

Figure: Web Services Preferences



2. Select the options in this dialog box according to your needs.

### WMS GetMap Pixel Limits

The GetMap Pixel Limits option represents the maximum number of pixels (in width/height) that a map request is limited to. The GetMap request is designed to retrieve the highest resolution map image as is necessary to render the image on the screen, for a printer, or for an export file. This option prevents the request from going higher than the specified values. Different servers have different limits, so you can set the limit that works best for your environment.

**Note:** You can set per-server defaults for **GETMAP PIXEL LIMITS** in the **WFS SERVER INFORMATION** dialog box.

Unfortunately, servers may not report their limits to us, so if the GetMap request fails, it means that you have entered a value that is too large for that server. Typically, large GetMap requests occur when you are printing or exporting windows containing WMS images. This happens because printing and exporting occurs at larger sizes and/or higher resolutions than on-screen display requires.

### Max Width

Max Width specifies the maximum number of pixels for a GetMap request in the X direction.

### Max Height

Max Height represents the maximum number of pixels for a GetMap request in the Y direction.

3. When you have completed your selections, click **OK** to save them.

**Note:** The WMS GetMap Pixel limits listed in the **WEB SERVICES PREFERENCES** dialog box can be overridden on a per server basis in the **WMS SERVER INFORMATION** dialog box.



## Overriding Default GetMap Pixel Limits Locally

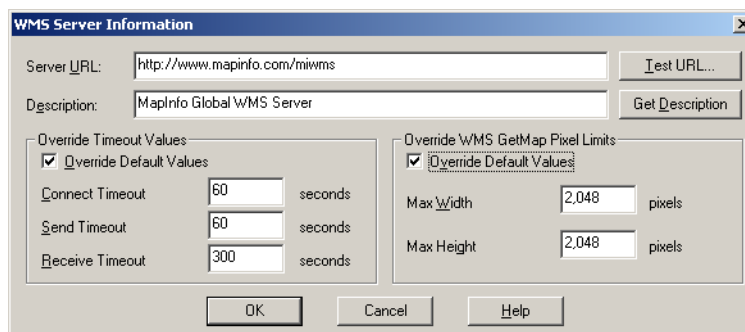
You can override the global settings for a particular server if the server's limits are different than the values you set in the Web Services Preferences. If a particular server's limits are higher than the values you selected in the Preferences dialog box, you may want to increase the limits for that server to get higher quality images. If a particular server's limits are lower than the values set in Preferences, you can set lower per-server values locally to prevent errors during the GetMap request.

Remember, the server may not include the limits in its capabilities document so MapInfo Professional cannot help you determine this. You can only find these pixel limits on a trial and error basis.

To override the default pixel limit values for a WMS server:

1. Do one of the following:
  - Click the **OPEN WMS** button on the **MAIN** toolbar
  - From the **FILE** menu select **OPEN WEB SERVICE > OPEN WMS**
2. Click the **SERVERS** button on the or **OPEN WMS TABLE** dialog boxes to display the **WMS SERVER INFORMATION** dialog box.
3. Double-click the server for which you want to change the default values from the list. The **WMS SERVER INFORMATION** dialog box displays.

Figure: WMS Server Information with Overrides Checkboxes Selected



4. Select the **OVERVERRIDE GETMAP PIXEL LIMITS** checkbox to enter the new overrides (in pixels) for this particular server in the fields that display.
5. Click **OK** to save these values. Then try to retrieve the WMS image you were looking for before.

## Importing GML 2.1 Files

You can now import GML 2.1 files into MapInfo Professional directly. To import successfully, the XML must contain a reference to a valid schema that MapInfo Professional can read. For example, the schema location could be a path relative to the XML file:

```
xsi:schemaLocation="http://www.mapinfo.com/wfs_XX .\mi_usa.xsd"
```

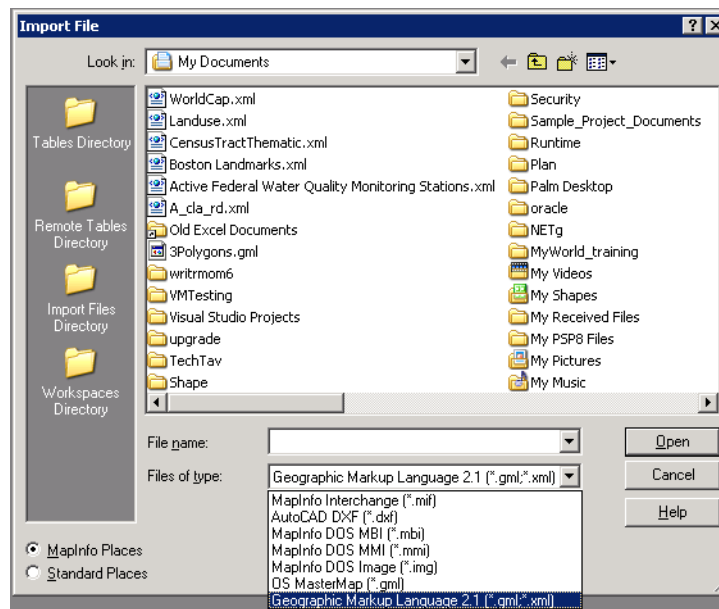
Or, it could be a URI:

```
xsi:schemaLocation="http://www.lm.se/xml/namespace/abc http://www2.xxx.se/xml/scheman/abc.xsd"
```

To import GML 2.1 files:

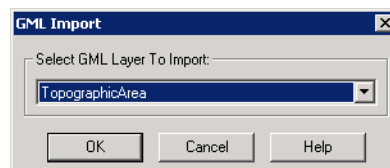
1. From the **TABLE** menu, click **IMPORT**. The **IMPORT FILE** dialog box displays.
2. From the **FILES OF TYPE** drop-down list, select **GEOGRAPHIC MARKUP LANGUAGE 2.1**.

Figure: Import File with Geographic Markup Language 2.1 Selected



3. Navigate to the directory in which your GML2 file is saved and select the file.
4. Click **OPEN** to display the **GML IMPORT** dialog box.

Figure: GML (2.1) Import



Here, you can select either **ALL LAYERS** (if more than one exists), or a specific layer that you want to import from the GML file.

**Note:** If projection information is not stored within the GML file(s), MapInfo Professional prompts you for a projection to use.

5. Select the GML layer (or **ALL LAYERS**) you want to display from the drop-down list and click **OK**. The **IMPORT INTO TABLE** dialog box displays.
6. Do one of the following:
  - Choose a name for the new .tab file
  - Accept the default naming convention for this new .tab file.
7. Press **SAVE** to import the file.

You can use the file you saved in your map and layout windows. Metadata for this file is also available by opening a browser window on this file.

## Database Enhancements

The following are the database enhancements for this version of MapInfo Professional:

- **Oracle Object Map Verification Change To Support Object/Map Validation**
- **Oracle, Informix, and SQL Server - Converting Unsupported Geometries**
- **Creating Legends from/for a Live Table**
- **Improved Error Messaging to Support OCI and ODBC Connectivity**
- **More Room for Longer Statements in SQL Select Dialog Box**

### Oracle Object Map Verification Change To Support Object/Map Validation

We have enhanced the Check Regions command to enable you to remove region line segments that intersect each other. You can also think of this as nodes within a single polygon of a region where the polygon intersects itself, as when a node has more than 2 line segments emanating from it.

These cases can be broken down into two other instances.

- If a polygon has 2 looped sections, and the path traced by the nodes of the polygon follow a cursive figure 8 pattern, then we call this a *Figure 8 polygon*.
- If the same 2 looped polygon can trace its path as a cursive capital letter B, then we call this a *Bow Tie polygon*.

We think of Figure 8 as worse than Bow Tie because the area of a Figure 8 is always incorrect, while the area of a Bow Tie can be correct and accurate. We have enhanced MapInfo Professional to ensure that both Figure 8's and Bow Ties are detected.

### Oracle, Informix, and SQL Server - Converting Unsupported Geometries

Some times when you are creating a Map in MapInfo Professional and you are storing the results in Oracle, Informix, or SQL Server, you create maps which use geometries that are not supported by these DBMS engines. Oracle does not support arcs, ellipses, rectangles, and rounded rectangles. Informix and SQL Server do not support arcs, ellipses, and rounded rectangles.

In the past when this situation occurred, you could not save maps with these geometries in them and your work was lost. We have added new functionality that will prompt you to save these unsupported geometries as regions or polylines, depending upon what is in the Map window and what DBMS you are working in.

**Note:** If you have created a map you do not want to lose but cannot save to the DBMS of your choice due to unsupported geometries, you can use the Save As command and save the map without the unsupported geometries.

### Oracle Geometry Conversion Behavior

If you try to save a map with unsupported spatial geometry types in Oracle, these are the results:

- **Spatial Geometry Types with All Unsupported Objects:** If you have created a map that might contain all of the unsupported objects and you are trying to save to Oracle, this message displays:

```
Table has unsupported objects (rounded rectangles, rectangles, ellipses or arcs). Convert to regions and/or polylines?
```

Click **YES** to convert the unsupported objects to regions or polylines; you would select **NO** to decline to convert the unsupported objects. If you decline, you cannot save the map you have created to the Oracle database. A confirmation message explains that the operation is canceled.

- **Spatial Geometry types with Region Objects Only:** If you have created a map that contains region objects only and you are trying to save to Oracle, this message displays:

Table has unsupported objects (rounded rectangles, rectangles, or ellipses). Convert to regions?

Click **YES** to convert the unsupported objects to regions; you would select **NO** to decline to convert the unsupported objects. If you decline, you cannot save the map you have created to the Oracle database.

- **For Spatial Geometry types with Line Objects Only:** If you have created a map that contains line objects only and you are trying to save to Oracle, this message displays:

Arc is an unsupported object. Convert to polylines?

Click **YES** to convert the unsupported objects to polylines; you would select **NO** to decline to convert the unsupported objects. If you decline, you cannot save the map you have created to the Oracle database.

### Informix and SQL Server Geometry Conversion Behavior

If you try to save a map with unsupported spatial geometry types in Informix or SQL Server, these are the results:

- **Spatial Geometry Types with All Unsupported Objects:** If you have created a map that might contain all of the unsupported objects and you are trying to save to Informix or SQL Server, this message displays:

Table has unsupported objects (rounded rectangles, ellipses or arcs).  
Convert to regions and/or polylines?

Click **YES** to convert the unsupported objects to regions or polylines; you would select **NO** to decline to convert the unsupported objects. If you decline, you cannot save the map you have created to the Informix or SQL Server database.

- **Spatial Geometry types with Region Objects Only:** If you have created a map that contains region objects only and you are trying to save to Informix or SQL Server, this message displays:

Table has unsupported objects (rounded rectangles or ellipses). Convert to regions?

Click **YES** to convert the unsupported objects to regions; you would select **NO** to decline to convert the unsupported objects. If you decline, you cannot save the map you have created to the Informix or SQL Server database.

- **For Spatial Geometry types with Line Objects Only:** If you have created a map that contains line objects only and you are trying to save to Informix or SQL Server, this message displays:

Arc is an unsupported object. Convert to polylines?

Click **YES** to convert the unsupported objects to polylines; you would select **NO** to decline to convert the unsupported objects. If you decline, you cannot save the map you have created to the Informix or SQL Server database.

## Creating Legends from/for a Live Table

We have added new functionality to the Create Legend Wizard for live tables to allow you to retrieve unique styles from the table. Previously, when you created a legend for live tables, we retrieved the default styles specified in the map catalog because it was a much faster operation. You can still retrieve styles from the map catalog, if performance is your primary concern. But if you prefer a more visually descriptive and appealing graphical representation of the unique map styles in your live table, the new functionality gives you this ability.

### When are unique map styles available for a live table?

In general, remote databases have no consistent way of storing styles for geographic data. MapInfo Professional gives you two different ways of associating styles with geographic data for remote databases. The first way is to specify a common style for a database table in the map catalog, which is used for all records in that database table. The second way is to have an additional column for the database table that specifies a style for each record in that table. (MapInfo Professional uses the map catalog to keep track of the style column for a database table.) Unique map styles are available for a database table when it has this designated style column.

To see this new functionality:

1. Open a remote DBMS connection and select a live table for display.
2. From the **MAP** menu, click **CREATE LEGEND** to display the **CREATE LEGEND STEP 1 OF 3** dialog box.
3. Select a layer to create a legend from and click **NEXT** to display the **CREATE LEGEND STEP 2 OF 3** dialog box. For purposes of this demonstration, click Next to display the **CREATE LEGEND STEP 3 OF 3** dialog box.
4. In the **STYLES FROM** box, there are three options. The first option, **MAP CATALOG**, provides the existing support and is still the default for live tables.
  - Select **MAP CATALOG** to retrieve the default styles for the selected legend frame from the map catalog. Use this option when you are concerned with performance. Retrieving map styles from live tables on a remote database can take a long time, but retrieving a default style from the map catalog can be significantly faster. Remember that styles in the map catalog may not be as visually descriptive as the other options. This is the default option for live tables, but is disabled for other types of tables.
  - Select **UNIQUE MAP STYLES** to retrieve all unique object styles for the live access table. MapInfo Professional retrieves all unique map styles from the database table for a more visually appealing legend. For extremely large tables, this option can take longer than the first option. This option is selected by default when the legend frame is not a live access table.
  - Select **UNIQUE VALUES IN A COLUMN OF THE SELECTED TABLE** to retrieve the styles associated with the values saved in a particular column in the database table for a more visually appealing legend. For extremely large tables, this option can take longer than the first option.
5. Then click the **SAVE FRAME SETTING TO METADATA** checkbox to preserve the choice you made in this dialog box. When you re-open this dialog box the settings from the metadata are used as default values instead of the system set default values. There is new legend metadata for the **STYLES FROM** radio buttons that we now preserve.

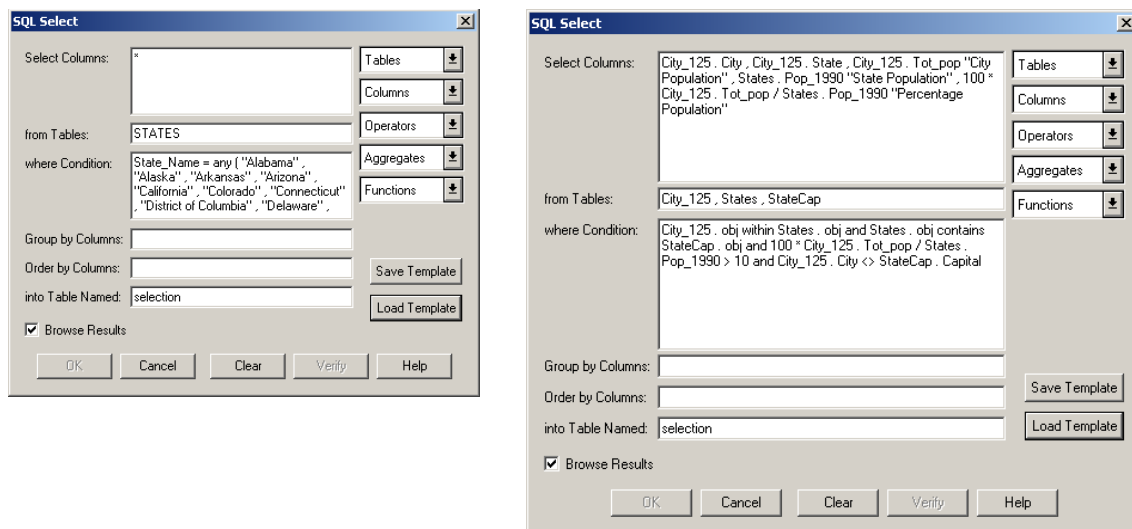
## Improved Error Messaging to Support OCI and ODBC Connectivity

You must have the OCI and ODBC drivers installed for MapInfo Professional to connect to remote databases. For more about understanding these error messages, see [Adding ODBC and OCI Drivers in Chapter 2 on page 103](#).

## More Room for Longer Statements in SQL Select Dialog Box

We have increased the size of the SQL Select dialog box to accommodate larger statements by increasing the width and lengths of the **COLUMNS**, **FROM TABLES**, **WHERE CONDITION**, **GROUP BY COLUMNS**, **ORDER BY COLUMNS**, and **INTO TABLE NAMED** fields.

Figure: Old SQL Select Dialog Box vs. New SQL Select Dialog Box



*The query on the left selects the state names, but cannot display all of the query.*

*The query on the right selects all non-capital cities whose population is greater than or equal to 10% of its state's population.*

We have also enhanced the usability of the edit controls. After you select something from the drop-down lists, the edit text control automatically scrolls to where the caret is for easy text entry. Additionally, the individual edit text controls can now handle up to 1024 characters each.

**Note:** Expanding the text controls is no guarantee that the resulting query can be handled by MapInfo Professional. You can still receive the `Query too complex` error when adding larger queries.

## Raster Enhancements

The following are raster enhancements for the new version of MapInfo Professional:

- **Save Window As Supports Additional Raster Formats**
- **New: ASRP v 1.2 Support Added**
- **ARC Grid Format Support Added**

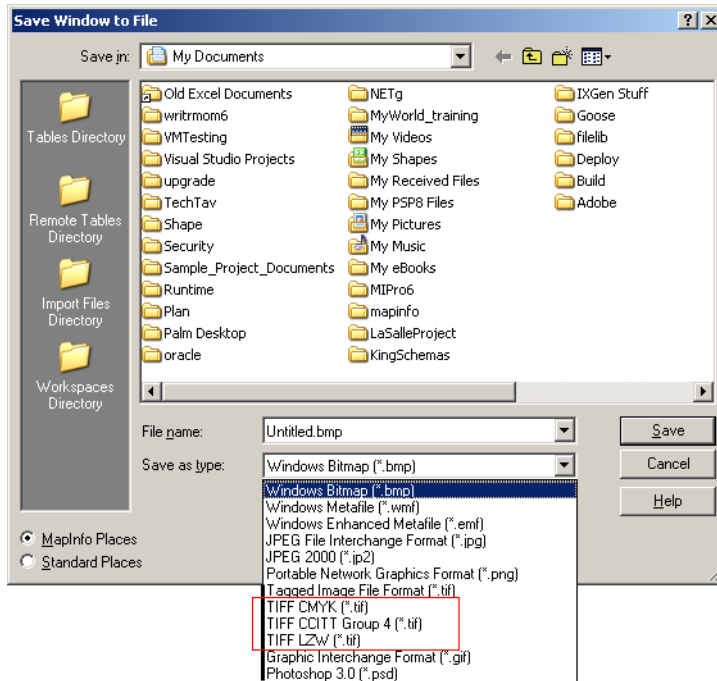
## Save Window As Supports Additional Raster Formats

You can now save your map images as GIF, TIFF LZW, and TIFF CCITT Group 4 images.

To see this functionality:

1. Open a Map, Layout, Browser or Graph window you want to save in the new format.
2. From the **FILE** menu, click **SAVE WINDOW AS** to display the **SAVE WINDOW TO FILE** dialog box.

**Figure: Save Window to File displaying Save As Type drop-down box**



3. Select the type you want to save it in from the **SAVE AS TYPE** drop-down list.
4. Type the name of the file in the **FILENAME** field and click **SAVE** to save your entries.

## New: ASRP v 1.2 Support Added

We have added support for the ASRP version 1.2 raster format. If you were unable to open this type of raster image before using MapInfo Professional, this problem has been resolved.

## ARC Grid Format Support Added

We have added the Arc Grid Handler to support the use and display of ESRI grid files. When you use the **OPEN TABLE** dialog box and choose the **FILES OF TYPE** option **GRID IMAGE**, you will see several new file extension options in the list.

- .adf
- .flt
- .txt
- .asc

This change allows you to open both ASCII and Binary Continuous and Classified grid formats but you can only hillshade the Continuous grid files. These types of data files are available from the USGS Seamless Data Distribution System.

**Note:** The Arc Grid Handler does not support the Arc Grid Export format (\*.e00 extension) in MapInfo Professional.

## New Tools and Tool Enhancements

### Adding a Tool to the Tool Manager in the Tools Menu

When we add a new tool to the utilities list, you need to add it into the Tool Manager list. 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.
2. Scroll down the list to find the tool you want to add.
3. Select the **LOADED** checkbox to add the tool for the session only. To ensure that the tool you are loading loads every time you open MapInfo Professional, select the **AUTOLOAD** checkbox.
4. Click **OK** to save your changes.
5. To use the tool, select **TOOLS** from the menu and scroll down to the tool you want to use and select the submenu entry that brings up the tool.

Tool Additions and Enhancements include:

- **New Tool - Deletes Duplicate Column Values in a Table**
- **New Tool - Workspace Resolver**
- **Find Nearest/Farthest Feature and Better Performance in Distance Calc Tool**
- **Export DGN 8.0 and Latest AutoCAD Formats using Universal Translator**
- **Geographic Tracker Tool Upgraded**
- **Sync Window Enhancements**

### New Tool - Deletes Duplicate Column Values in a Table

We have added a new tool called Delete Duplicates which allows you to delete duplicate records from a table while retaining map objects. This tool does not change the original table in any way. Keep in mind that MapInfo Professional has a 255 byte/ 5-column limit for a Group by clause, so you may have to change the size of your columns if they are unusually wide.

When we say duplicate rows, we mean rows that have duplicate occurrences of the same column value for the column you select.

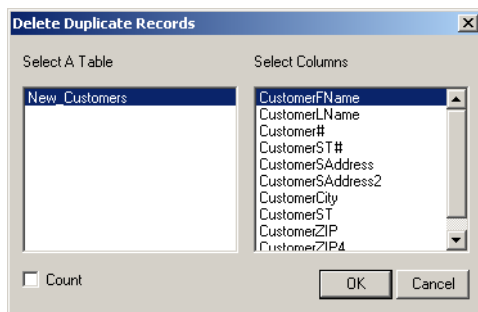


### Removing Duplicate Records from a Table

To remove duplicate records from a table and save the cleaned table to a new file:

1. Add the **DELETE DUPLICATES** tool to the **TOOL MANAGER** using the instructions in **Adding a Tool to the Tool Manager in the Tools Menu**.
2. Open the table or tables you want to delete duplicates from.
3. From the **TOOLS** menu, click **DELETE DUPLICATES** and **DELETE DUPLICATES** to display the **DELETE DUPLICATE RECORDS** dialog box.

Figure: Delete Duplicate Records



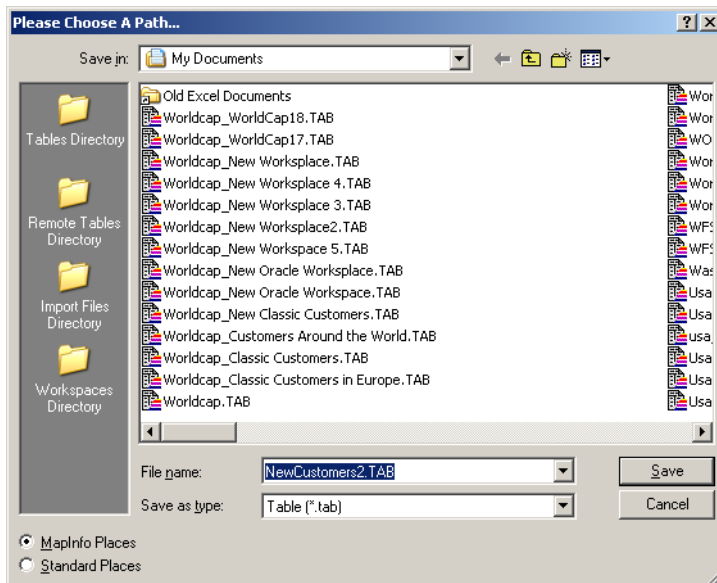
The list of tables on the left contains all of the currently open tables. Make sure the tables you want to work with are open before you open the Delete Duplicates tool.

4. Select the table you want to delete duplicates from in the first column. A list of the columns in that table displays on the right.
5. Select the column that contains information that should be unique to each row from the **SELECT COLUMNS** list.

**CAUTION:** To avoid deleting data incorrectly, give this step a lot of thought. For example, we do not recommend you select customer names or addresses for this step.

6. Select the **COUNT** checkbox to add a column to your new table that shows the number of instances of the column value found in the original table. This is an optional feature.
7. Click **OK**. The **PLEASE CHOOSE A PATH** dialog box displays.

Figure: Please Choose a Path



8. Select a path and a file name for the new table in this dialog box. Then select **SAVE**. The tool removes rows containing duplicate column values according to the column you selected. A browser window displays with the results of the new table.

Figure: NewCustomers2 Browser

	Custom	Custom	Customer	Custo	CustomerSAddress	CustomerSAddress	CustomerCit	Cus	CustomerZIF	CustomerZIP4	Duplicate
<input type="checkbox"/>	Jansen	Hamil	23433	45	West Liminton Avenue	Apartment 34	Frentsberg	NY	12354	8889	2
<input type="checkbox"/>	Stan	Theman	83933	182	South Pride Land Street	Second Floor	Frentsberg	NY	12354	9383	1
<input type="checkbox"/>	Lindsay	Dratma	39339	93224	Main Street		Frentsberg	NY	12354	8211	1
<input type="checkbox"/>	Michael	Deer	12331	334	Jakes Tavern Road		Frentsberg	NY	12354	3212	1
<input type="checkbox"/>	Colleen	Reyes	34425	123	Hemlock Place	Apartment 2B	Frenstberg	NY	12354	8383	1
<input type="checkbox"/>	John	Duncan	87653	1110	Casey Stengel Way	Suite 10	Frentsberg	NY	12354	8442	2
<input type="checkbox"/>	Willetta	Stark	56553	933	Openheimer Drive		Frentsberg	NY	12354		1
<input type="checkbox"/>	Connie	Herr	39942	1	Enchanted Evening	Plaza Suite	Frentsberg	NY	12354	8321	1
<input type="checkbox"/>	Summer	Holmes	94332	78	Whittier Green	Floor 6	Frentsberg	NY	12354	2654	1
<input type="checkbox"/>	Sybill	Liberties	84843	12	Tolerance Way		Frentsberg	NY	12354	8412	2
<input type="checkbox"/>	Jackie	Tan	76443	721	Alibaster Drive	Penthouse Suite	Frentsberg	NY	12354	3253	1
<input type="checkbox"/>	Honorita	Sylvie	85443	302	Kentontown Place		Frentsberg	NY	12354	3321	3

The last column contains the count of instances of the row containing duplicate column values in the original table.

### New Tool - Workspace Resolver

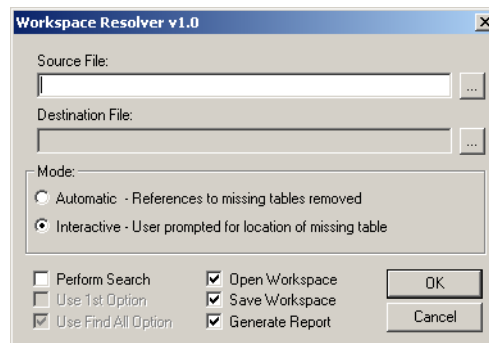
Workspace Resolver allows you to open a workspace that references tables that no longer exist in the location specified by the workspace file. This tool can perform a search and replace for the missing table or alternatively resolve the workspace file by ignoring the missing table.


#### Resolving Workspaces by Removing Missing TAB File References

To use the Workspace Resolver to remove references to a missing table in a workspace:

1. Add the Workspace Resolver tool to the Tool Manager using the instructions in **Adding a Tool to the Tool Manager in the Tools Menu on page 79**.
2. Close all of the open .tab files before using the Workspace Resolver. If you do not, a prompt displays asking you if you want the application to close them for you. Click **CLOSE ALL** to continue.
3. From the **TOOLS** menu, click **WORKSPACE RESOLVER** and **RESOLVE WORKSPACE TABLES**. The **WORKSPACE RESOLVER** dialog box displays.

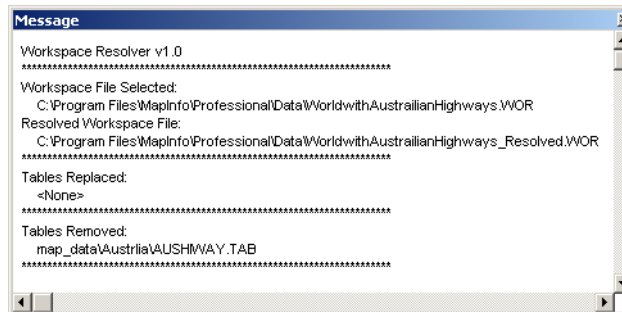
Figure: Workspace Resolver



4. Find the workspace that is missing one or more .tab files using the **ELLIPSIS**  button at the end of the **SOURCE FILE** field. MapInfo Professional prefills the **DESTINATION FILE** field with the same name and path plus the word **\_Resolved** as a convenience, but you can rename this file as necessary.

5. In the **MODE** box, click **AUTOMATIC** to remove references to the missing tables from the .wor file you selected.
    - To save the workspace after the references are removed, select the **SAVE WORKSPACE** checkbox. You must select this checkbox or the workspace is not saved.
    - To open the new workspace file after the references are removed, select the **OPEN WORKSPACE** checkbox.
    - To display the results of the process, select the **GENERATE REPORT** checkbox.
  6. Click **OK** to begin the process.
    - If you selected **SAVE WORKSPACE**, the Workspace Resolver saves the workspace with the file name you specified.
    - If you selected **OPEN WORKSPACE**, the new workspace displays without the file that is missing. Once the workspace is open you can work with it as you normally would.
- Note:** The resolved workspace has not been saved if you did not select the **SAVE WORKSPACE** checkbox.
- If you selected **GENERATE REPORT**, a text box displays a list of the actions performed to resolve the workspace.

**Figure: Message (Workspace Resolver Generate Report Result)**

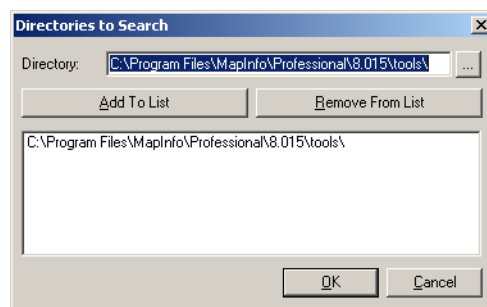


### Setting the Search Directories for the Workspace Resolver

You can create a list of directories you want the Workspace Resolver to search to find the missing workspace .tab files. To create a list of directories for the Workspace Resolver tool to search for missing workspace .tab files:

1. Add the Workspace Resolver tool to the Tool Manager using the instructions in [Adding a Tool to the Tool Manager in the Tools Menu on page 79](#). If the tool has already been added, skip this step.
2. From the **TOOLS** menu, click **WORKSPACE RESOLVER** and **SETTINGS**. The **DIRECTORIES TO SEARCH** dialog box displays.

**Figure: Directories to Search**




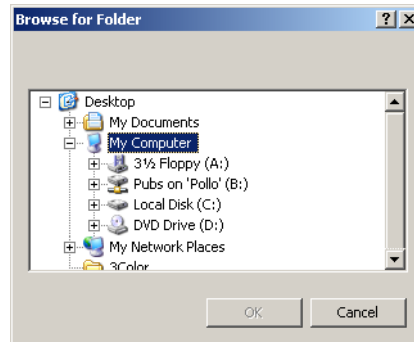

3. In the **DIRECTORY** field, use the **ELLIPSIS**  button to navigate to the first directory you want the Workspace Resolver to search. When you click the **ELLIPSIS** button, the **BROWSE FOR FOLDER** dialog box displays.

Figure: Browse for Folder



4. Navigate to the directory you want to add to the list and click **OK**. The dialog box closes and the directory you selected displays in the **DIRECTORIES TO SEARCH** dialog box.
5. Click the **ADD TO LIST** button. Repeat this process for as many directories as you want to add to the list. The Workspace Resolver searches the subdirectories of any folder you select. If you enter a directory by mistake or want to remove it, highlight it in the list and click **REMOVE FROM LIST** to delete it. There is no confirmation for this action.
6. When you have completed this list, click **OK** to save this list. The Workspace Resolver uses this list whenever you search for missing .tab files.

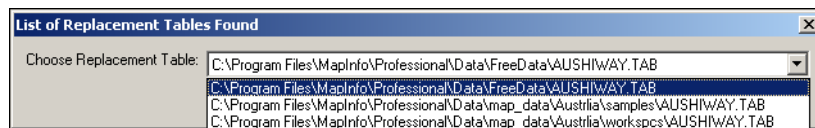
### Resolving Workspaces by Finding or Replacing Missing TAB File References

1. Add the Workspace Resolver tool to the Tool Manager using the instructions in **Adding a Tool to the Tool Manager in the Tools Menu on page 79**. If the tool has already been added, skip this step.
2. Close all of the open .tab files before using the Workspace Resolver.
3. From the **TOOLS** menu, click **WORKSPACE RESOLVER** and **RESOLVE WORKSPACE TABLES**. The **WORKSPACE RESOLVER** dialog box displays.
4. Navigate to the workspace file that needs resolving using the **ELLIPSIS**  button at the end of the **SOURCE FILE** field. MapInfo Professional prefills the **DESTINATION FILE** field with the same name plus the word **\_Resolved** in the same path as a convenience, but you can rename this file as necessary.
5. Make one of the following selection combinations:
  - In the **MODE** box, click **AUTOMATIC** and then **PERFORM SEARCH** to search for the missing file(s) automatically. The Workspace Resolver locates the first file with the same name as the missing .tab file and uses it to resolve the missing referenced .tab file.
  - In the **MODE** box, click **INTERACTIVE** and then **PERFORM SEARCH** to find or replace the references to the missing tables from the .wor file you selected. When you select **INTERACTIVE**, other **USE** options enable. You can only select one of these two options:
    - a. Select **USE 1ST OPTION** to use the first matching file it can find to resolve the missing referenced .tab file. If the file is not found, the Workspace Resolver prompts you to identify a replacement table.
    - b. Select **USE FIND ALL OPTION** to display a list of all matching instances of the missing .tab file so you can select the file you want to resolve the missing reference.

**Note:** The search for missing files is based on your settings in **Setting the Search Directories for the Workspace Resolver**.

6. Select from the following options to complete your Workspace Resolver selections.
  - To save the workspace after the references are updated, select the **SAVE WORKSPACE** checkbox. The Workspace Resolver does not save the workspace if you do not select this checkbox.
  - To open the new workspace file after the search is performed, select the **OPEN WORKSPACE** checkbox.
  - To display the results of the process, select the **GENERATE REPORT** checkbox.
7. Click **OK** to resolve the workspace.
  - If you selected **AUTOMATIC** mode, the Workspace Resolver searches for the first matching file name and replaces it in the workspace. This process continues until all of the references are resolved. If no matching file is found, the missing references are removed.
  - If you selected **INTERACTIVE** mode and **USE FIRST OPTION**, the Workspace Resolver uses the first matching file it can find to resolve the workspace. If no matching file is found, the **LOCATE MISSING TABLE** dialog box displays to allow you to search for this .tab file yourself.
  - If you selected **INTERACTIVE** mode and **USE FIND ALL OPTIONS** and the Workspace Resolver finds more than one file, the **LIST OF REPLACEMENT TABLES FOUND** displays.

Figure: List of Replacement Tables Found



Select the file you want to replace the missing file with from the list and click **OK**.

- If you selected **SAVE WORKSPACE**, the Workspace Resolver saves the file.
- If you selected **OPEN WORKSPACE**, the new workspace displays the resolved workspace.
- If you selected **GENERATE REPORT**, a text box displays.

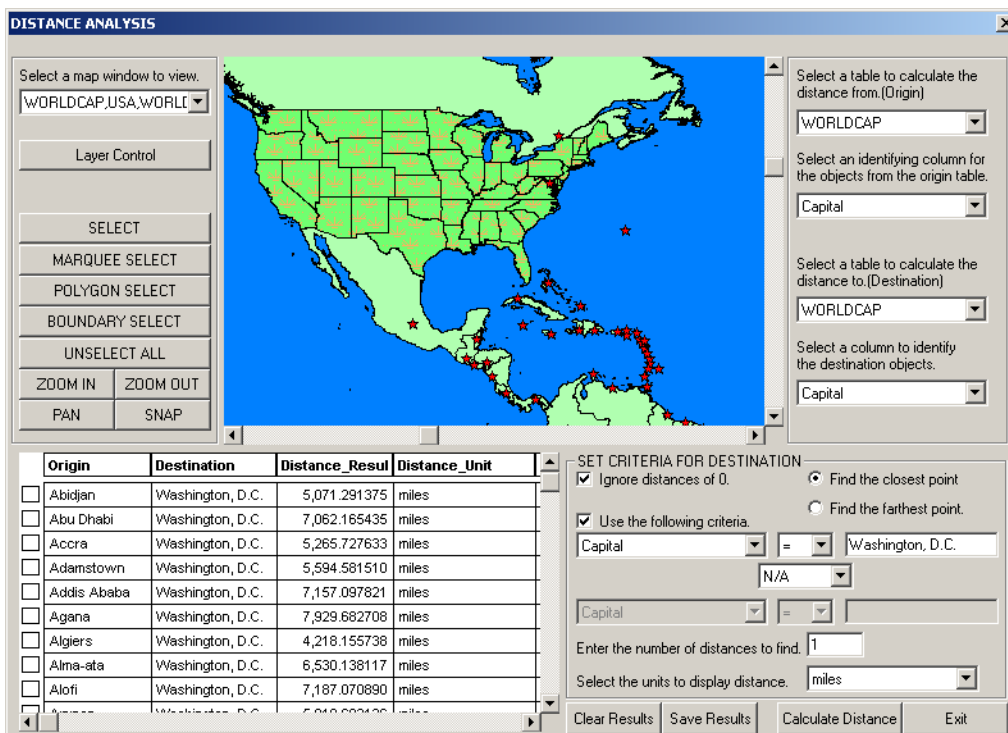
### Find Nearest/Farthest Feature and Better Performance in Distance Calc Tool

The Distance Calculator tool calculates the distance between all the objects in a table or all the objects between two tables and displays the results in a browser. Previously, the tool used the object centroid to determine the distance, which worked very well for point tables. For this release we have introduced new functionality that is based on core MapInfo Professional technology. This technology takes into account the whole object and measures the Nearest and Farthest distances to the object in the table or between tables. The look of the Distance Calc tool has not changed. According to our discussions with customers, this Nearest/Farthest calculation will be useful.

Because this new feature is based on core MapInfo Professional functionality, this tool is often faster, particularly when point tables are involved. When you are processing distances for Region or Polyline tables, the processing time may be slower, due to the complex nature of the calculation.

To use the Distance Calculator tool:

1. Open the table(s) in which or between which you want to calculate distances.
2. Add the Distance Calculator tool to the **TOOL MANAGER** using the instructions in **Adding a Tool to the Tool Manager in the Tools Menu**.
3. From the **TOOLS** menu, select **DISTANCE CALCULATOR** and **RUN DISTANCE CALCULATOR** to display the **DISTANCE ANALYSIS** dialog box.



In this example, we are searching for the real distances between world capitals and Washington, D.C., so we selected the criteria you see in this dialog box.

4. Select the criteria you want to use to calculate the distances between different areas. This tool can be used to calculate distances from a particular place to the closest ATMs, beaches, banks, movie theaters, any sort of location on any map.
5. When you have completed the criteria selection, click **CALCULATE DISTANCE**. The data area to the left of the buttons displays the results of the search.

Figure: Distance Calc Resulting Data

Origin	Destination	Distance_Result	Distance_Unit	Criteria1	Criteria2
<input type="checkbox"/> Abidjan	Washington, D.C.	5,071.291375	miles	Capital = Washington, D.C.	
<input type="checkbox"/> Abu Dhabi	Washington, D.C.	7,062.165435	miles	Capital = Washington, D.C.	
<input type="checkbox"/> Accra	Washington, D.C.	5,265.727633	miles	Capital = Washington, D.C.	
<input type="checkbox"/> Adamstown	Washington, D.C.	5,594.581510	miles	Capital = Washington, D.C.	
<input type="checkbox"/> Addis Ababa	Washington, D.C.	7,157.097821	miles	Capital = Washington, D.C.	
<input type="checkbox"/> Agana	Washington, D.C.	7,929.682708	miles	Capital = Washington, D.C.	
<input type="checkbox"/> Algiers	Washington, D.C.	4,218.155738	miles	Capital = Washington, D.C.	
<input type="checkbox"/> Alma-ata	Washington, D.C.	6,530.138117	miles	Capital = Washington, D.C.	
<input type="checkbox"/> Alofi	Washington, D.C.	7,187.070890	miles	Capital = Washington, D.C.	

6. Click **EXIT** to close the tool.

Figure: Distance Calc Resulting Data (7.8)

Origin	Destination	Distance_Result	Distanc	Criteria1	Criteria2
<input type="checkbox"/> Abidjan	Washington, D.C.	5,071.290000	miles	Capital = Washington, D.C.	
<input type="checkbox"/> Abu Dhabi	Washington, D.C.	7,062.170000	miles	Capital = Washington, D.C.	
<input type="checkbox"/> Accra	Washington, D.C.	5,265.730000	miles	Capital = Washington, D.C.	
<input type="checkbox"/> Adamstown	Washington, D.C.	5,594.580000	miles	Capital = Washington, D.C.	
<input type="checkbox"/> Addis Ababa	Washington, D.C.	7,157.100000	miles	Capital = Washington, D.C.	
<input type="checkbox"/> Agana	Washington, D.C.	7,929.680000	miles	Capital = Washington, D.C.	
<input type="checkbox"/> Algiers	Washington, D.C.	4,218.160000	miles	Capital = Washington, D.C.	
<input type="checkbox"/> Alma-ata	Washington, D.C.	6,530.140000	miles	Capital = Washington, D.C.	
<input type="checkbox"/> Alofi	Washington, D.C.	7,187.070000	miles	Capital = Washington, D.C.	

## Export DGN 8.0 and Latest AutoCAD Formats using Universal Translator

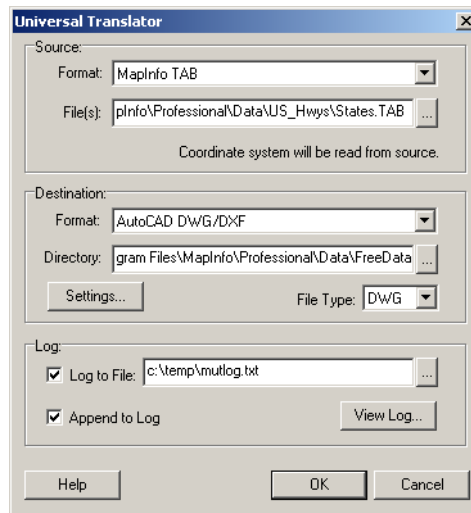
We have upgraded the Universal Translator to allow the translation of MapInfo .TAB files into MicroStation version 8 and AutoCAD DWG and DXF 2004 formats. We modified the Universal Translator dialog box and the underlying code to permit this type of output and to support all versions of AutoCAD DWG and DXF to release 2005.

### Translating MapInfo .TAB Files to DGN 8.0 Format

To translate a MapInfo .tab file into a Microstation Design 8.0 file:

1. From the **TOOLS** menu, select **UNIVERSAL TRANSLATOR** and then **UNIVERSAL TRANSLATOR** from the submenu. The **UNIVERSAL TRANSLATOR** dialog box displays.

Figure: Universal Translator with MicroStation Options Selected



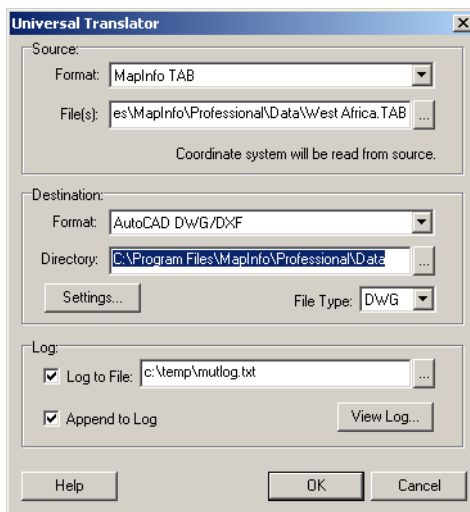
2. In the **SOURCE FORMAT** drop-down list, select the MapInfo .tab option. The coordinate system will be read from the source file.
3. Click the **...** **ELLIPSIS** button beside the **FILES** field to display the **SELECT INPUT MAPINFO TAB FILES** dialog box.
4. Select the file you want to translate from the list and click **OPEN**.
5. In the **DESTINATION** box, click the **FORMAT** drop-down list to select the **MICROSTATION DESIGN** option and click the **...** **ELLIPSIS** button beside the **DIRECTORY** field to select the folder into which you want to save the new file. Click **OK** to save the directory.
6. Select the MicroStation Design version (**7** or **8**) from the **VERSION** drop-down list.
7. Select your log options from the **LOG** box and click **OK** to begin the translation. A Translating message displays and when the translation is complete, a confirmation message displays.

### Translating MapInfo .TAB Files AutoCAD DWG/DXF 2004 Formats

To translate a MapInfo .TAB file into AutoCAD DWG/DXF 2004 format:

1. From the **TOOLS** menu, select **UNIVERSAL TRANSLATOR** and then **UNIVERSAL TRANSLATOR** from the submenu. The **UNIVERSAL TRANSLATOR** dialog box displays.

Figure: Universal Translator with AutoCAD Options Selected





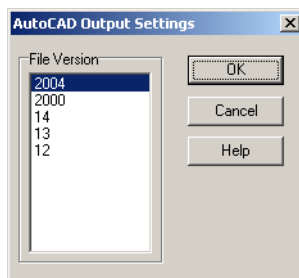
2. In the **SOURCE FORMAT** drop-down list, select the MapInfo .TAB option. The coordinate system will be read from the source file.
3. Click the **ELLIPSIS**  button beside the **FILES** field to display the **SELECT INPUT MAPINFO TAB FILES** dialog box.
4. Select the file you want to translate from the list and click **OPEN**.
5. In the **DESTINATION** box, click the **FORMAT** drop-down list to select the **AUTOCAD DWG/DXF** option and click the **ELLIPSIS**  button beside the **DIRECTORY** field to select the folder into which you want to save the new file.
6. Select the **SETTINGS** button to specify the AutoCAD release the output file should be compatible with. Current options include Releases **12**, **13**, **14**, **2000**, and **2004**.

Figure: AutoCAD Output Settings

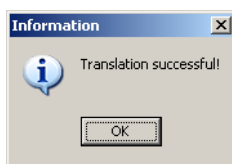


*If you have AutoCAD release 2002, select Release **2000**. If you have AutoCAD release 2005, select **2004**. There is no difference in format between AutoCAD version 2005 files and AutoCAD version 2004. Also, there is no difference in format between AutoCAD version 2002 files and AutoCAD version 2000 files.*

7. Select the file type for the new file:
  - Select the **DXF** (Drawing eXchange Format) option if you require an ASCII output format.
  - Select **DWG** (DraWinG) if the file you are translating is very large because and you want a binary output format.
8. Select your log options from the **LOG** box and click **OK** to begin the translation. A **TRANSLATING** message displays and when the translation is complete, a confirmation message displays. Click **OK** to finish this process.



Figure: Information



### Geographic Tracker Tool Upgraded

Blue Marble Geographics has upgraded the Geographic Tracker tool to include support for the Garmin proprietary interface (on serial as well as USB) and increased the maximum baud rate for a serial connection.

### Sync Window Enhancements

The Sync Windows tool gives you access to nine tool bar buttons that allow you to control what displays on selected open Map windows and allows you to automate common MapInfo Professional tasks. In this release we have enhanced this tool by changing some of the toolbar buttons and creating a way to control the addition and removal of embedded legends.

#### Changing the Sync Windows Toolbar Buttons

We changed some of the icons we use in this tool to clarify their meaning.

Figure: Sync Windows Toolbar



1 Clone Map Window, 2 Rename Current Window, 3 Tile Windows 4 Sync All Map Windows, 5 Create a Symbol on All Cosmetic Layers 6 Create a Polyline on All Cosmetic Layers, 7 Create a Rectangle on All Cosmetic Layers 8 Create an Ellipse on All Cosmetic Layers, 9 Clear All Cosmetic Layers

#### Controlling an Embedded Legend Behavior in Sync Windows

To control the behavior of embedded legends in open map windows:


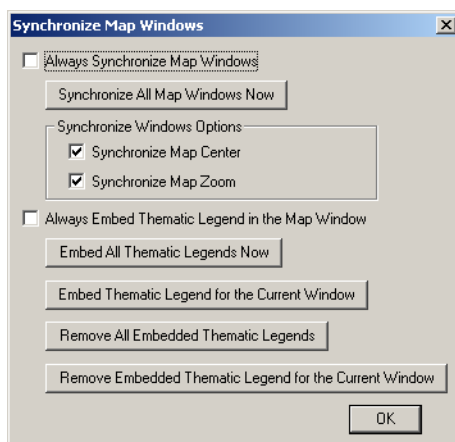
1. Add the **SYNC WINDOWS** tool to the **TOOLS** menu. See [Adding a Tool to the Tool Manager in the Tools Menu on page 79](#) for these instructions.
2. Click the  icon on the **SYNC WINDOWS** toolbar to display the **SYNCHRONIZE MAP WINDOWS** dialog box.

Figure: Synchronize Map Windows



3. To control the behavior of embedded legends in the open map windows, choose from the following options:

#### **Always Embed Thematic Legend in the Map Window**

Use this check box to embed all theme legends in their corresponding Map window(s). When you select this option, the **REMOVE** options disable.

#### **Embed All Thematic Legends Now**

Use this button to embed all current theme legends in their corresponding Map windows.

#### **Embed Thematic Legend for the Current Window**

Use this button to embed the thematic legend for the current window only.

#### **Remove All Embedded Thematic Legends**

Use this button to remove the embedded thematic legends from all open Map windows.

#### **Remove Embedded Thematic Legend for the Current Window**

Use this button to remove the thematic legend from the current Map window.

4. When you have selected the options you want in this dialog box, click **OK** to save them.

## Digitizing Enhancement

### **Auto Node - Stream Digitizing Added**

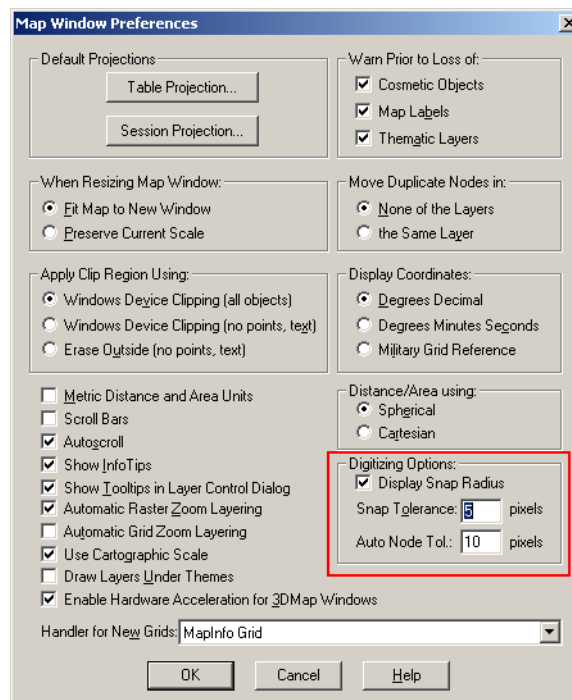
When you are tracing over a map, you may not want to press the button for each node. You can now enable the Auto Node function, which drops nodes along the route you are tracing based on your tolerance settings. Auto Node is available for the Add Polyline, Add Polygon, and ruler tools.

#### **Setting up the Auto Node Feature**

To set up the AutoNode feature:

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

Figure: Map Window Preferences with Digitizing Options Highlighted



2. In the **DIGITIZING OPTIONS** box, there is a new option called **AUTO NODE TOLERANCE**. If you leave the default entry (**10**) in this box, this means that while this feature is active and you are tracing a line, MapInfo Professional will drop a node every 10 pixels automatically. You can change this number to suit your needs. We recommend that you move your mouse slowly so you can be as accurate as possible. This ensures that the Auto Nodes are added correctly.
3. Click **OK** to save your entry.

### Using the Auto Node Feature

To enable Auto Node feature, press the **N** key and click to place your first node. MapInfo Professional computes the straight-line distance between that node in the polyline/polygon and the current mouse position. When you have moved the mouse at least as far as the distance you specified in the **AUTO NODE TOLERANCE** field, MapInfo Professional drops a new node to the object. This continues until you turn Auto Node off or you complete the objects you are creating. To remove the previous node, press the **BACKSPACE** key.

You can use this feature in both Map and Layout windows. You toggle this feature as you would the Snap or Autotrace features. The word **AUTONODE** displays in the **STATUS BAR** at the bottom of the application window when Auto Node is active.

### Do Not Use AutoNode and Autotrace Together

We do not recommend you use the Auto Node with the Autotrace functionality. If you do, nodes may get inserted in addition to the autotrace nodes and may produce undesirable results.

## Sample Data Enhancements

For this release, we have enhanced the sample data as follows:

- **Sample Data Metadata Extracted for Easy Access**
- **Sample Data Upgraded to Latest Vintage**
- **New Demographic Variables Added**
- **Samples of New Theme Templates**

### Sample Data Metadata Extracted for Easy Access

#### Urban Areas

**Columns:** Name (Census name for the major Urban Area)

Urban\_Pop\_Cy ( Urban Population of the polygon based off of TargetPro 4.6 Data).

Total\_Area\_Miles (The area of each polygon in Square miles)

Urbanized Areas (UAs): An urbanized area consists of densely settled territory that contains 50,000 or more people. The U.S. Census Bureau delineates UAs to provide a better separation of urban and rural territory, population, and housing in the vicinity of large places. For Census 2000, the UA criteria were extensively revised and the delineations were performed using a zero-based approach. Because of more stringent density requirements, some territory that was classified as urbanized for the 1990 census has been reclassified as rural. (Area that was part of a 1990 UA has not been automatically grandfathered into the 2000 UA.) In addition, some areas that were identified as UAs for the 1990 census have been reclassified as urban clusters.

**Note:** Urban Clusters are not included in the values for this dataset.

#### Wilderness Boundaries

The Wilderness boundary file was thinned using a 3 Node Collinear Deviation of .03 mi and a node separation of .01 mi. These data are intended for geographic display and analysis at the national level, and for large regional areas. The data should be displayed and analyzed at scales appropriate for 1:2,000,000-scale data.

#### Abstract

This map layer consists of National Wilderness Preservation System areas of 640 acres or more, in the United States and Puerto Rico. The map layer was created by extracting these wilderness areas from the National Atlas map layer: Federal Lands of the United States.

**Columns:** Name (Wilderness area name)

State( 2 character state abbreviation)

State\_Fips ( 2 character state code)

Feature\_Type ( Describes the type of area)

Area\_Sq\_Miles ( The area in square miles of each polygon)

Perimeter\_Miles ( The distance in miles of the outer edge of each polygon)

URL (a web address that will open a website with information about the wilderness area. Hotlink tool is used for this feature)

## Interstates

This layer was derived from The National Atlas website, created from a National Highway Planning Network map. The interstate roads were kept and the US and State roads were removed. The file was thinned using a 3 Node Collinear Deviation of .03 mi and a node separation of .03 mi.

### Interstate Shield Layers:

*Us\_Int\_Shields1* is a bitmap Interstate shield layer with 70 records. Each record represents a Highway number.

*Column:* HwyNumber (Represents the sign number for the Interstate)

*Us\_Int\_Shields2* is a bitmap Interstate shield layer with 224 records. Each record represents a Highway number.

*Column:* HwyNumber (Represents the sign number for the Interstate)

*Us\_Int\_Shields3* is a bitmap Interstate shield layer with 494 records. Each record represents a Highway number.

## Abstract

The National Highway Planning Network is a comprehensive network database of the U.S. major highway system, with over 400,000 miles of the nation's highways comprised of Rural Arterials, Urban Principal Arterials and all National Highway System routes. The data set covers the 48 contiguous States plus the District of Columbia, Alaska, Hawaii, and Puerto Rico. The nominal scale of the data set is 1:100,000 with a maximal positional error of  $\pm 80$  meters. Vintage: 2002.

**Columns:** Interstate\_Number ( Designated number for the road segment)

State\_Fips ( 2 character state code)

Cnty\_Fips (3 character county code)

Length\_Miles (length in miles of each line segment that makes up the road object)

Length\_Kilometers (length in kilometers of each polyline segment that makes up the road object)

## Secondary Highways

This layer was derived from The National Atlas website, created from a National Highway Planning Network map. The interstate roads were removed and the US and State roads were kept together. The file was thinned using a 3 Node Collinear Deviation of .03 mi and a node separation of .03 mi.

## Abstract

The National Highway Planning Network is a comprehensive network database of the nation's major highway system. It consists of over 400,000 miles of the nation's highways comprised of Rural Arterials, Urban Principal Arterials and all National Highway System routes. The data set covers the 48 contiguous States plus the District of Columbia, Alaska, Hawaii, and Puerto Rico. The nominal scale of the data set is 1:100,000 with a maximal positional error of  $\pm 80$  meters.

Vintage: 2002

**Columns:** Route\_Number (The Sign designation S = State and U = U.S. Highway. Not all have a number assigned)

Route\_Name (Common name used for some Roads. Not all have a value)

St\_Fips ( 2 character state code)

Cnty\_Fips (3 character county code)

Length\_Miles (length in miles of each polyline segment that makes up the road object)

Length\_Kilometers (length in kilometers of each polyline segment that makes up the road object)

Us\_Int\_Shields1 - 70 records

Us\_Int\_Shields2 - 224 records

Us\_Int\_Shields3 - 494 records

These Shield layers are lined up with the US\_Hiways and Interstate layers. Each Shield layer is made up of a bitmap icon and has a different number of records for use at different zoom levels. Each is a 1 column file containing the interstate number.

### Streams\_Rivers

The Stream\_Rivers layer was derived from The National Atlas website. (<http://nationalatlas.gov/>)

The file was thinned with a 3 Node Collinear Deviation of .03 mi and a node separation of .03 mi. Only those records referencing a stream or river were retained. Others were omitted because of space constraints for the sample data.

### Abstract

The National Waterway Network is a comprehensive network database of the nation's navigable waterways. The data set covers the 48 contiguous States plus the District of Columbia, Hawaii, Alaska, Puerto Rico and water links between. The nominal scale of the data set varies with the source material. The majority of the information is at 1:100,000

This is a revised version of the November 1999 data set.

### Lakes

The Lakes layer was derived from The National Atlas website (<http://nationalatlas.gov/>)

The file was thinned with a 3 Node Collinear Deviation of .03 mi and a node separation of .03 mi. For purposes of this dataset, only the named lakes were retained. The other features and unnamed objects were omitted.

### Abstract

The data set portrays the polygon and line water features of the United States, Puerto Rico, and the U.S. Virgin Islands. The file was produced by joining the individual State hydrography layers from the 1:2,000,000-scale Digital Line Graph (DLG) data produced by the USGS. This data set was formerly distributed as Hydrography Features of the United States. This is a revised version of the November 1999 data set.

**Columns:** Name (The name of the represented body of water)

State (The state abbreviation where the lake resides)

St\_Fips ( 2 character state code)

Area\_Square\_Miles (Area of each body of water)

Perimeter\_Miles (Measurement of the outer edge of each boundary)

### Urban\_CitiesPop10K\_plus

This table is comprised of a portion of the points from the Uscty\_8k table. A point in polygon query was run to determine which points from the 8K table fell within the new Urban\_Areas table and had a population greater than or equal to 10K.

**Columns:** Name (The name of the Urban Area where the city is located)

City (The name of the city)

State (The state abbreviation where the city resides)

### New Raster Imagery Sample:

A 1 foot resolution image of Manhattan, NY has replaced the ImagePro sample of Washington, D.C. The Manhattan sample is provided by AirPhotoUSA.

### Sample Data Upgraded to Latest Vintage

The US\_ Zip file (zip code points) has been updated to April 2005.

### New Demographic Variables Added

The Population Urban and Rural in the States.tab and the USA.tab has been update from Census Summary File 3.

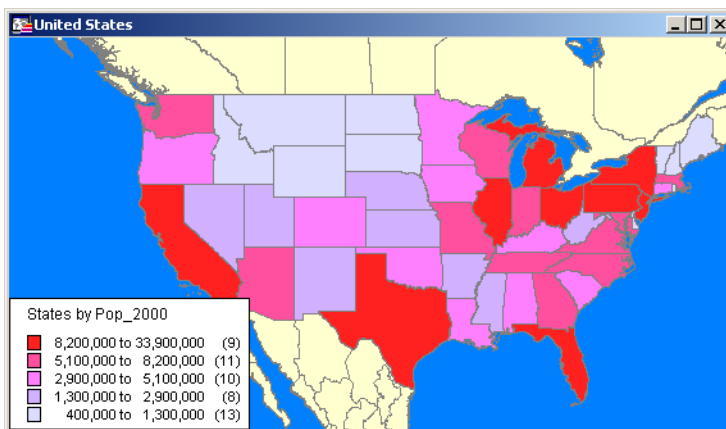
### Samples of New Theme Templates

We have added new theme templates to our list for region ranges, region individual values, point ranges, and grid elevations. We have included examples of all of the new templates in **New Thematic Templates in Appendix J on page 739**.

Some of the new region range templates are *sequential* (variations on a particular color to show intensity), and some are color *diverging* (starting with one color and moving to other complementary colors) and each has its purpose.

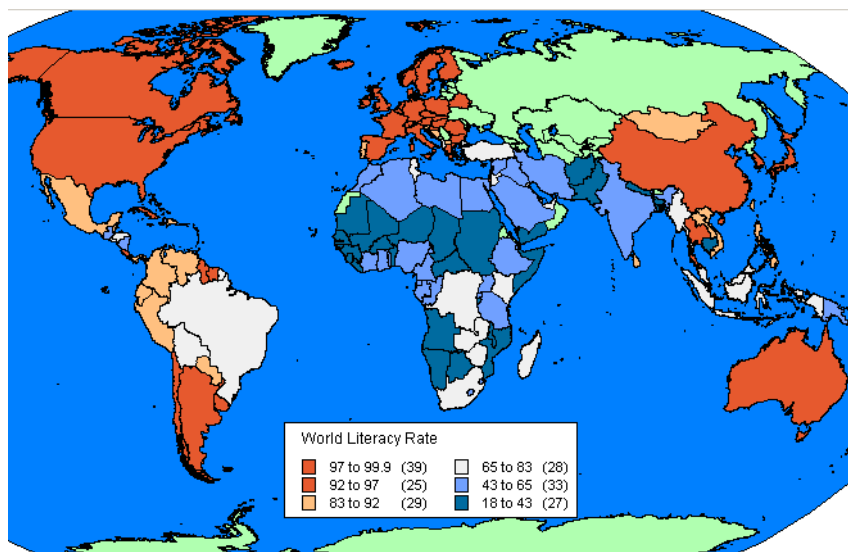
*Sequential templates* are helpful when you are showing a progression of data, that is, when the data is straight forward. An example might be population.

Figure: Sequential Template Example



Diverging templates are useful when showing data that diverges more dramatically. An example might be world literacy rates:

Figure: Divergent Theme Example



The areas in green are areas we do not have data for.





# Installing and Configuring 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. . . . . 98**
- ◆ **Before You Install MapInfo Professional 8.0 . . . . . 99**
- ◆ **Installing MapInfo Professional. . . . . 100**
- ◆ **Setting your Database Connection Preferences . . . . . 105**
- ◆ **Modifying or Removing MapInfo Professional . . . . . 106**
- ◆ **Setting the MapInfo Professional Preferences . . . . . 113**
- ◆ **Starting up and Leaving MapInfo Professional . . . . . 128**

## System Requirements for MapInfo Professional

These are the system requirements for MapInfo Professional 8.0:

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 2 Windows XP Home SP 2 Windows 2003 Server Windows 2003 Server with Terminal Services/Citrix	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 spatial database servers:

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

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

- Oracle ODBC Driver 9iR2
- SQL Server 2000
- Informix 3.82

To make your database work more productive, MapInfo Professional 8.0 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
- Oracle 10G
- MS Access XP
- MS SQL Server 2000
- Informix 9.4

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## Before You Install MapInfo Professional 8.0

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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 8.0 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 8.0 CD Browser

The initial screen of the MapInfo Professional 8.0 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 8.0 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](http://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

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**CAUTION:** We strongly recommend that you exit from all Windows programs before beginning the installation process. If you are upgrading from an earlier version of MapInfo Professional, we recommend that you uninstall 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 8.0 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 101](#) 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 101](#) 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 104](#) 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 105](#).

If you have already upgraded to MapInfo Professional 8.0 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 or Removing MapInfo Professional on page 106](#). 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 100](#) 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 make changes.

3. Click **INSTALL** to begin. The **INSTALLING MAPINFO PROFESSIONAL 8.0** 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 8.0 for the first time, the final installation and configuration process takes place automatically.

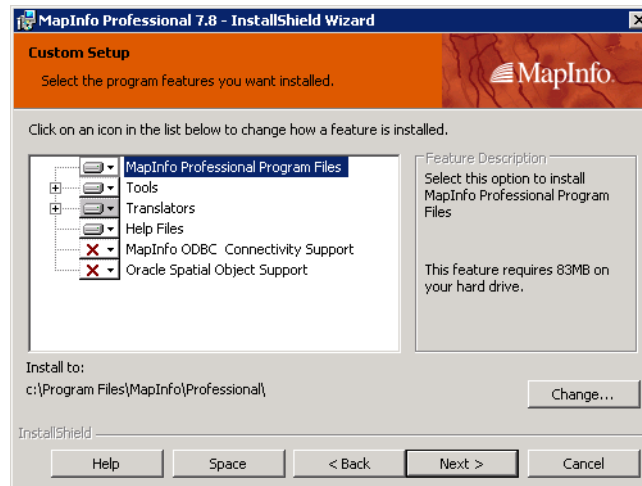
## Custom Workstation Installation

Choose this installation type to select components and drivers within the MapInfo Professional 8.0 installation program. This is particularly useful if you need to install MapInfo ODBC Connectivity support and/or Oracle Spatial Object support.

**CAUTION:** Make sure you have completed the directions in [Installing MapInfo Professional on page 100](#) 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.



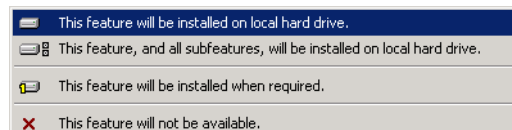
A feature description, and the space required for the feature and its sub-features displays in the Feature Description area.

2. 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**

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



4. 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 the 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 installs 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. 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 8.0** 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 8.0 for the first time, the final installation and configuration process takes place. This happens automatically and does not require any additional work.

### Adding ODBC and OCI 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 105](#).

You must have the OCI and ODBC drivers installed for MapInfo Professional to connect to remote databases. If you see the following messages, then you have installed the MapInfo DLLs for these features correctly but the drivers are missing:

#### OCI (Oracle Call Interface)

The MapInfo Oracle OCI Database driver (MIDLOCI.DLL) failed to load.  
This is most commonly caused by not having an installation of Oracle's OCI driver, which is necessary for the MapInfo Oracle OCI Database driver to load. To fix this issue, please install the Oracle OCI Database driver or rerun the MapInfo Professional Installer to remove the MapInfo Oracle OCI Database driver. Clicking "OK" will allow you to run MapInfo Professional without the ability to open Oracle tables through Oracle's Oracle Call Interface.  
If you need more information, please contact MapInfo Technical Support.

#### ODBC (Open DataBase Connectivity)

The MapInfo ODBC Database driver (MIDLODBC.DLL) failed to load.  
This is most commonly caused by an incomplete installation of MapInfo ODBC Connectivity Support. To fix this issue, please rerun the MapInfo Professional Installer to repair or remove the MapInfo ODBC Connectivity Support. Clicking "OK" will allow you to run MapInfo Professional without the ability to open remote database tables through ODBC.  
If you need more information, please contact MapInfo Technical Support.

A combined message displays if you attempt to add both of these options and neither of them have access to the appropriate database drivers.



## Network Installation

Installing MapInfo Professional 8.0 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 100](#) 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 8.0 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 104](#) 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:

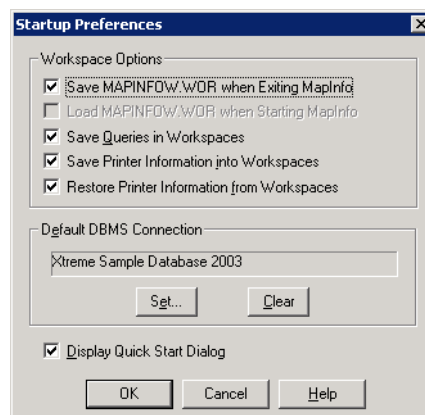
1. Map a drive to the MapInfo Professional Install directory.
2. Select **RUN** from the **START** menu.
3. Run **SETUP.EXE** from the [MapInfo install directory]\AddClient. The MapInfo Professional 8.0 Client Welcome screen displays.
4. Click **NEXT**. The License Information screen displays.
5. Click "**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

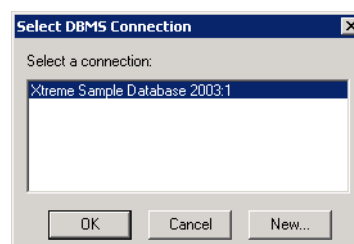
If you have a favorite database connection setting, we have established a Startup preference setting to create that connection automatically at the beginning of your session.

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 or Removing MapInfo Professional

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Use the Program Maintenance feature of the CD Browser to modify, repair, or remove MapInfo Professional 8.0.

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 8.0 based on your needs.
  - Click **MODIFY** to display the **CUSTOM SETUP** dialog box. See the instructions for **Custom Workstation Installation on page 101** for more about this process.
  - Click **REPAIR** to repair installation errors in the program.
  - Click **REMOVE** to remove an existing copy of MapInfo Professional 8.0 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 8.0**.

## Controlling Advanced System Settings

MapInfo Professional has some advanced system 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 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. To modify one of MapInfo Professional's advanced system settings (such as the DDE time-out setting), use this procedure.

## Modifying the Windows Registry

MapInfo Professional stores system settings in the Windows registry. 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 (for example, enter 30000 to specify a time-out of 30 seconds). For more on editing the registry, see the online help for REGEDIT or REGEDT32.

## Descriptions of Advanced Registry Settings

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, MapInfo Professional will redraw the map. If you are using a video driver that is problematic, and encounter video problems with Map windows, you may 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.

**MaxORACLE\_TILES** = *number*

A value from 0 = unlimited tiles to infinity.

### Improving Performance for MapInfo Professional

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

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, create a setting file, MODE.INI, to specify the location of application data files 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
ThmTmplt	per user, roaming
GraphSupport	per machine

### MODE. INI File Example

Create a text file with the following syntax:

```
GraphSupport = 3
CustSymb = 1
ThmTmplt = 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 8.0:

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 and click **NEXT** to continue:
  - MapInfo Professional
  - MapInfo Run Time

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 checkbox 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

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

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 8.0 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

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 8.0 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

MapInfo Professional 8.0 supports the Microsoft IntelliMouse™ as follows:

**Document Scrolling:** In the Map, Layout, Browser, and MapBasic windows, hold down the **CTRL** 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 8.0 User's Guide (Unabridged)* on your MapInfo Professional 8.0 Installation CD for more information.



## Installing Global Positioning Software (GPS)

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 8.0 provides the following online reference documents: *MapInfo Professional Supplement*, *MapBasic Reference Guide*, *Crystal Reports User's Guide*, *ArLink*, 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](http://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 from your System using Control Panel

Remove MapInfo Professional 8.0 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.

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## Setting the MapInfo Professional Preferences

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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.

**Web Services** – Sets refresh, timeout values, WMS GetMap pixel limits, and proxy server settings for MapInfo Professional WFS and WMS services.

## 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.

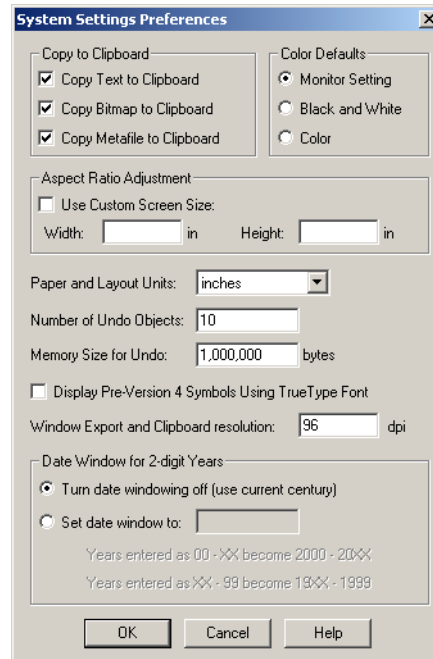
What follows in this section are details to assist you in setting your preferences.

### 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 checkbox(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 checkbox to indicate how you want to draw symbols from versions of MI Pro earlier than 4.0. Select this checkbox 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.

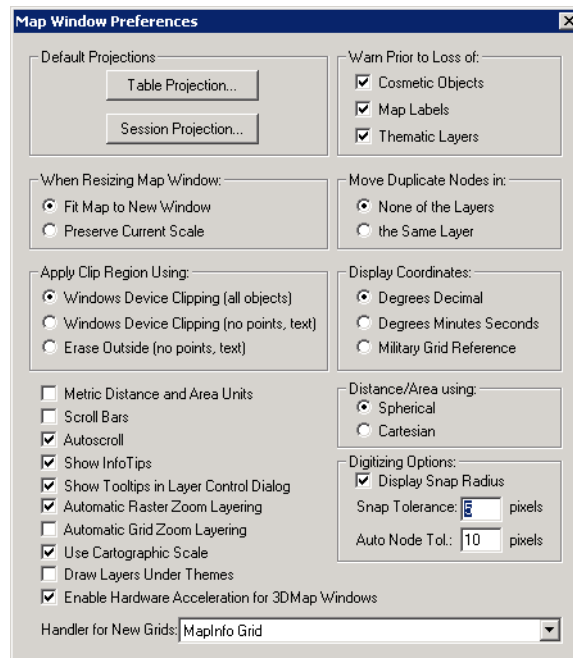
## Setting your Map Window Preferences

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** dialog box.

Figure: Map Window Preferences



2. Make your default projection 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 GML 2.1, MIF, MBI, and IMG files, and for **CHOOSE PROJECTION** options in dialog boxes.

**Note:** You can override the table projection defaults by accessing the **CHOOSE PROJECTION** button throughout MapInfo Professional except when you use the Universal Translator, ArcLink, or when you import 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 always display and are 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 always display and are 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 checkbox. 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** checkbox. By default, MapInfo Professional does not display scrollbars in Map windows.
  - **AUTOSCROLL** — To scroll the layout automatically, select the **AUTOSCROLL** checkbox.
  - **INFOTIPS** — To display one or two word tips when you cursor over a button, select the **INFOTIPS** checkbox. By default, MapInfo Professional displays InfoTips. Clear the **SHOW INFOTIPS** checkbox 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 checkbox. 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 checkbox. Automatic Grid Zoom Layering is turned off by default.
  - **USE CARTOGRAPHIC SCALE** — To display your maps in Cartographic Scale automatically. 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 and a scale indicator displays in the Status Bar.
  - **3D MAP WINDOW HARDWARE ACCELERATION** — This checkbox 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 311](#). For more information about this preference setting, see [Setting Snap Preferences for a Visible Snap Area on page 312](#).
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.

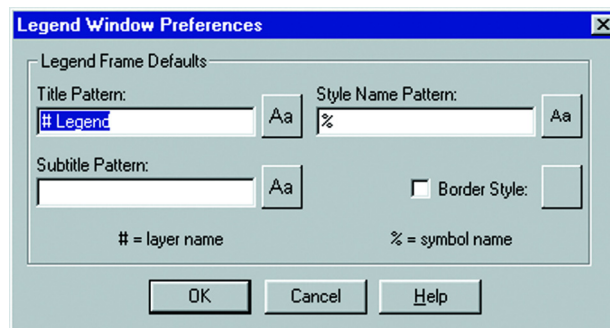


## Setting your Legend Window Preferences

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 on legends, see [Working with Legends in Chapter 9 on page 380](#).

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 “#.” To have no default pattern, 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 checkbox to place a border around the legend and select the appropriate style by clicking the **BORDER STYLE** button.
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.

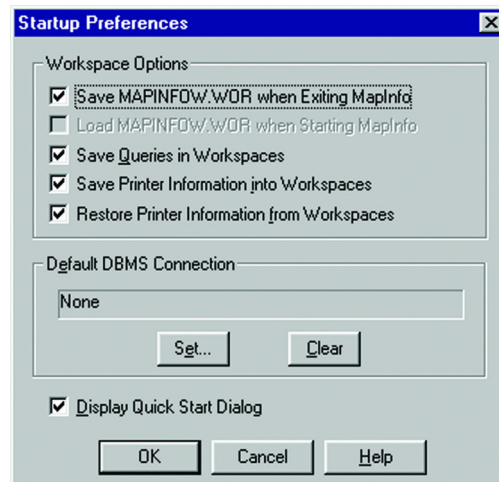
## Setting the Startup Preferences

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 checkbox to disable this functionality. You may select all that apply.
  - **SAVE MAPINFOW.WOR WHEN EXITING MAPINFO** — Select this checkbox to save your setup to the MAPINFOW.WOR workspace when you exit MapInfo Professional. When you clear this checkbox, 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 checkbox.

**Note:** To enable this checkbox, you must clear the **DISPLAY QUICK START DIALOG** checkbox.

- **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 checkbox.

The **SAVE PRINTER INFORMATION INTO WORKSPACES** checkbox 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 checkbox. 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.

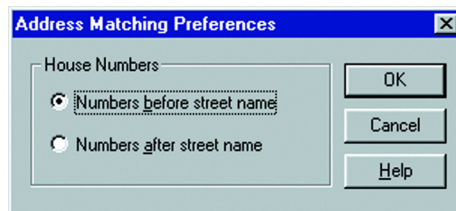
- **DBMS CONNECTION** — To save a default DBMS Connection, specify a DBMS connection that will be opened each time you begin a MapInfo Professional session. Click **SET** to set this connection.
  - **DISPLAY QUICK START DIALOG** — Select this checkbox to display the **QUICK START** dialog box automatically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

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.



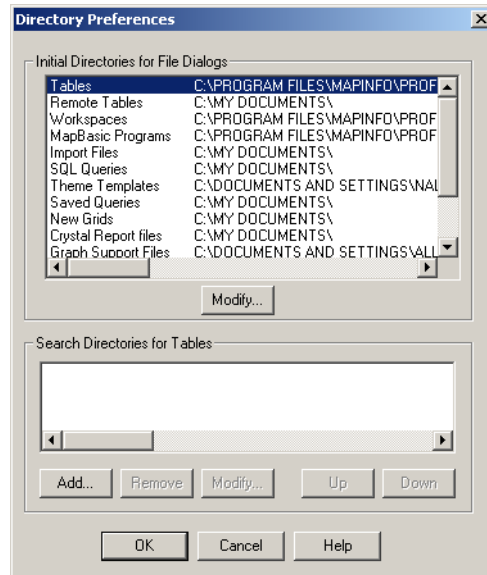
2. Click **OK** to save this preference and return to the **PREFERENCES** dialog box.
3. Click **OK** to close the **PREFERENCES** dialog box.

## Setting your Directory Preferences

The Directory preferences control the directories in which 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

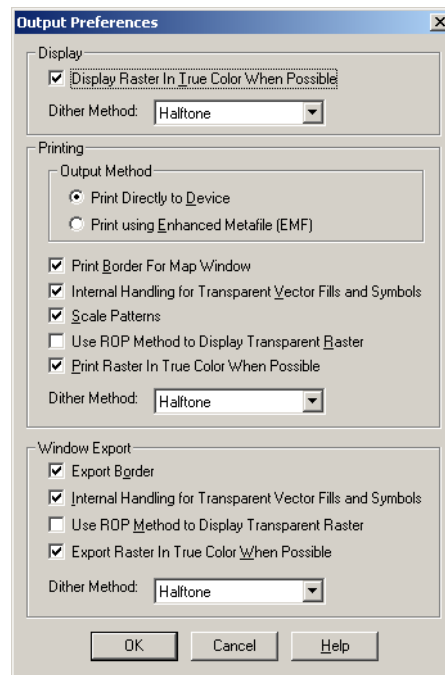
The Output Settings allow you to control raster and grid file color settings for on-screen display, printed output, and file export settings. In addition, you can also specify how you want to handle transparency in vector and raster files in both your printed output and exported files. Other printer 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 checkbox 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 checkbox 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 checkbox 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 checkbox to print a black border around the image you are printing. Clear this checkbox to leave the image unbordered. This checkbox 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 checkbox to use this functionality or clear it to let the printer or Windows export functions to handle this. This checkbox is checked by default.
- **SCALE PATTERNS** — Select this checkbox to match the non-transparent fill patterns in your print output to more closely match what you see on your screen. This checkbox is checked by default. Clear this checkbox to let the printer driver have exclusive control over rendering the pattern fills.

**Note:** The **SCALE PATTERNS** checkbox does not affect transparent fill patterns because transparent fill patterns are always scaled.

- **USE ROP METHOD TO DISPLAY TRANSPARENT RASTER** — Click this checkbox 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 checkbox 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 checkbox 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 checkbox if you are not working with a color printer. This checkbox 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 checkbox to include a black border on images you are exporting. Clear this checkbox to export the image without a border. This checkbox 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.

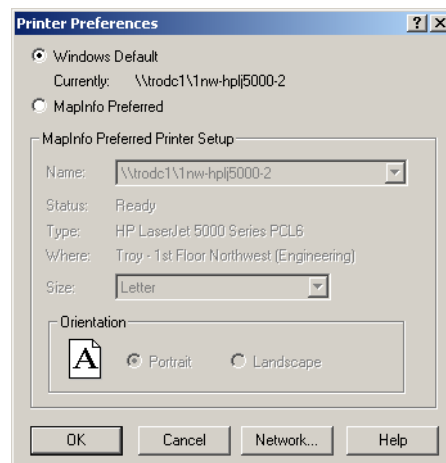
## Setting your Printer Preferences

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.

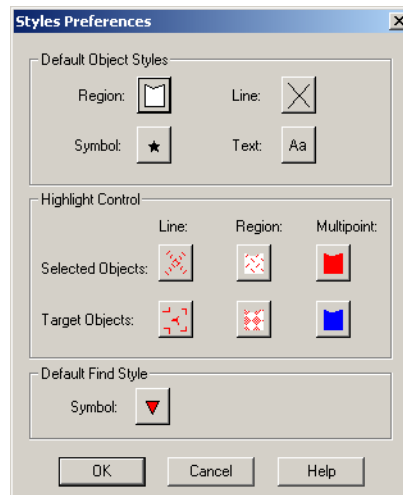


## Setting your Style Preferences

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

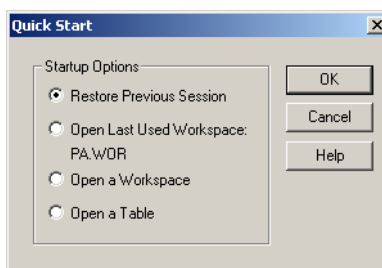
Now that you have MapInfo Professional installed and have read a little about its power and functionality, you are ready to begin mapping and analyzing your data.

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 8.0** (or **MAPINFO PROFESSIONAL 8.0 CLIENT**, if this is a network installation) from the Selected Program folder.

Using either method the **QUICK START** dialog box 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 . 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 .
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 **CTRL**-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 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 204**.

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** checkbox 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 . . . . . 134
- ◆ Data - Where MapInfo Professional Begins . . . . . 139
- ◆ Reviewing the Windows in MapInfo Professional . . . . . 147
- ◆ Understanding Layers and Objects . . . . . 151
- ◆ Saving and Exporting Your Work . . . . . 168
- ◆ Using the Tools in the Tool Manager . . . . . 174

## 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.

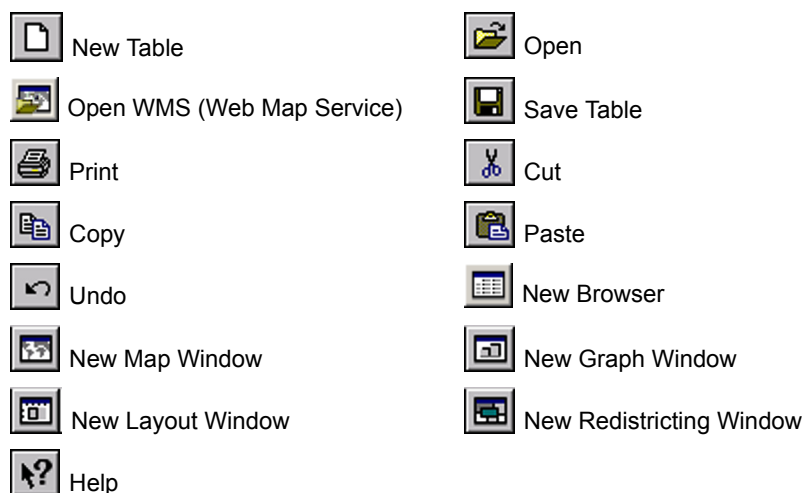
1. On the **OPTIONS** menu, click **TOOLBARS**, and in the **TOOLBAR OPTIONS** dialog box.
2. Do one of the following:
  - Select the **FLOATING** checkbox for each toolbar that you want to have float and be able to move around.
  - Clear the **FLOATING** checkbox for each toolbar you want to dock.

**Note:** To display or hide the toolbars, select or clear the **SHOW** checkbox. 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 **CTRL** 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 buttons for selecting objects, changing the view of the Map window, getting information about an object, and showing 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 <b>CHANGE VIEW</b> 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 <b>LAYER CONTROL</b> 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 <b>DRAG MAP WINDOW</b> 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 .tab 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 294](#).

	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 <b>LINE STYLE</b> 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 <b>REGION STYLE</b> 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 <b>SYMBOL STYLE</b> 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 <b>TEXT STYLE</b> dialog box where you can change the font type-face, size, style, color, and background of text objects.

## Reviewing the DBMS Toolbar

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

	Open DBMS Table	Accesses the <b>OPEN</b> dialog box, which allows you to access a remote database. If a connection has not been established, you are prompted to open one. This button is also found in the <b>OPEN</b> dialog box if DBMS is installed.
	Make DBMS Table Mappable	Accesses the <b>MAKE DBMS TABLE MAPPABLE</b> dialog box, which allows you make a table linked to a remote database mappable in MapInfo Professional.
	Refresh DBMS Table	Accesses the <b>REFRESH DBMS TABLE</b> 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 <b>UNLINK DBMS TABLE</b> dialog box, which allows you to unlink a downloaded table from its remote database.
	Change Symbol for a Mappable DBMS Table	Accesses the <b>CHANGE SYMBOL FOR A MAPPABLE DBMS TABLE</b> dialog box, and allows you to change the symbol style of a mappable DBMS table.
	DBMS Disconnect	Accesses the <b>CLOSE DBMS DISCONNECTION</b> 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
- 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 listed in a workspace, you invalidate the workspace. Table names are stored in the workspace file, so if change it, the workspace cannot find it.

For example, if you create a workspace called CUSTOMER.WOR that 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** checkbox. 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 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.

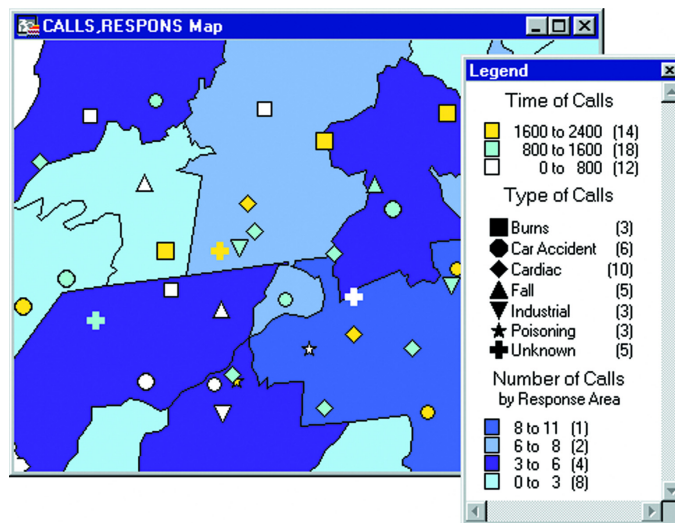
To restore printer information from a workspace, check the **RESTORE PRINTER INFORMATION TO WORKSPACES** box. When you open the workspace, the printer name, paper orientation, paper size, and the number of copies are restored. This is useful if you are sharing workspaces with other MapInfo Professional 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.*



MapInfo Professional begins when you open 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 328](#).

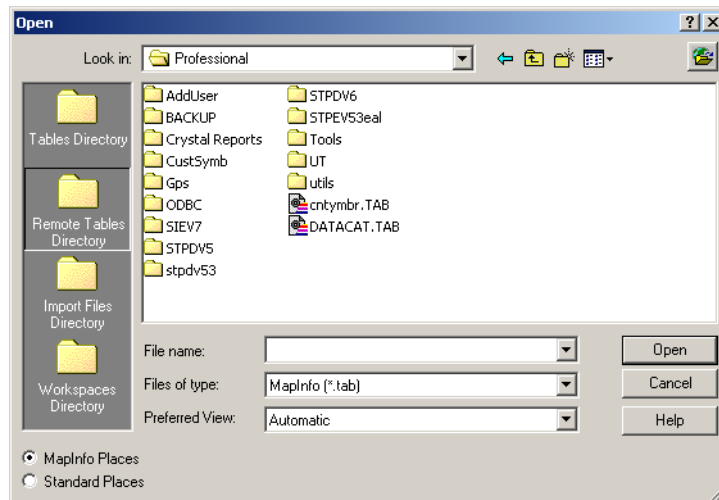
## Opening Tables and Files

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 142](#).
  - **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 144](#).

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 .

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 checkbox 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 105](#).

## 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
- Comma Delimited CSV files

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 657](#).

### **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 204](#), 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 190](#) for this process).
3. Display your data on the map (see [Displaying Your Data on the Map in Chapter 4 on page 239](#) 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 266](#) and for additional support. For more information about converting, displaying, and printing your data, see [Enhancing Your Data in Chapter 5 on page 249](#).

## 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

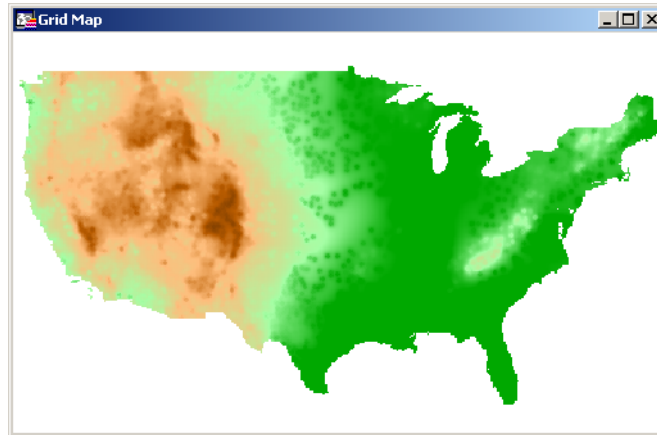
There are additional file types that MapInfo Professional can read including rasters, grids, shape files. For details about working with raster images, see [Displaying a Raster Image on page 163](#) and .

### *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.

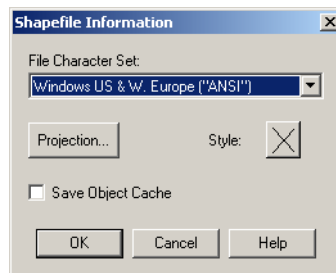


### Opening an ESRI Shapefile

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 file's directory and click it to open it.
4. Click **OPEN** to display the **PLEASE SPECIFY A TAB FILENAME** file. This dialog box saves the shapefile 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 display 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**.

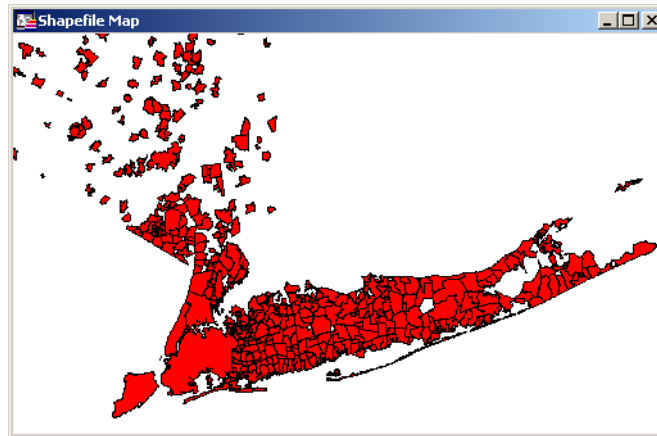
#### Style

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 checkbox 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 checkbox.

**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.

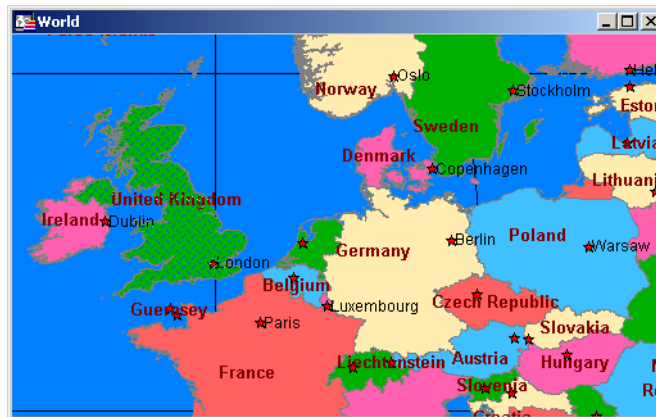
- **Map windows** present information arranged as conventional maps, allowing you to visualize the geographic patterns of your data.
- **Browser windows** present information as tabular lists (just as conventional databases do), allowing you to fully examine tabular data.
- **Graph windows** present 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 .

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-Litu	Oceania
<input type="checkbox"/> Western Sahara	N/A	Africa

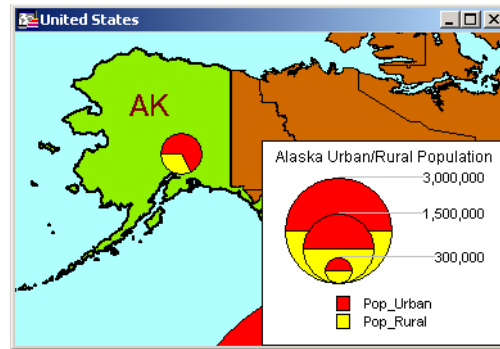
To create a report of your data, use the Crystal Reports functionality included with this version of MapInfo Professional (on the **TOOLS** menu, click **CRYSTAL REPORTS**).

## 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 .



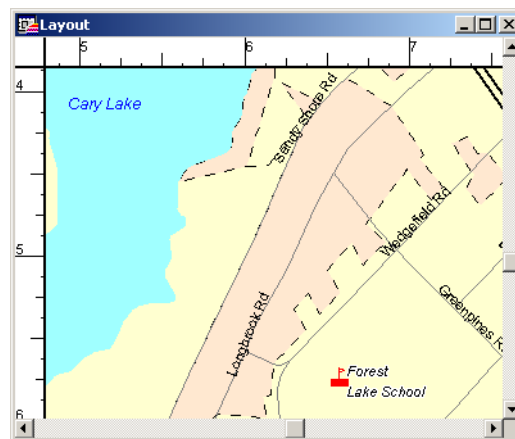
## Displaying Data in a Layout Window

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 148](#) 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 *Thematic 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 380](#).

- *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](#) in the MapInfo Professional *User Guide (Unabridged)* on the Installation CD.

## 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.

Figure: Map Layers Example



Map layers form the building blocks of maps in MapInfo Professional. Once you have created your layers, you can customize them 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 293](#).


## 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 checkbox 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.

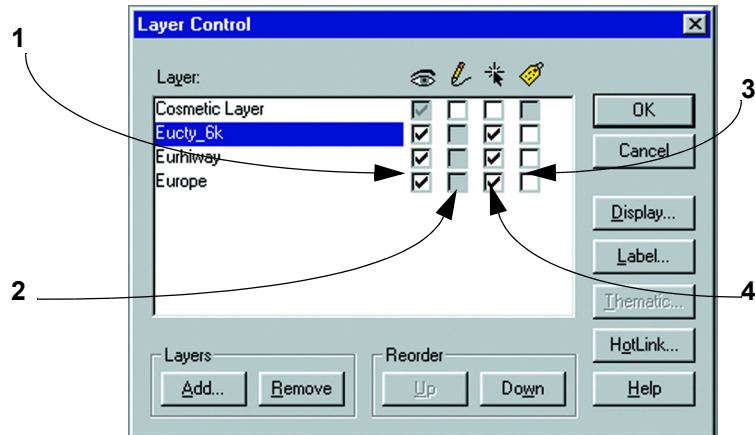
You also have options available to change the Display and Label settings; modify any thematic maps you have displayed; and reorder, add, or remove layers.

### Accessing Layer Control

To access the **LAYER CONTROL** dialog box:

1. 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 determine the map display.



- 1 Select these boxes to display a layer. 2 Select these boxes to edit a layer.
- 3 Select these boxes to label a layer automatically.
- 4 Select these boxes to make a layer selectable.


2. When you have completed your changes, click **OK** to display them 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 (for example, 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.

**Note:** Since the Cosmetic layer is always the top layer, reordering has no effect on it. You cannot move a layer above the Cosmetic layer.

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 (for example, 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 **CTRL** 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 **CTRL** 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.

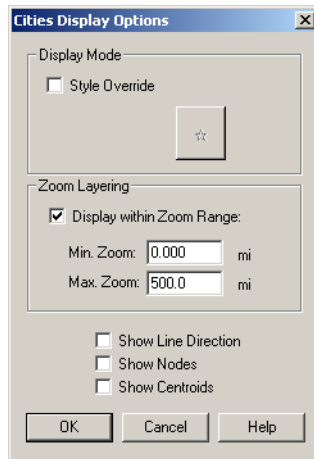
### Changing a Layer's Display Options

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 454](#).

To change the display options of a layer:

1. Click  in the Main toolbar to display the **LAYER CONTROL** dialog box.
2. 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.

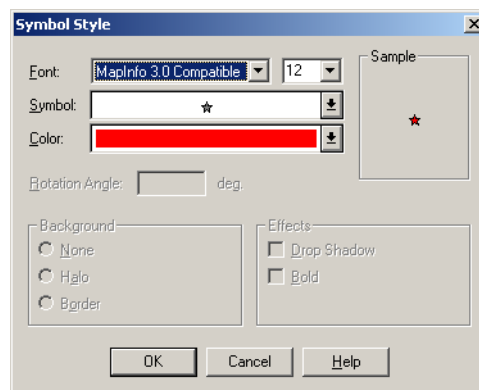
3. To make changes to the **STYLE OVERRIDE** or the **ZOOM LAYERING** options, select the check boxes.

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 156](#).

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 157](#) for more about these options.

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

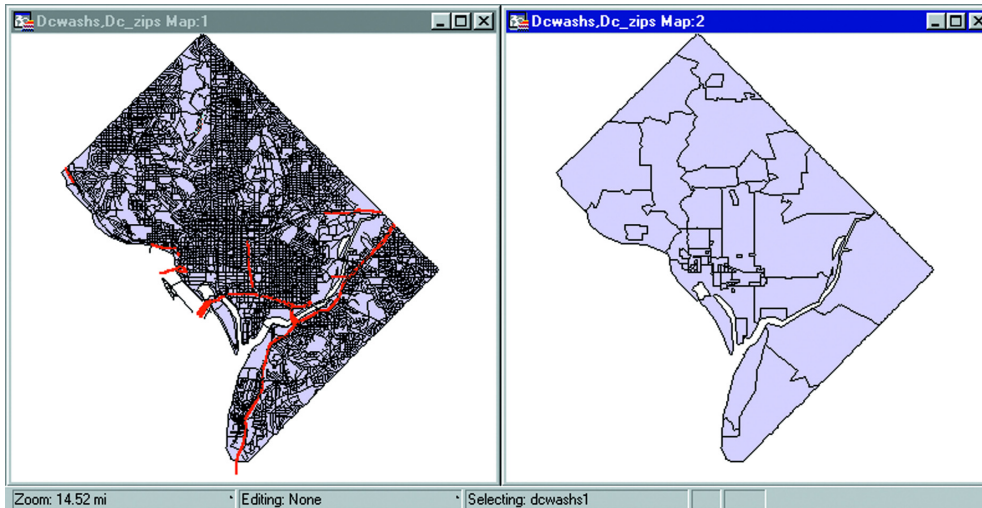


You can make changes to every aspect of the symbol styles in this layer.

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 click **CANCEL**, MapInfo Professional cancels the zoom layering. If you click **OK**, you need to adjust your zoom settings to see this feature again.

## Displaying the Lines, Nodes, and Centroids


The **DISPLAY OPTIONS** dialog box allows you to display line directions, nodes, and object centroids. Select the **SHOW LINE DIRECTION** box when you want to show the direction in which line objects are drawn. Check the **SHOW NODES** box to display the nodes in a layer.

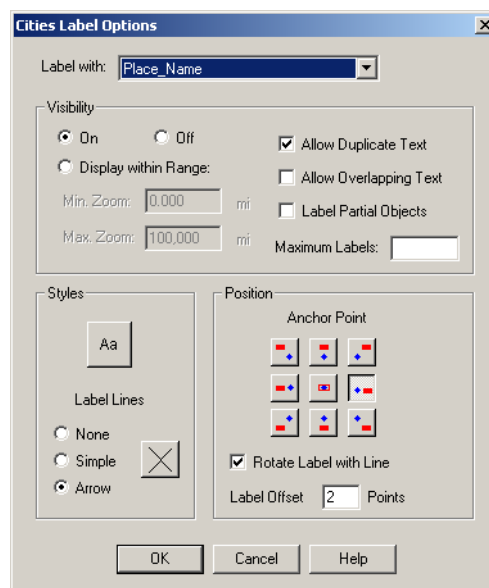
The **SHOW CENTROIDS** box displays the centroids of each object in a layer. In MapInfo Professional, a region's centroid does not represent its center of mass. Instead, the centroid represents the location used for automatic labeling, geocoding, and placement of thematic pie and bar charts. If you edit 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.

To change the label options of a layer:

1. Click  in the Main toolbar to display the **LAYER CONTROL** dialog box.
2. 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 label visibility options in this layer based on zoom criteria, duplication, overlap, and partial labeling of objects. You can even set a label maximum.
  - 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 or reorder the Cosmetic Layer.



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:

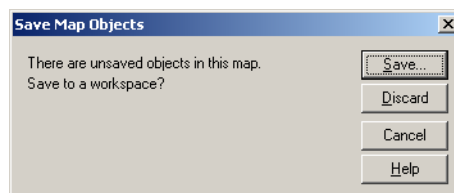
- On the **MAP** menu, click **CLEAR COSMETIC LAYER**.

### 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.

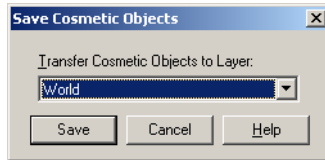


2. Click **SAVE** to display the **SAVE WORKSPACE** dialog box.
3. Type the name of the workspace in the File name field and click **SAVE**.

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.

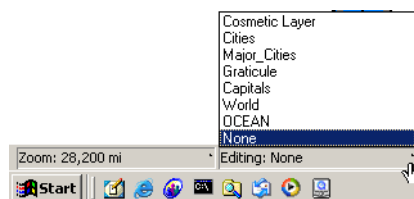
To make a layer editable:

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**.

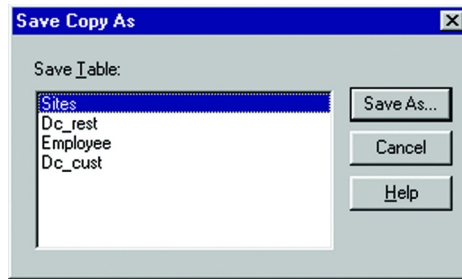
## How to Make a Read-Only Table Editable

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. Open the table you want to make editable.
2. On the **FILE** menu, click **SAVE COPY AS**. In this example, we will save a copy of an Excel file named Sites.






3. Choose a new name for the file.
4. 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** checkbox 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** checkbox 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.

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

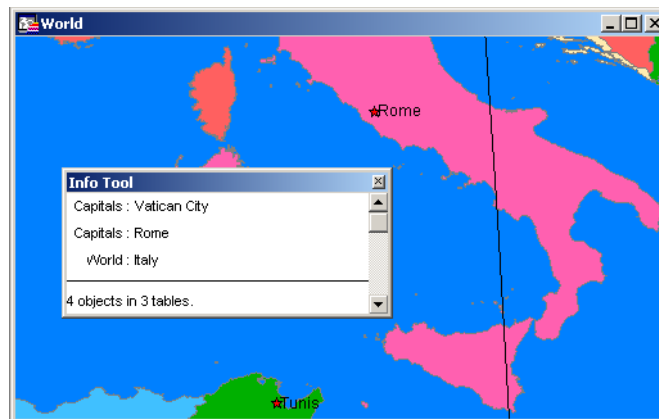
You can use the Info tool to get information pertaining to the map layer.

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 Tool 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 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 358](#).

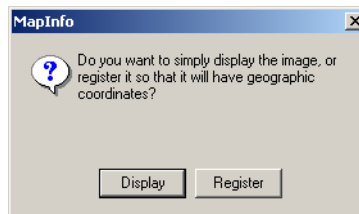
## Working with Raster and Grid Layers in Layer Control

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 765](#) and [Projection on page 764](#) in the Glossary.

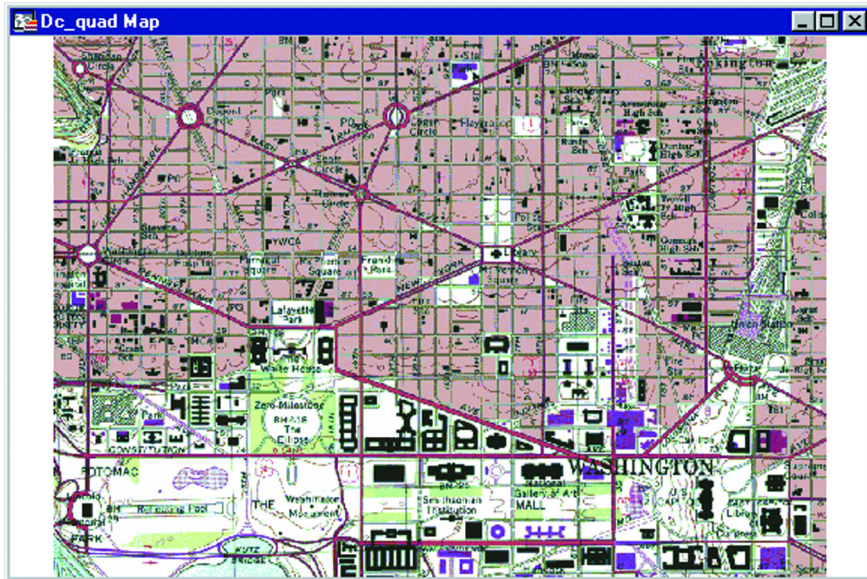
5. Do one of the following:
  - Click **DISPLAY** to simply display the raster image.
  - Click **REGISTER** to set up registration points for the raster image. For details on registering the raster image, see .

## 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** checkbox 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 .

## 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.

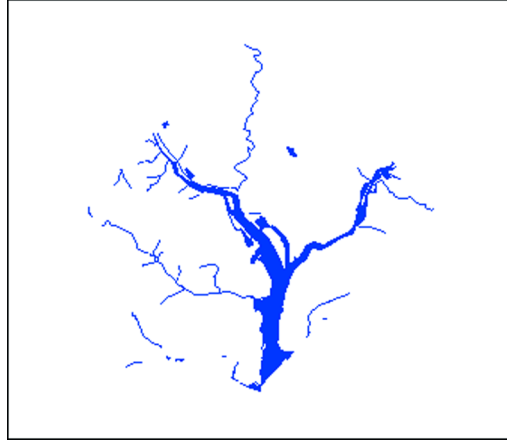
## Opening a Seamless Map Layer

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* in the MapInfo Professional *User Guide (Unabridged)* on the Installation CD.

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](http://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.
- *Browser 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

Open the DCWATER seamless layer and click **LAYER CONTROL** to display the **LAYER CONTROL** dialog box.

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.

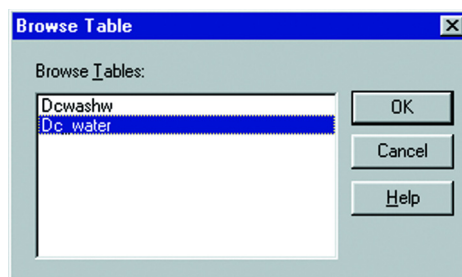
Choose your seamless layer and experiment with order, display and labeling options.

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 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

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.



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## Saving and Exporting Your Work

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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.

## Saving Your Workspace as an XML-Based MWS File

MapInfo Professional enables you to save your workspace to an XML format for use with MapXtreme 2004 applications. When saving a workspace to this MWS format, keep in mind that 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, you can open it with the Workspace Manager utility that is included in the MapXtreme 2004 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 8.0 can be validated using schemas supplied with MapXtreme 2004.

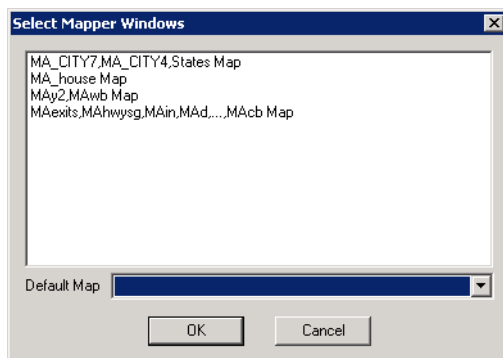
**Note:** You will not be able to read files saved in MWS format in MapInfo Professional 8.0.

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 in MWS Format***

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.

**Note:** In MapInfo Professional 8.0, We added label and thematic expression support for the MWS (XML-based) workspace files in MapInfo Professional. When saving themes and label expressions to a MWS file, we translate the expressions into the MapInfo SQL language supported by MapXtreme 2004.

### ***What is Not Saved in MWS Format***

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
- New for MapInfo Professional 8.0: Themes based on computed columns are not supported.
- Any queries
- Export options
- Line direction arrows
- Whether object nodes are drawn or not
- Hot links for labels and objects

## **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 **CTRL**-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, as when you want to:

- Retain any changes while preserving the original table.
- Save a table with a temporary column (from Update Column).
- Create a new table before you make editing changes to the original table.
- Save spreadsheet files that you wish to modify in MapInfo Professional.
- 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.

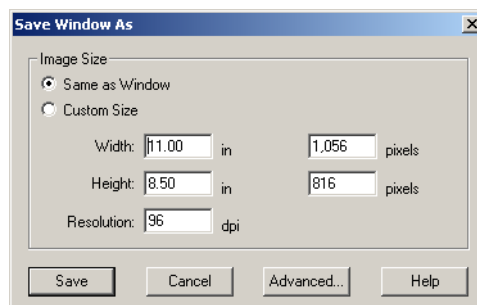
### Supported Export Formats

You can save data in a number of formats in MapInfo Professional. Windows .bmp is the initial default. The **SAVE WINDOW TO FILE** dialog box sets the last-used format as the default. Formats include:

- 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)
- Comma Delimited CSV (\*.CSV)

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 173](#) for these details.



To include a border for your exported file, to select the **EXPORT BORDER** checkbox.

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 .

### Export Border

Select this checkbox to include a black border on images you are exporting. Clear this checkbox to export the image without a border. This checkbox 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 checkbox to use this functionality or clear it to let the printer or Windows export functions to handle this. This checkbox is selected by default.

### Use ROP Method to Display Transparent Raster

Select this checkbox 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 checkbox is cleared by default.

### Export Raster in True Color When Possible

Select this checkbox 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 checkbox if you are not working with a color printer. This checkbox 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 .

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## Using the Tools in the Tool Manager

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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 Manger 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.

**Delete Duplicates** – Use this tool to find and optionally delete duplicate rows from a table or between two tables.

**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.

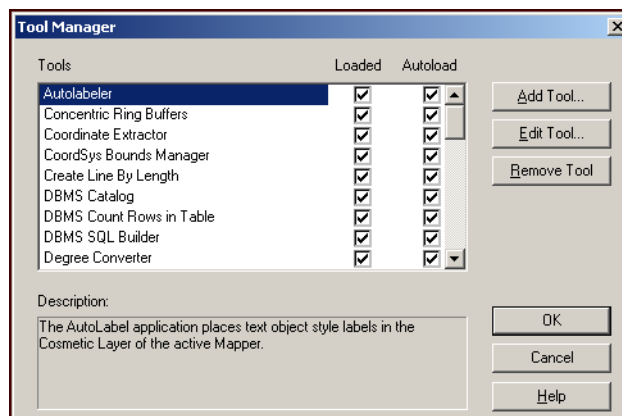
**Workspace Packager** – Use this tool to create a copy of a workspace in a new location or folder, and copies all the data referenced by the workspace to the same location. MapInfo Professional updates the internal references in the workspace and .tab files to point only to the "packaged" copies of 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.

**Workspace Resolver** – Use this tool to complete workspaces that are missing .tab file references. Using this tool, you can either replace the missing file with a file from a new location or you can remove the reference to that file within the workspace. If the file you are replacing in the workspace is invalid or corrupt, you may not be able to open the workspace even if the .tab files are resolved.

## 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 checkbox beside it in the **LOADED** column.

Select the checkbox in the **AUTOLOAD** column to load this tool each time you open the application.

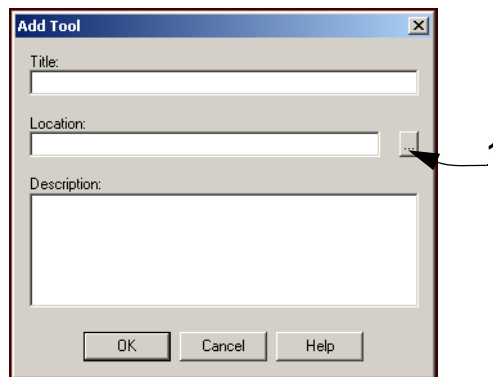
To unload a tool in this list, clear the checkbox beside it.

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.



1 Click here to locate the tool directory.

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**.
4. 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:

1. On the **TOOLS** menu, click **TOOL MANAGER** to display the **TOOL MANAGER** dialog box.
2. Click the tool you want to remove to highlight it.
3. Click the **REMOVE TOOL** button. The **UNREGISTER SELECTED TOOL** dialog box displays.
4. Click **OK** to remove the tool from the list. The **TOOL MANAGER** dialog box displays.
5. 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.

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.

## Using the Tool Manager Tools

The topics in this section cover the use of some of the Tool Manager tools in MapInfo Professional.

### 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.

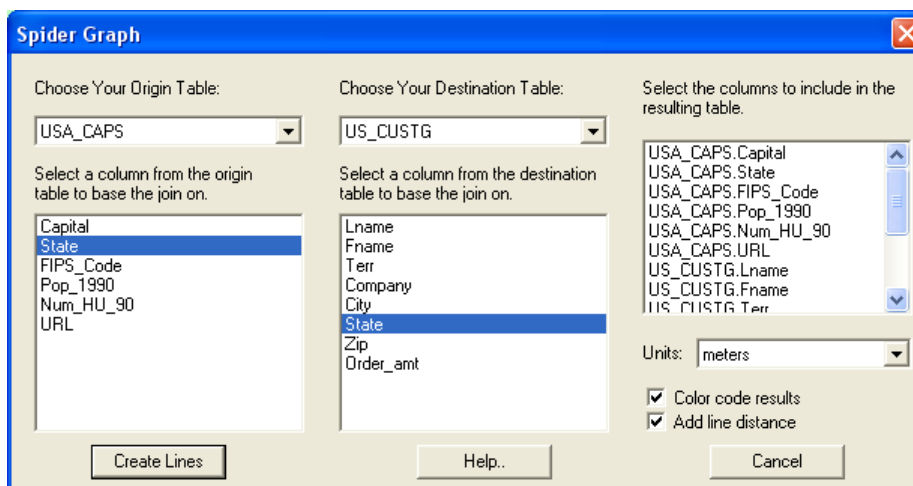
To use the Spider Graph tool:

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.

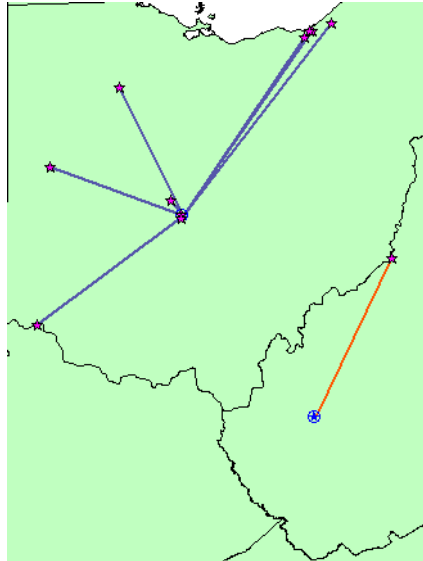
Figure: Spider Graph



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.

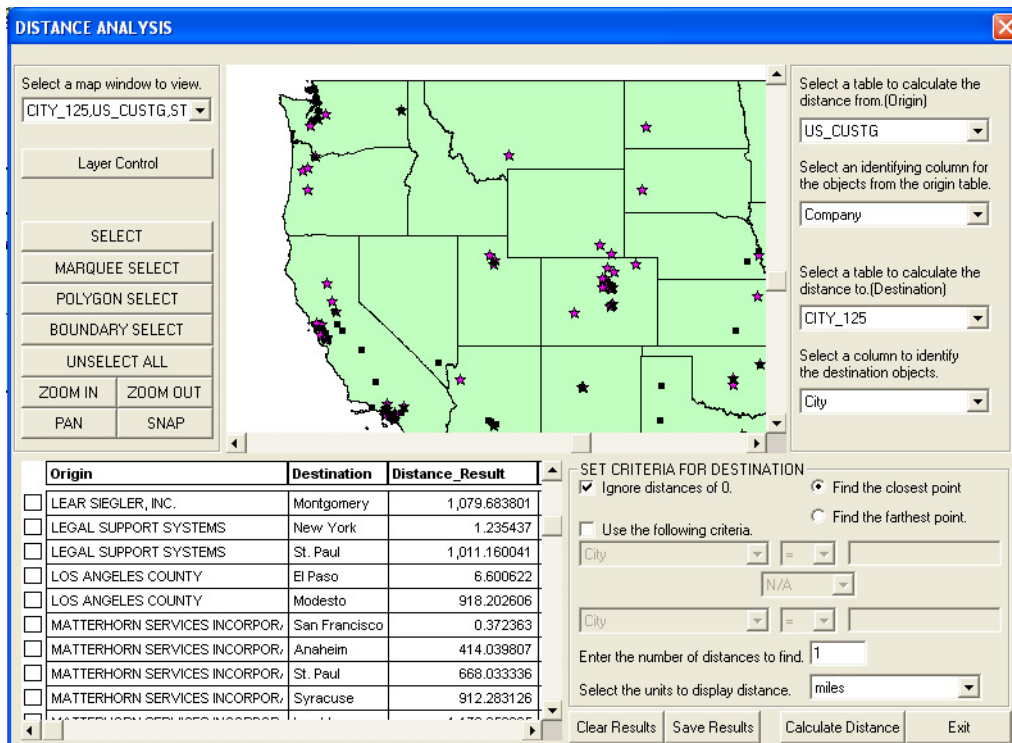
For example, you can calculate the distance between each customer site listed in the US\_CUSTG table and the nearest big city listed in the CITY\_125 table. The accompanying **LAYER CONTROL**, **SELECT**, **ZOOM**, **PAN**, and **SNAP** buttons function just as they do throughout the MapInfo Pro interface.

**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](http://www.mapinfo.com/miprotutorial).

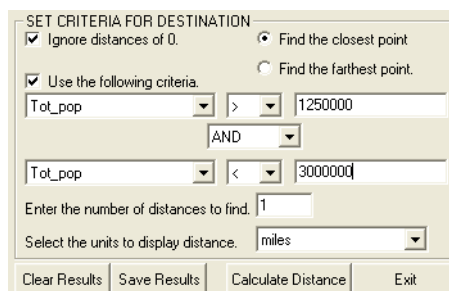
4. When you click **CALCULATE DISTANCE**, the results of the distance query are displayed in the browser window. The results may then be cleared (**CLEAR RESULTS**) saved to a table (**SAVE**

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.



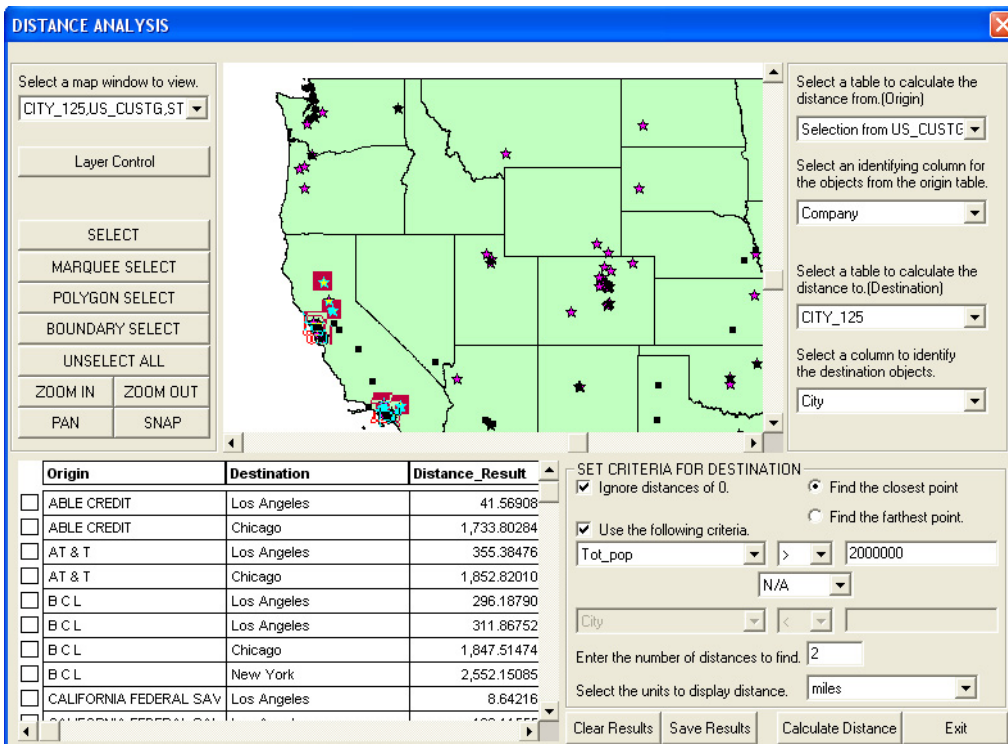
5. Optionally, you can also set destination criteria to limit the results. For example, after checking the **USE THE FOLLOWING CRITERIA** checkbox you could restrict your results according to selected criteria (for example, to cities with populations greater than a specified number).
6. Optionally, you can restrict the number of destination distances to find for each origin point. The default is 1.
7. 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** checkbox 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**.



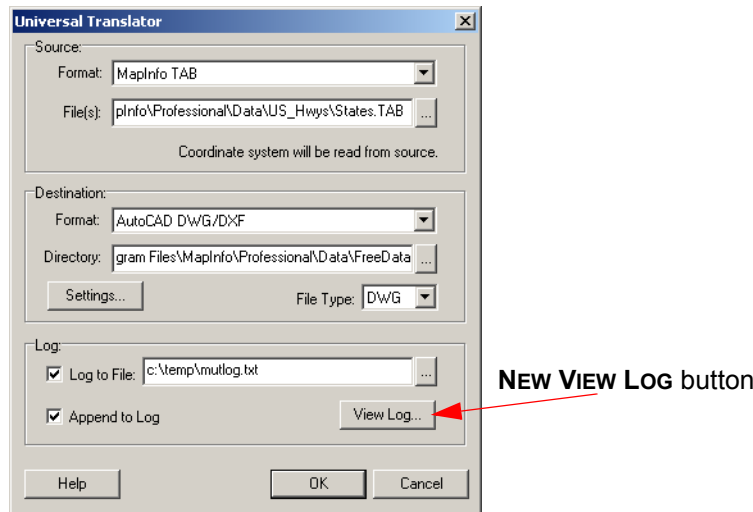
## Using the Log Viewer of the Universal Translator

Universal Translator tool to make it easier to view log files.

To use the new log file viewing features:

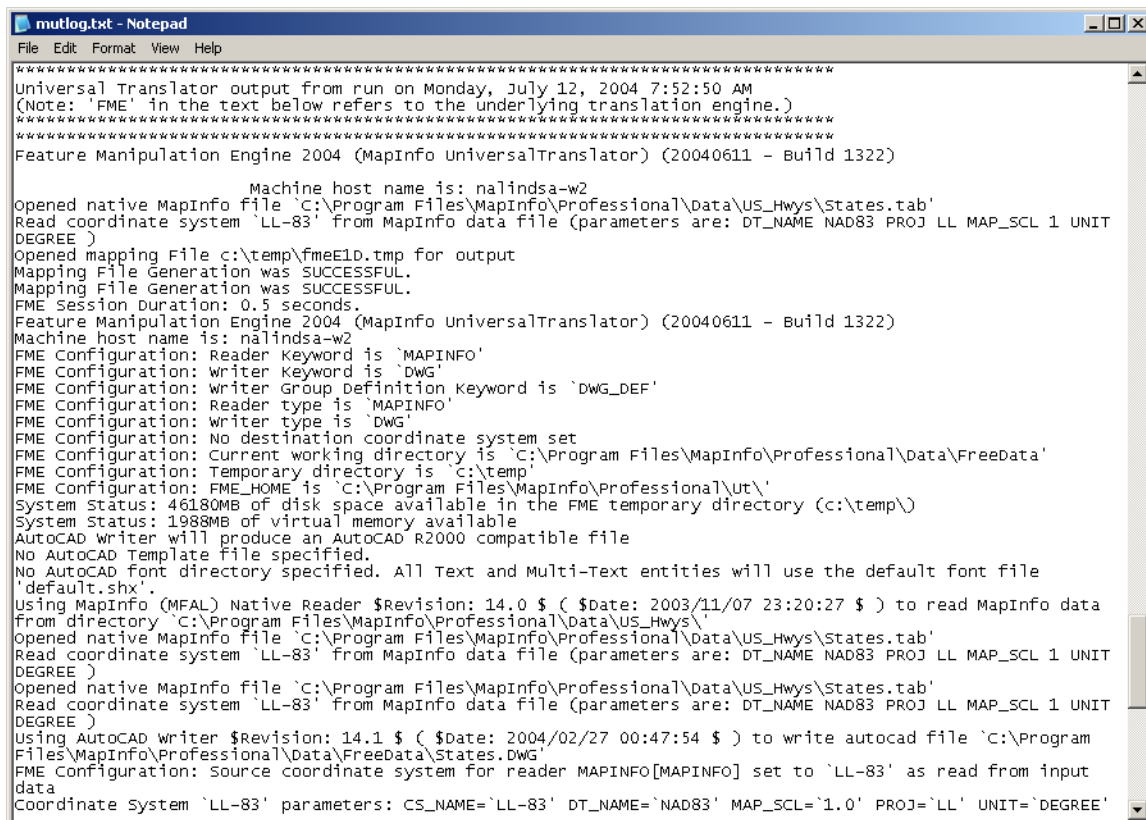
1. On the Main Menu, click **TOOLS**, select **UNIVERSAL TRANSLATOR** and select the **UNIVERSAL TRANSLATOR** submenu. The **UNIVERSAL TRANSLATOR** window displays.

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.text - Notepad



To resolve a translation issue, we have added new algorithms for our KKK datum to the Universal Translator to update the Finnish projection. Additionally the JGD2000 datum has been added to the Universal Translator.



## Using the Synchronize Windows Tool

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 features.

**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.

## Using the COGOLine (Create Line by Length) Tool

The COGOLine tool, also known as the Create Line By Length tool, 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:


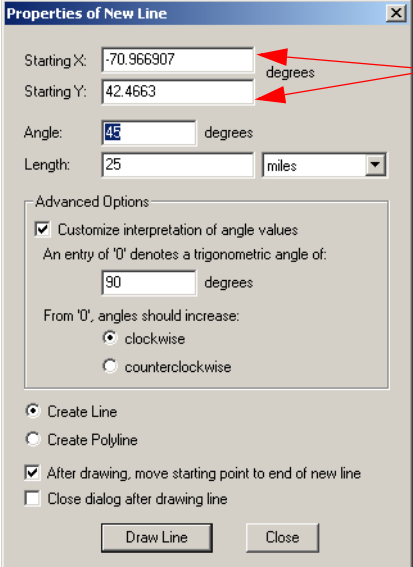
- To run the COGOLine utility, do one of the following:
  - From the Main Menu, click **TOOLS** and select the **CREATE LINE BY LENGTH** entry and click **RUN COGOLINE** to display the **PROPERTIES OF NEW LINE** dialog box.
  - Select the **CREATE LINE BY LENGTH** icon  from the **TOOLS** toolbar, and 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 screenshot shows the 'Properties of New Line' dialog box. It contains the following fields and options:

- Starting X: -70.966907 (with a red arrow pointing to the 'degrees' label next to it, and a '1' next to the arrow)
- Starting Y: 42.4663
- Angle: 45 degrees
- Length: 25 miles
- Advanced Options:
  - Customize interpretation of angle values
  - An entry of '0' denotes a trigonometric angle of: 90 degrees
  - From '0', angles should increase:
    - clockwise
    - counterclockwise
- Create Line
- Create Polyline
- After drawing, move starting point to end of new line
- Close dialog after drawing line
- Buttons: Draw Line, Close

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

- 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.

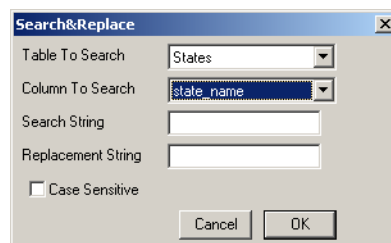
## Using the Search and Replace Tool to Update Multiple Column Entries

The Search and Replace tool facilitates 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 [Adding \(Registering\) a Tool in the Tool Manager on page 177](#).

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** checkbox.
7. Click **OK** to begin the search and replace process.

---

## Third-Party Tools

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The tools in this section are designed to work with MapInfo products but have not been produced by MapInfo personnel.

### GeoTracker Geographic Utility

The GeoTracker Geographic Utility integrates the Geographic Positioning Systems (GPS) with MapInfo Professional. It is a free utility available as a separate download from the Installation CD . As of version 8.0, 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.



# 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?** . . . . . 190
- ◆ **Geocoding - Assigning Coordinates to Records** . . . . . 204
- ◆ **Putting Latitude/Longitude Coordinates on a Map** . . . . . 231
- ◆ **Displaying Your Data on the Map** . . . . . 239

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## How Do I Get My Data on the Map?

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There are three steps to putting your data on a map:

- Creating a MapInfo .tab file of 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 204](#).
- For more about the create points process, see [Putting Latitude/Longitude Coordinates on a Map on page 231](#).

**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

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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)
- Comma Delimited files (.CSV)
- 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.

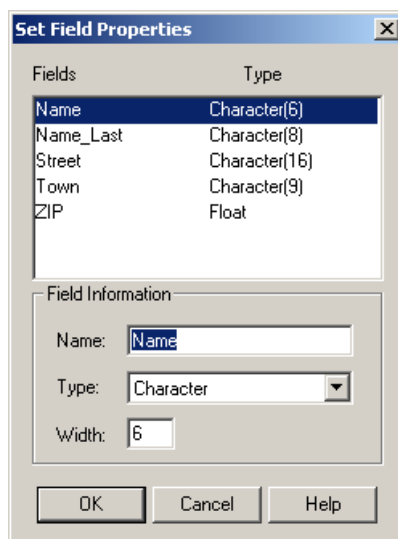
To create a .tab file from your Excel (.XLS) data:

1. In MapInfo Professional on the **FILE** menu, click **OPEN** to display the **OPEN** dialog box.
2. In the **FILES OF TYPE** list select (.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.

The default data range for an Excel file is the entire worksheet.

- If you select the **USE ROW ABOVE SELECTED RANGE FOR COLUMN TITLES** checkbox, the default data range begins at A2 (row 2).
  - If you clear the **USE ROW ABOVE SELECTED RANGE FOR COLUMN TITLES** checkbox, both the **NAMED RANGE** and **CURRENT VALUE** fields revert to their previous values on the Entire Worksheet.
4. Click **OK** to display the **SET FIELD PROPERTIES** dialog box.

This dialog box allows you to reset the name, type and properties of any field (column) that you import from the Excel table. The top 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 **FIELD INFORMATION** box entries at the bottom allow you to specify the field name, data type, number of characters (for character and decimal fields) or number of decimals (for decimal fields only).



**Note:** If you click **CANCEL**, MapInfo Professional cancels the import operation.

5. Click **OK** to convert the 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

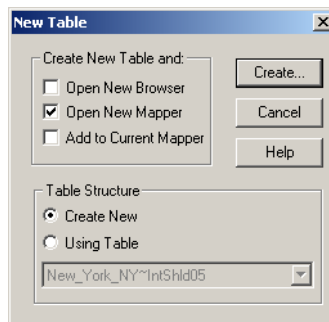
There is a wide range of work you can do with Microsoft Access files in MapInfo Professional. This section covers that work.

### 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.

Figure: New Table

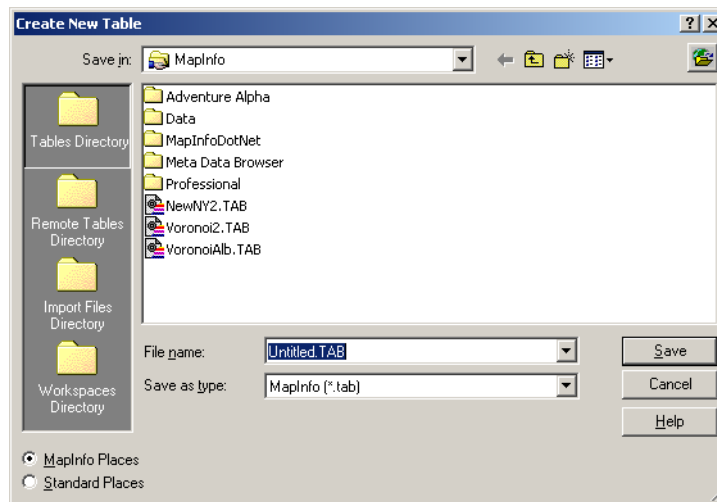


2. Decide how you want to display the new table and select from the following check boxes. You can choose more than one and MapInfo Professional will add the new windows accordingly.
  - **OPEN NEW BROWSER** — Select this checkbox to display the new table as a Browser window.
  - **OPEN NEW MAPPER** — Select this checkbox to display the new table as a Map window.
  - **ADD TO CURRENT MAPPER** — Select this checkbox 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.

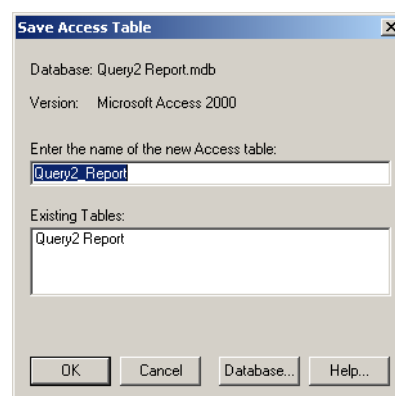
5. Do one of the following:
  - If you are adding an entirely new table, click the **ADD FIELD** button and add the fields you want this table to contain. Continue to add fields until your table is complete.
  - If you are copying an existing table, click the **ADD FIELD** button to add fields, or highlight 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.

Figure: Create New Table



7. In the **SAVE IN** field, specify the path to use to create the MapInfo Professional table definition (.tab file) of your Access file. The MapInfo Professional.tab file keeps 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.

Figure: Save Access Table



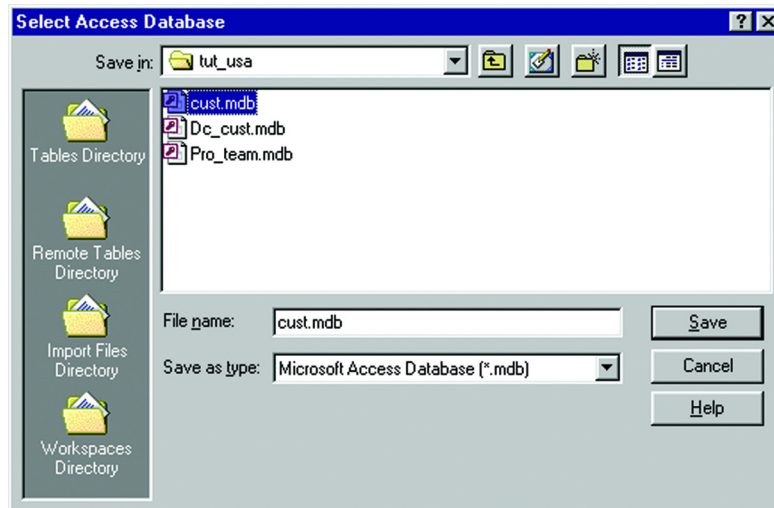
9. To create your table in the default database, use the default file name or enter a new one in the **ENTER THE NAME OF THE NEW ACCESS TABLE** field.

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.

**Figure: Select Access Database**



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 displays 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***

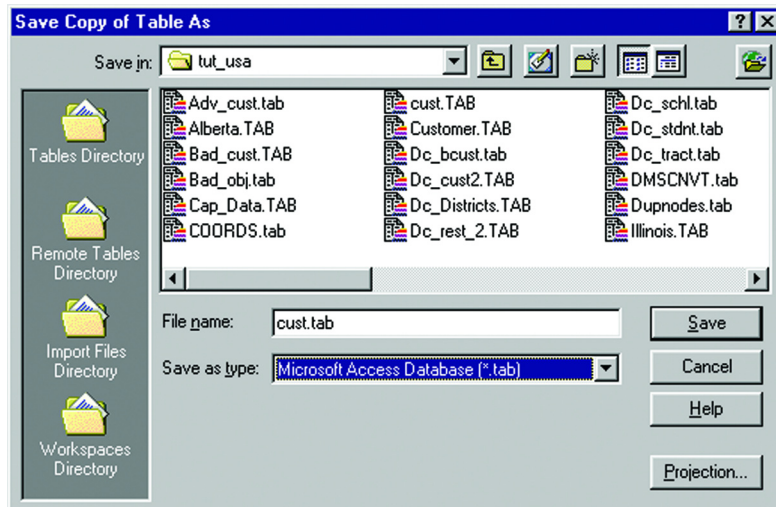
You can save a MapInfo Professional table as an Access table, save an Access table as a MapInfo Professional table, and save an Access table as an Access table using the Save Copy As menu command.

### Saving a MapInfo Professional Table as an Access Table

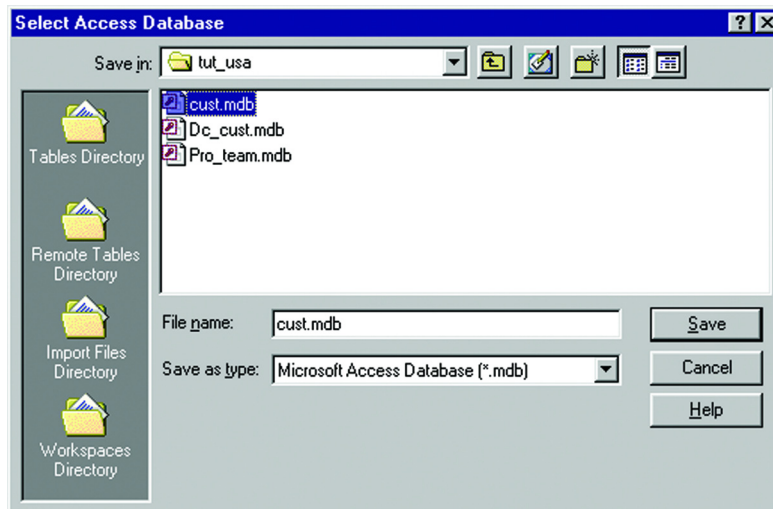
To save a MapInfo Professional table as an Access table, do the following:

1. On the **FILE** menu, click **SAVE COPY AS**. The **SAVE COPY OF TABLE AS** dialog box displays.

Figure: Save Copy of Table As



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, 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** list, specify the location of the Access database.
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 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 an Access table in MapInfo Professional and change a FLOAT type to a DECIMAL, the type changes to FLOAT.
- The MapBasic Pack Table statement saves a copy of the original Microsoft Access table without the columns that MapInfo Professional does not support. If a MS Access table has a MEMO, OLE, or LONG BINARY type column, it is lost during a pack.
- Compact your database. Each time a table is renamed, you use up disk space. 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. A MS Access database may be compacted using the ODBC Administrator or Access itself. To compact an Access database using the ODBC Administrator, see the ODBC Administrator's online help. To compact an Access database using Access, see Access's online help.
- This application can only use and create Access tables compatible with Access '95, '97, 2000, and XP.
- Access recognizes Time in a Date/Time field but MapInfo Professional only recognizes Dates. Therefore, MapInfo Professional translates Time values 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** checkbox. 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 another text editor. 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** checkbox 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.

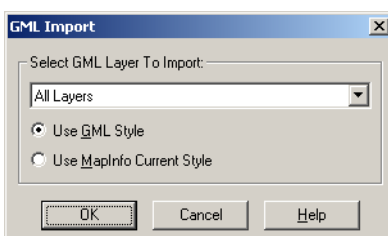
## Importing GML File Data into .tab Files

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. Currently, we maintain support for these features and add support for Cartographic Text and Departed Features.

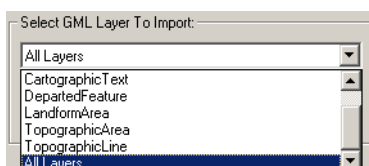
Currently, we support the OSGB recommended styles by mapping the style definitions to existing MapInfo Professional styles. Where it is not possible to render complicated fill patterns, we use the simple dot screen that the OSGB recommended to us. You cannot change the OSGB style mapping to MapInfo styles.

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](#) in the MapInfo Professional *User Guide (Unabridged)* on the Installation CD.

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 198** 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 266**.



## 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.

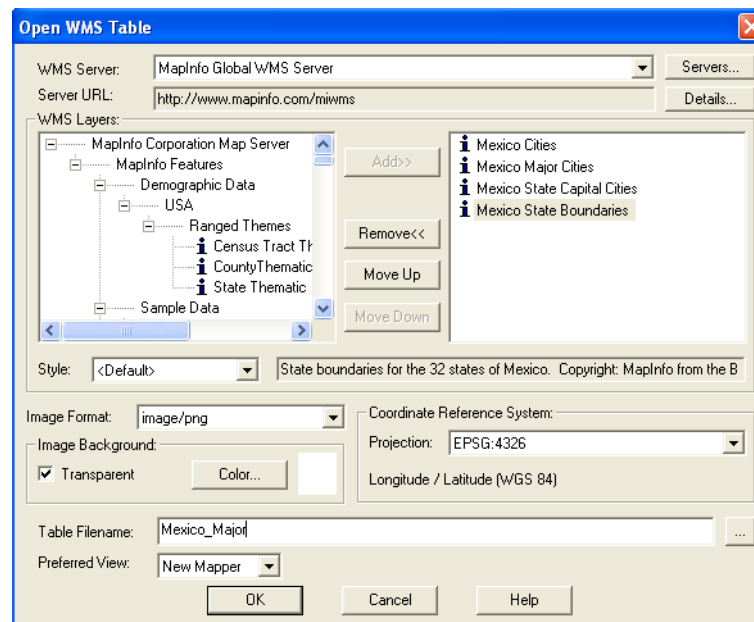
This specification supports transparent pixel definition for image formats as well. This allows you to use the images you retrieve as overlays and not solely as the bottom layer of your map.

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 the layers in the pane on the right determines their display order.*

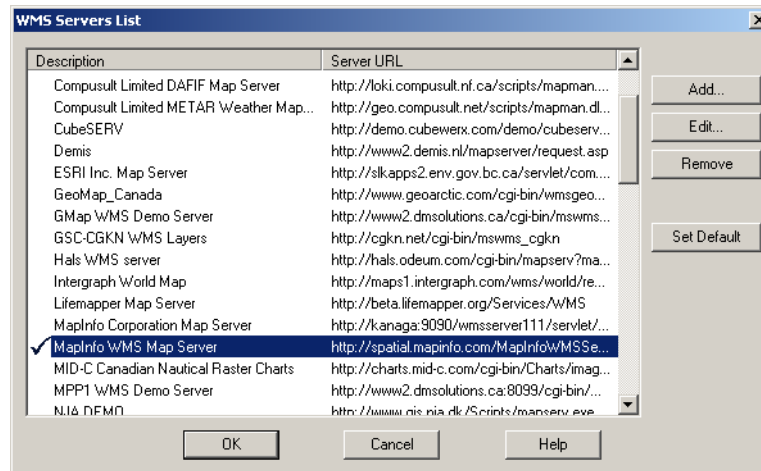
2. Click the **MOVE UP** and the **MOVE DOWN** buttons to arrange the layers appropriately.

**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.

3. To work with the layers from a particular server, select a WMS Server from the **WMS SERVERS** drop-down list.

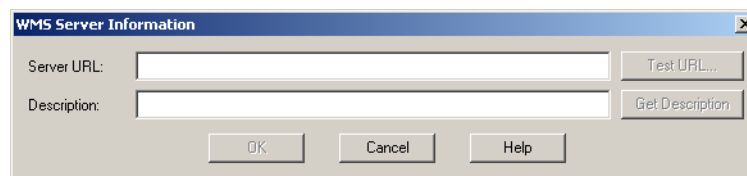
To see the details of a particular WMS Server, including the Server URL, the Server Name, version, and usually a server supplied description, click **DETAILS**.

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.



The check mark indicates the default server.

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.

4. When you have completed your work in the **WMS SERVERS LIST**, click **OK** to return to the **OPEN WMS TABLE** dialog box.
5. 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.

6. 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.

7. 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.


8. 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.
9. To change the background options, specify them in the **IMAGE BACKGROUND** box. To make the background of your layer transparent, click the **TRANSPARENT** checkbox 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.

10. 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.

11. 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
12. 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.
13. 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

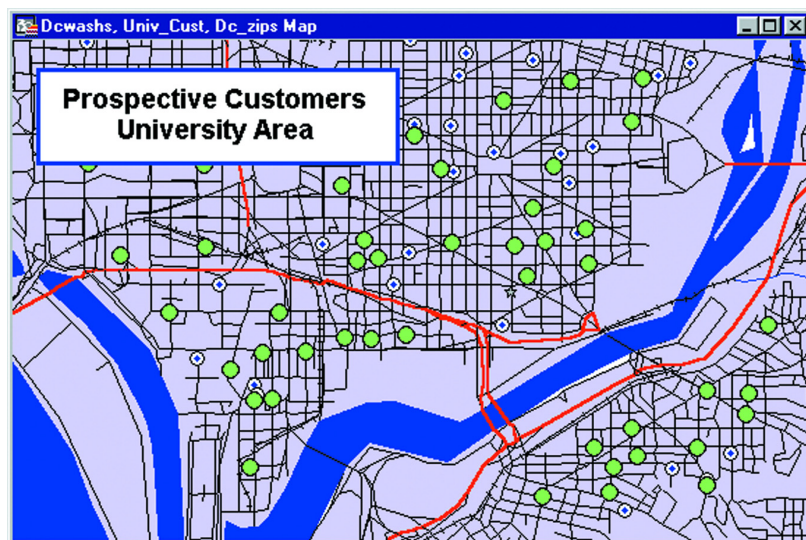
The coordinate system used in the map image is very important. It is what enables various layers to line up properly. Make sure you retrieve WMS Server images that you can use with the other maps you use. Keep in mind that the raster layer always determines the projection of the map. If there is more 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.

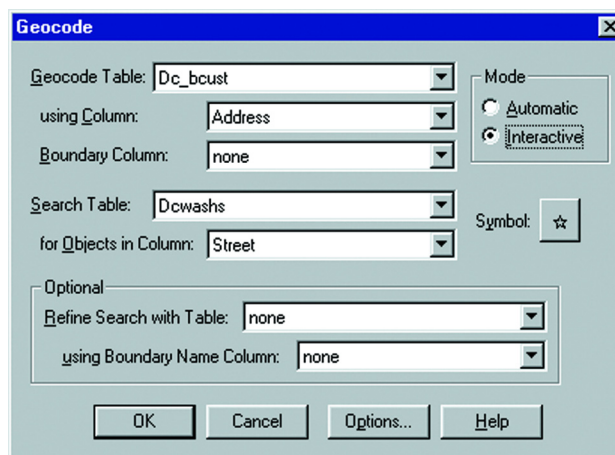
If, however, you are going to use your data to thematically shade postal code boundaries, town boundaries, county boundaries, state boundaries, or country boundaries, you may not need a high degree of accuracy.

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 206](#).

**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 and then geocode in interactive mode to deal with the records MapInfo was unable to handle automatically.

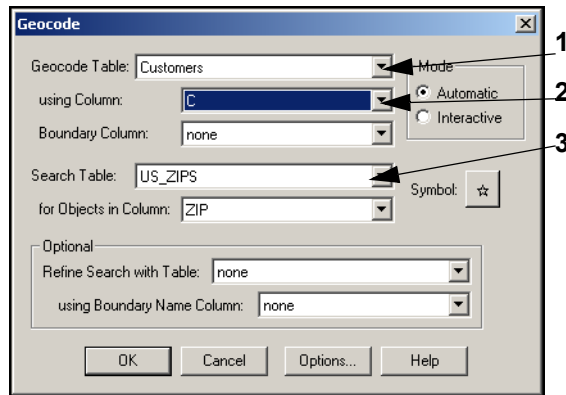
## Geocoding Automatically

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 190](#).

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.



- 1 Select your target table from this list.
  - 2 Identify the column your data is in. (In this example, postal codes are in column C of the Customers table.)
  - 3 Select the source table name in this list. (In this case US\_ZIPS.tab.)
3. Set every other entry to **NONE** and 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.

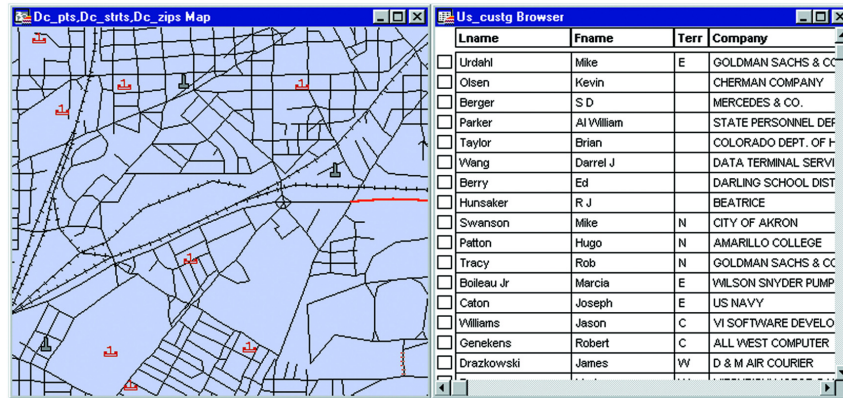
### Geocoding Manually

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 211](#).

## 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 .

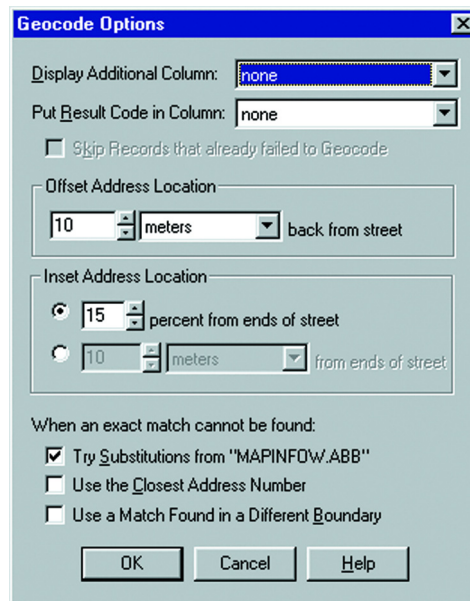
## Placing Geocoded Points

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 an inset can 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. Specify one of the following radio buttons:
  - **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:

- In Automatic mode, it moves to the next row
- In Interactive mode, it presents you with the closest matches and you pick the best match. MapInfo Professional then moves on 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 Professional would scan the address ranges until it finds the one where “343” goes. Since 343 is between 333 and 375, the application locates this address on that street segment (the middle one in the table). Once MapInfo Professional 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:

- In Automatic mode, it moves to the next row
- In Interactive mode, it presents you with the closest matches and you pick the best match. MapInfo Professional then moves on to the next row.

At this point MapInfo Professional has done the best it can at locating address numbers. Note that one of the options (on the **GEOCODE OPTIONS** dialog box) is to automatically pick the closest address range in 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.

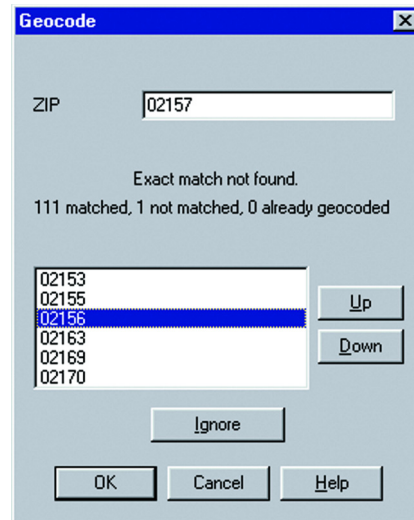
## Matching to Region

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.

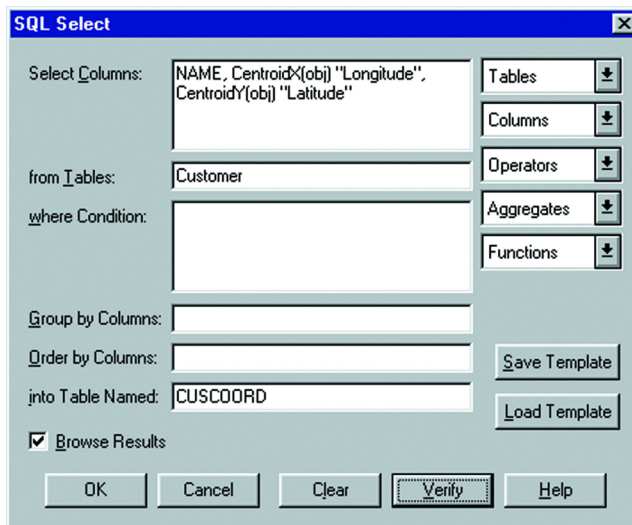
### Extracting Longitude and Latitude from a Geocoded Table

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:

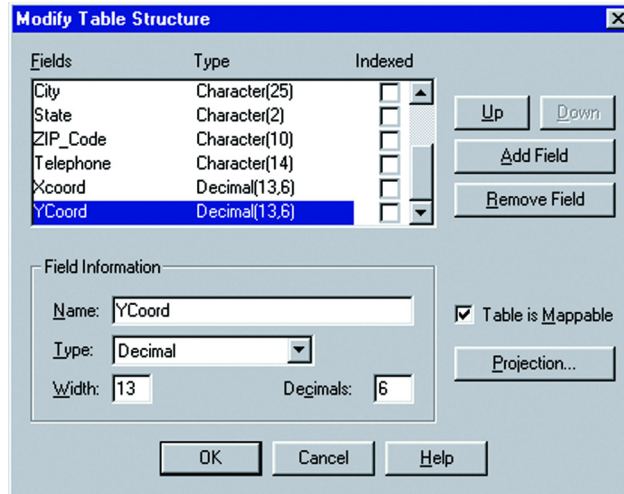
FNAME	LNAME	Longitude	Latitude
<input type="checkbox"/> Mike	Urdahl	-76.8521	39.172
<input type="checkbox"/> Kevin	Olsen	-96.7904	32.8651
<input type="checkbox"/> S D	Berger	-118.396	33.8652

### Extracting Latitude and Longitude into the Original Table

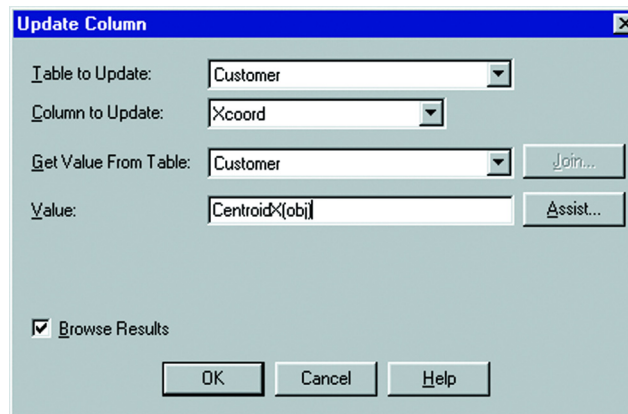
The following process will let you update your original table with the latitude and longitude coordinates.

1. On the **TABLE** menu, point to **MAINTENANCE** and click **TABLE STRUCTURE**.
2. 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.





3. 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**.
4. 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**.
5. Fill in the **UPDATE COLUMN** dialog box and click **OK**.



6. 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 176](#).

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** checkbox 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

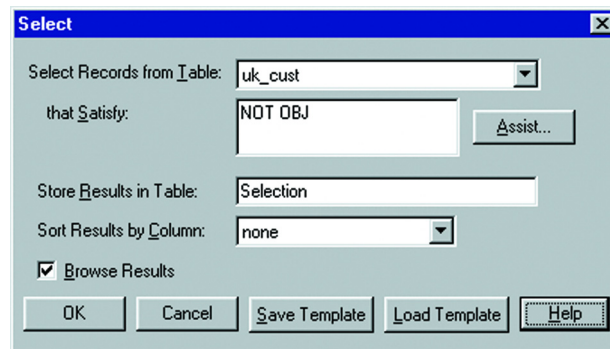
It is recommended that you use float type columns for the coordinates. Other column types may not be able to fit all the coordinate information in the column. If you select character columns, the coordinate values will include six digits after the decimal place.

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 219](#).
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** checkbox 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** checkbox. 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.

### Abbreviations File 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
!EOLNSPACE

'
;
#
!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.

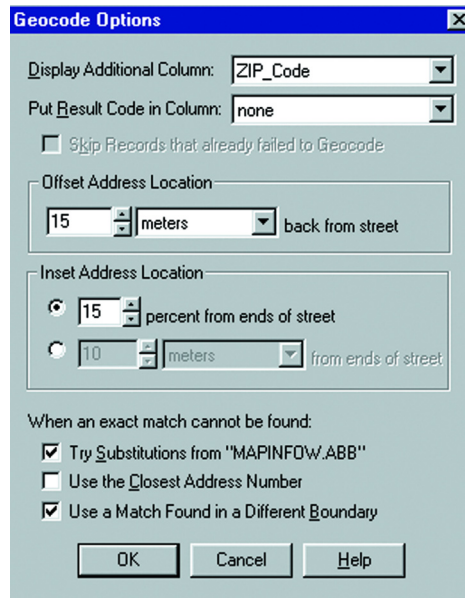
To refine a search, select the column in your table that contains boundary information (TOWN, CITY, POSTALCODE). Next, select a MapInfo Professional table that also contains that boundary information you need. If you purchased your county street map from MapInfo Professional, two of the files included 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 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 Professional encounters a comma or a number sign in an address it will ignore it and everything after it.

```
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'
```

To strip out the hyphen and the apostrophe. Make the following entries in 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.

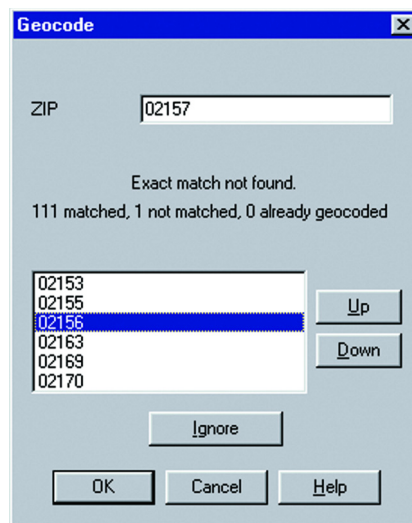
The abbreviation file is a simple ASCII file — MAPINFOW.ABB. You can edit it in any text editor or word processor. Open the file and make your additions, adding keywords as necessary.

## 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.

	<b>Refining-Boundary Codes</b>
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.

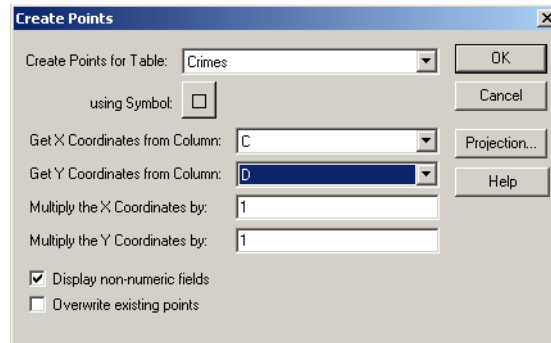
**Note:** MapInfo Professional uses the coordinate fields in your table to create point objects. Records that already have graphic objects associated with them will be skipped during the Create Points operation.

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:

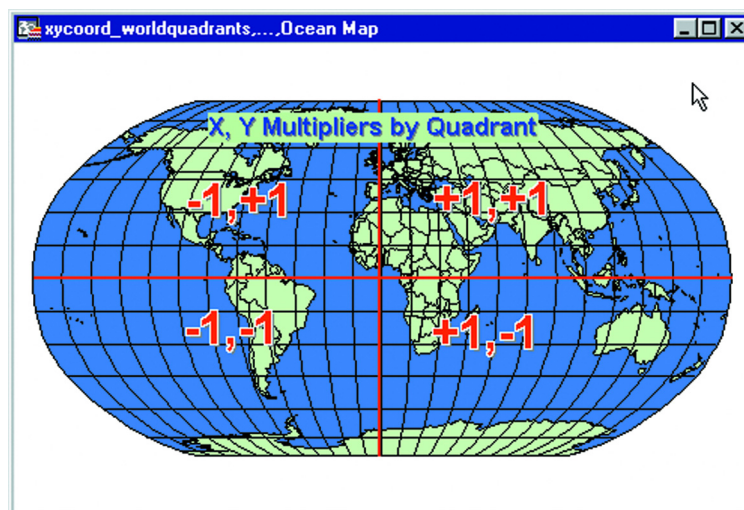
1. Open the table for which you want to create points.
2. On the **TABLE** menu, click **CREATE POINTS**. The **CREATE POINTS** dialog box displays.





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 checkbox if the data you want to create points for is in text fields in the original table. MapInfo Professional can attempt to convert the text values to numbers. If the values are not numbers, MapInfo Professional cannot create an object for that record. This checkbox is automatically selected and disabled when the table you have selected does not contain two numeric fields.
  - **OVERWRITE EXISTING POINTS** — Select this checkbox 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 extra steps to the create points process when your data is 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 for conversion information. If it is a different coordinate system, it must be in numeric columns.

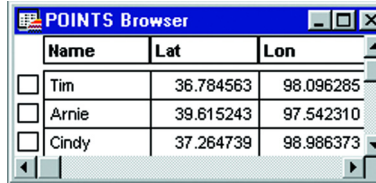
If you are using the latest version of this application, MapInfo Professional can use your numeric data even if it is in a non-numeric column. However, if you are using a version of MapInfo Professional earlier than 7.5, you still need to change the table structure of your original file to ensure that 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, for example, 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, for example, 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

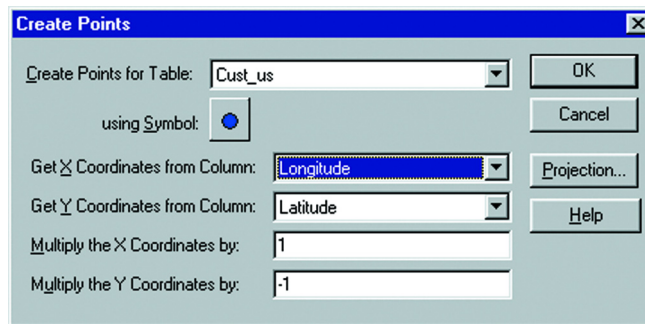
If your point information is in longitude/latitude, do the following:

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.



Create Points for Table: Cust\_us

using Symbol:

Get X Coordinates from Column: Longitude

Get Y Coordinates from Column: Latitude

Multiply the X Coordinates by: 1

Multiply the Y Coordinates by: -1

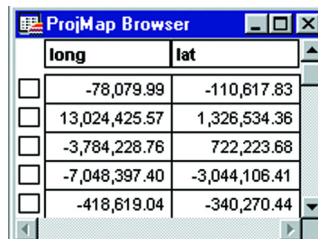
Buttons: OK, Cancel, Projection..., Help

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

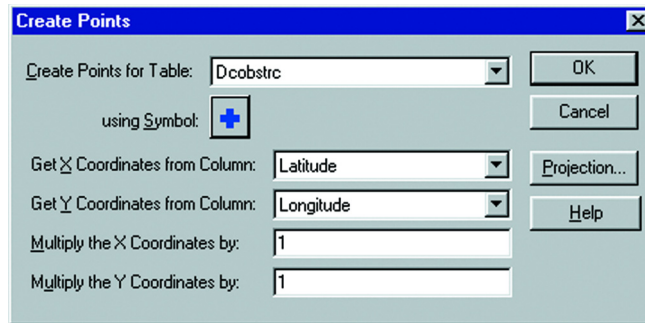
To create points using a projection, do the following:

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.



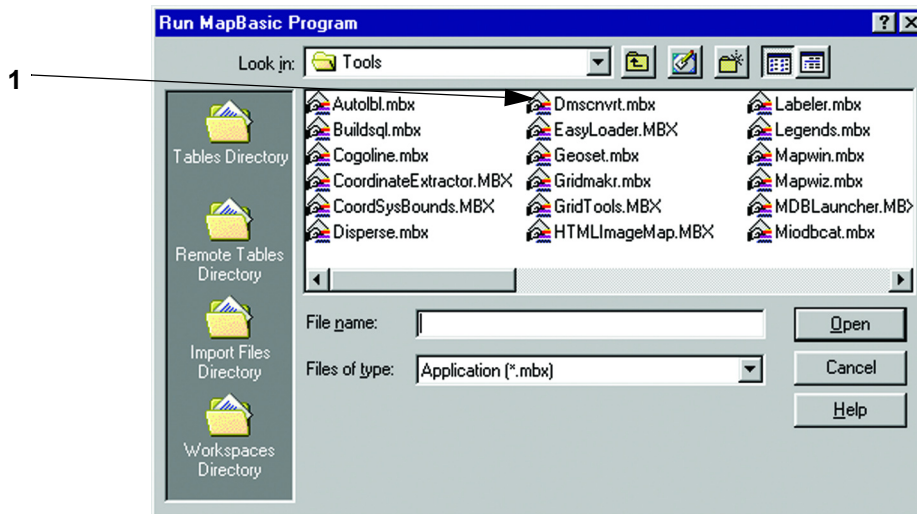
3. Click the **PROJECTION** button and choose the projection category and member.
4. Click **OK**.

### 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 176](#).

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.

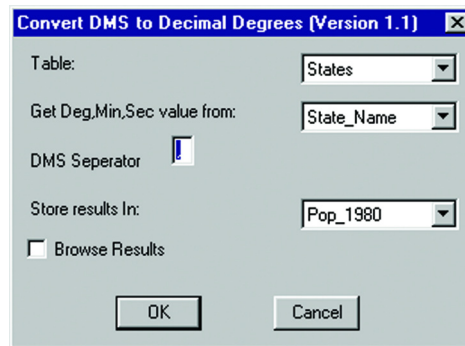


1 Degree Converter Tool.

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 176](#)

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**. Methods include:
  - **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** and 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.

6. On the **FILE** menu, click **SAVE COPY AS** and save the resulting table.
7. Open the newest table and ungeocode it.
8. On the **TABLE** menu, point to **MAINTENANCE** and click **TABLE STRUCTURE**. Clear the **TABLE IS MAPPABLE** box.
9. Geocode the unmapped table to one of the copies of the street file. You may have duplicate points at the same location if a street intersects another of the same name more than once.

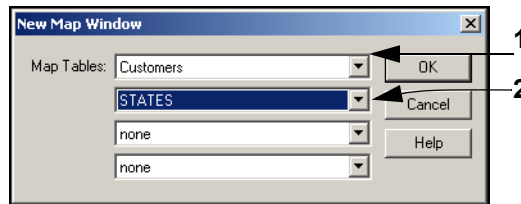
You can review directions for extracting longitude and latitude from a geocoded table [Extracting Latitude and Longitude into a New Table on page 215](#). For more about querying and selecting data, see [Selecting and Querying Data in Chapter 8 on page 319](#).

## 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 in your map. The order in which you select these tables determines the order they display.



1 Select your data from this drop-down list.

2 Select the background map here.

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 355](#) or see [Drawing and Editing Objects in Chapter 7 on page 293](#) for more about customizing your map.

## Printing Your Results

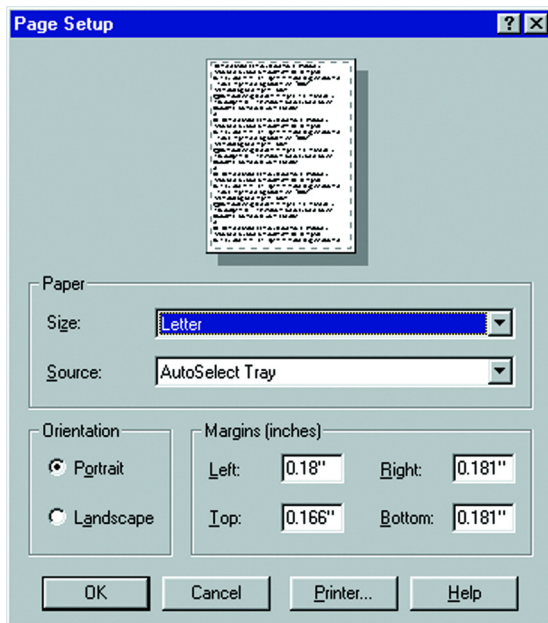
Once you have created the perfect map or graph, you can easily print the individual windows. For presentation, use the Layout menu to bring together all views of your mapping session. Here, you can combine different types of windows to create an attractive and more informative presentation. On the **WINDOW 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 469](#), 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.

Figure: Page Setup



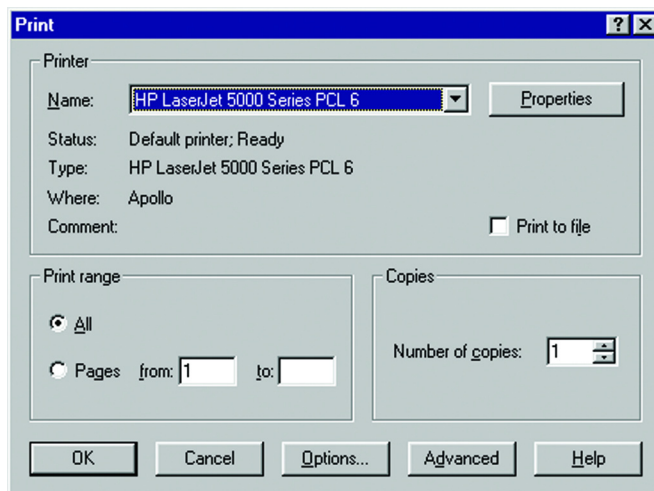
## Printing Your Map

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.

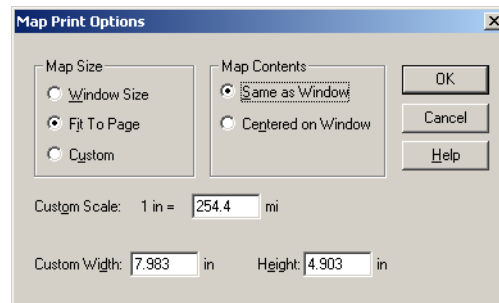
Figure: Print



- 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 241](#) for more information.

**Figure: Map Print Options**



**Note:** The Map Window Preference setting **USE CARTOGRAPHIC SCALE** affects the entries in this dialog box.

- 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 241](#). 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.
- 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 ). When you have completed your selections, click **OK** to continue.
- After you complete your selections, click **OK** on the **PRINT** dialog box to print your results.

## Graph/Browser/3DMap Printing Options

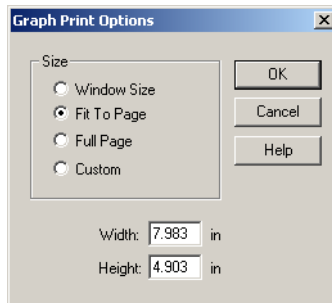
In this section we review the options you have in printing your graphs, your browsers, and your 3DMaps. These options that display in the **PRINT** dialog box depend upon the type of window or map you are trying to print. Not all options display, whenever you are in the **PRINT** dialog box.

## 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.



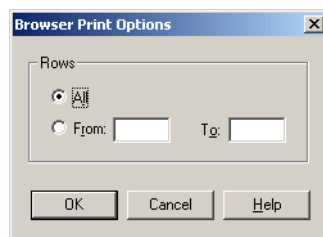
2. Select from these options and click **OK** to save them.
  - **MAP SIZE** — Click the size of the graph you have produced; the options are Window Size, Fit to Page, Full Page, and Custom. As you make selections, the Custom Width and Height entries change.
  - **FIT TO PAGE** — Click this button to 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:

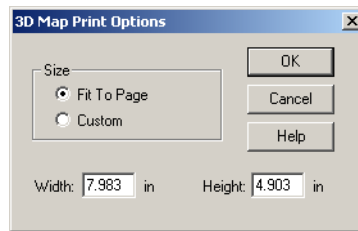
1. In the **PRINT** dialog box, click the **OPTIONS** button. The **BROWSER PRINT OPTIONS** dialog box displays.



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.



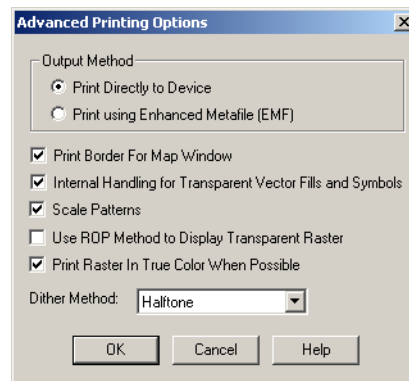
3. Select from these options and click **OK** to save them.
  - **FIT TO PAGE** — Click this button to fit the current 3D map to the page size you have selected in your preferences or in your **PRINT** dialog box.
  - **CUSTOM** — Click this button and enter your own custom width, and height entries 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 checkbox to print a black border around the image you are printing. Clear this checkbox to print the image without a border. This checkbox 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 checkbox to use this functionality or clear it to let the printer or plotter to manage this type of work. This checkbox is selected by default.
- **USE ROP METHOD TO DISPLAY TRANSPARENT RASTER** — Select this checkbox 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 checkbox 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 the MapInfo Professional *User Guide (Unabridged)* on the Installation CD.
- **PRINT RASTER IN TRUE COLOR WHEN POSSIBLE** — Select this checkbox 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 checkbox 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 113](#) 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 113](#) 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. 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 the MapInfo Professional User Guide (Unabridged) on the Installation CD* 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.

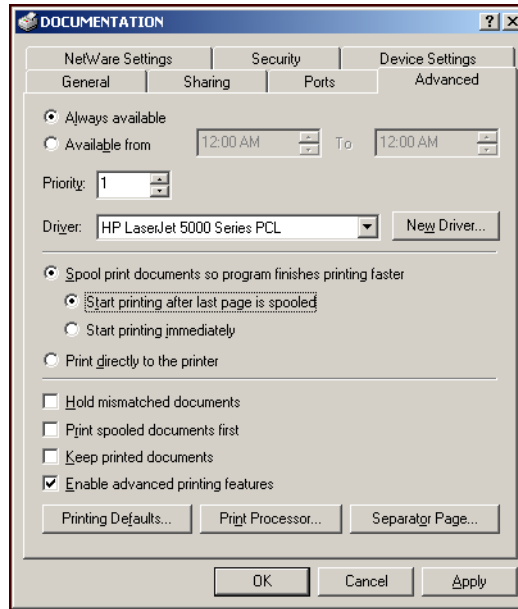
### **Make Room for the Metafile**

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.



4. 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 to make this change.

5. 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** ..... 250
- ◆ **Creating a Report of your Data** ..... 263

## Working with MapInfo Tables

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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 258](#).

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 190](#) 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.

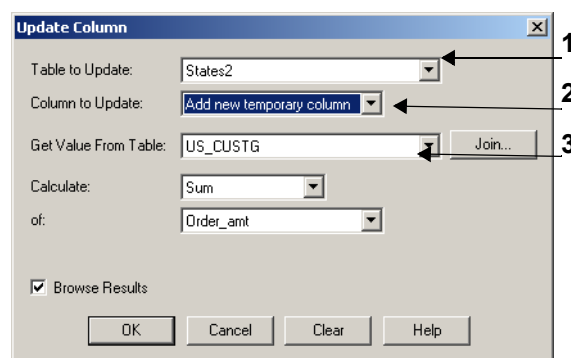
You have tremendous flexibility with how information is imported and what information is transferred. You can perform aggregate functions to transfer averages, minima, maxima, sums, weighted averages, and proportional sums. You can also create expressions to derive additional information from the data.

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:



- 1 Select this table to update from this list.
- 2 Select this column to update from this list or select **ADD NEW TEMPORARY COLUMN**.
- 3 Select the table that contains the update values in this list.

**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](http://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 340](#).)

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**.

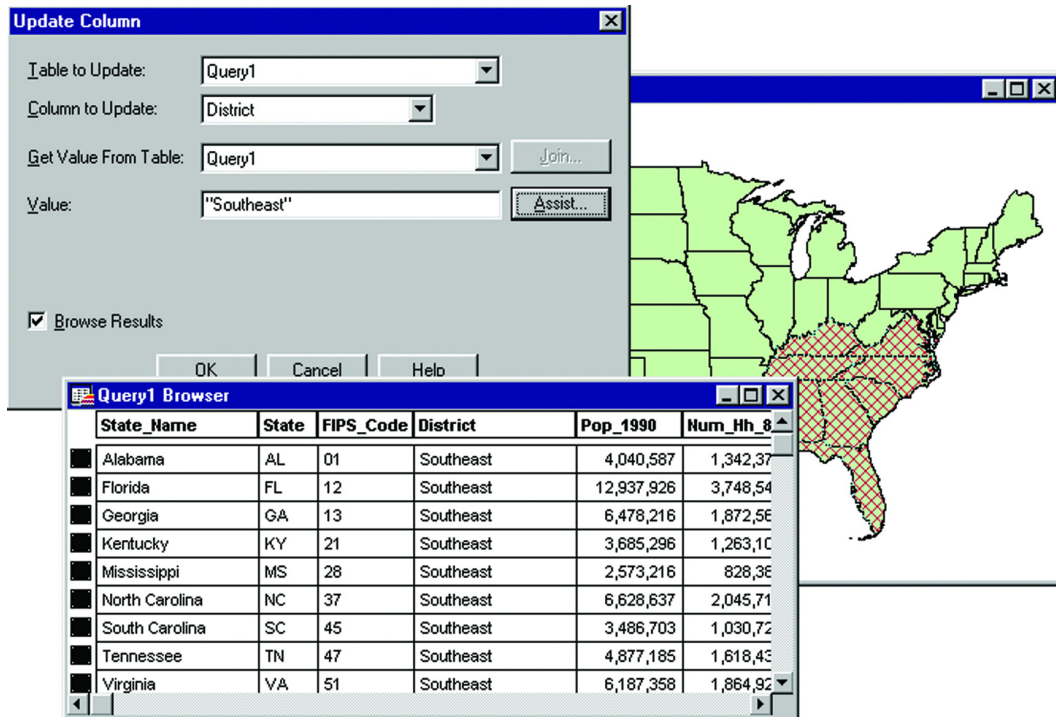
You can also save the information if the table is part of a workspace that you save. If the information is saved with **SAVE COPY AS**, the values will remain the same. If saved in a workspace, MapInfo Professional recomputes the column whenever you open the workspace. Also, the **UPDATE COLUMN** dialog 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 171](#).

## 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. Redisplay 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 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**.

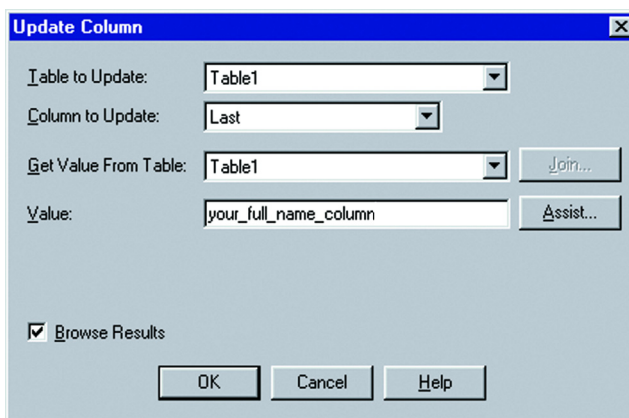
If the corresponding columns do not have the same data type, a best fit is done to convert the data to the appropriate type. If the order of the columns is not the same between the two tables, use the Table Structure command to reorder the columns before using **APPEND ROWS TO TABLE**.

**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 174](#) for more about the Coordsys Bounds tool.

## Parsing Data from One Column to Multiple Columns

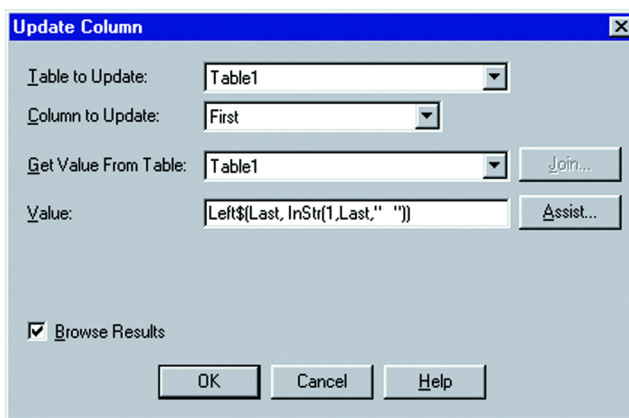
If you have imported data into MapInfo Professional from another format, there is always the chance that the data will not come in exactly the way you want it. In some instances, items that should appear in separate columns may be put together in one column. The following is a series of column updates 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 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.

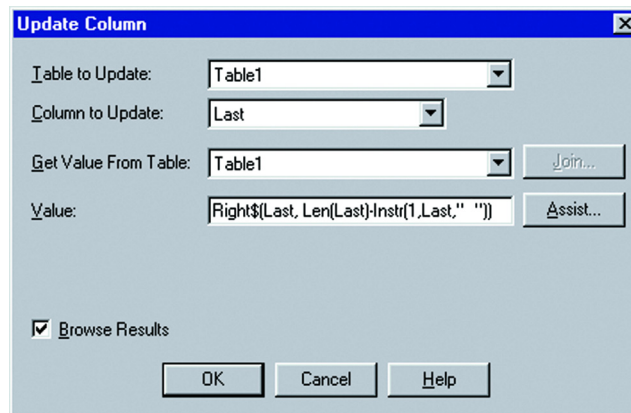
4. To parse the first name out of the full name column, choose the **TABLE** menu and click **UPDATE COLUMN**. Fill in the **UPDATE COLUMN** dialog box.



The Column to Update is: **FIRST**

The Value is: `left$(LAST, instr(1, LAST, " "))`

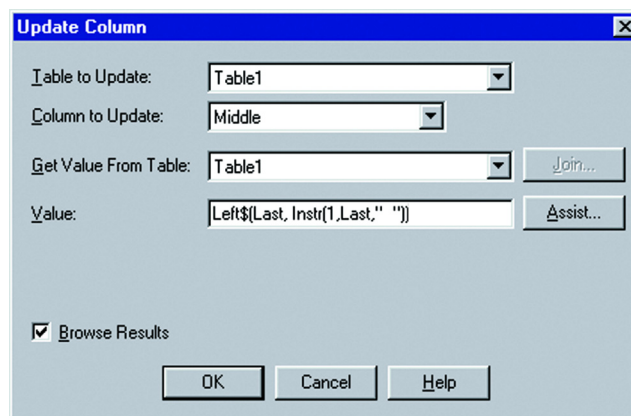
- To parse the last name out of the full name column, on the **TABLE** menu, click **UPDATE COLUMN**. Fill in the **UPDATE COLUMN** dialog box.



The Column to update is: LAST

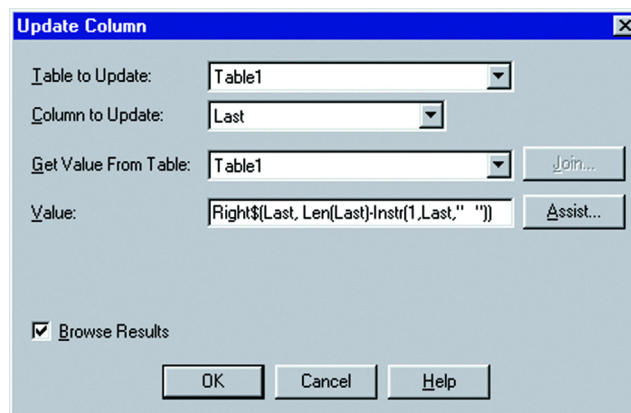
The Value is: `Right$(LAST, Len(LAST) - Instr(1, LAST, " "))`.

- 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 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.



The Value is: `Right$(LAST, Len(LAST) - Instr(1, LAST, " "))`

- Click **OK** to update the column.

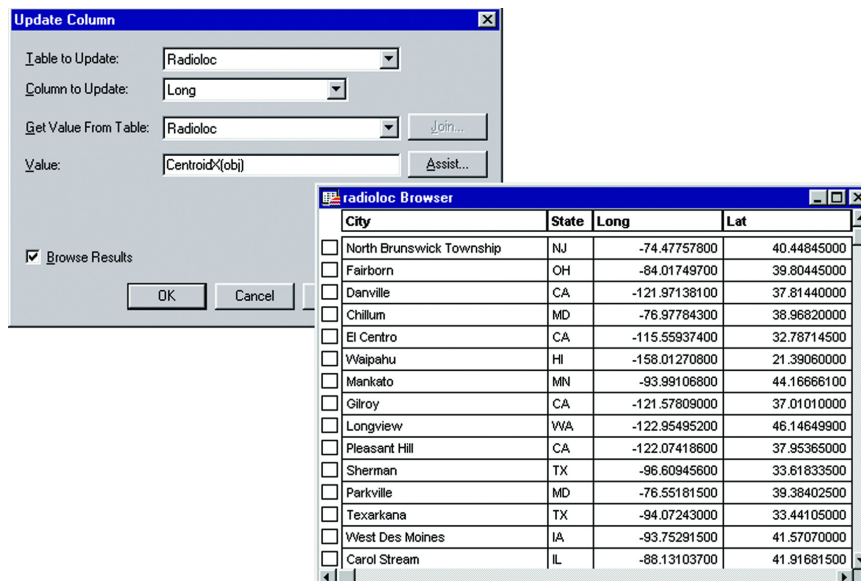


## Placing Graphic Information in Visible Columns

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. 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 **UPDATE COLUMN** 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, 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 is removed from any open window. The table is still open 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** list choose **CENTROIDX** to return the expression CentroidX(obj).
7. Click **OK** to return to the **UPDATE COLUMN** dialog box. The expression is now 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 latitude coordinates using the CentroidY(obj) expression.
10. On the **FILE** menu, click **SAVE TABLE** to 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 an editable MapInfo table.

To add a new row:

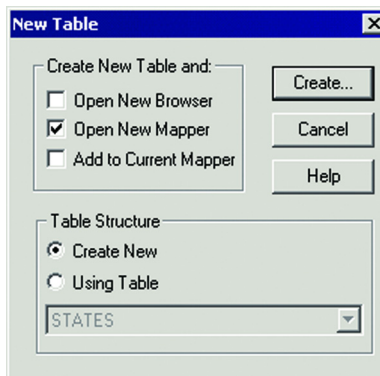
1. On the **WINDOW** menu, click **NEW BROWSER** window.
2. Choose an editable table from the drop-down list.
3. Click **OK** to display the table in a Browser window.
4. On the **EDIT** menu, click **NEW ROW** to add a new row to the bottom of the table.
5. Type the new data into each appropriate column 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

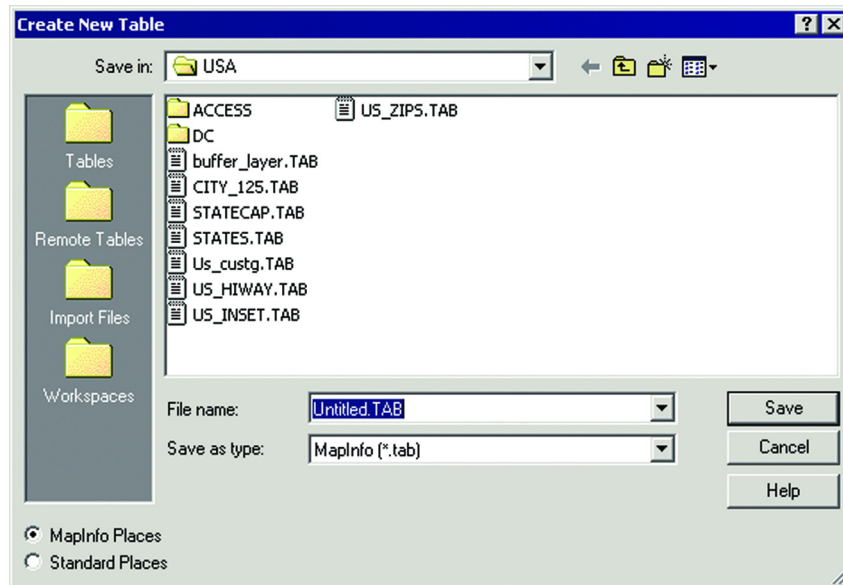
You can bring in data tables from several outside sources: dBASE, Excel, Access, Lotus 1–2–3, shapefiles, Grid, comma delimited, and delimited ASCII. You can also create your own database directly in MapInfo Professional. These databases can be opened and displayed as maps (providing they contain graphic 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 in one of these 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. 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.

## 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.

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 only deletes 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 and 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
<b>Average</b>	Calculates the average of the values for all records in a group.
<b>Count</b>	Counts the number of records in a group.
<b>Minimum</b>	Finds the lowest value for all records in a group.
<b>Maximum</b>	Finds the highest value for all records in a group.
<b>Sum</b>	Calculates the sum of the values for all records in a group.
<b>Weighted Average</b>	Gives more weight to one value over another when averaging.
<b>Proportion Sum</b>	A sum calculation that is adjusted based on how much of one object is within another object.
<b>Proportion Average</b>	An average calculation that is adjusted based on how much of one object is within another object.
<b>Proportion Weighted Average</b>	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 250](#).

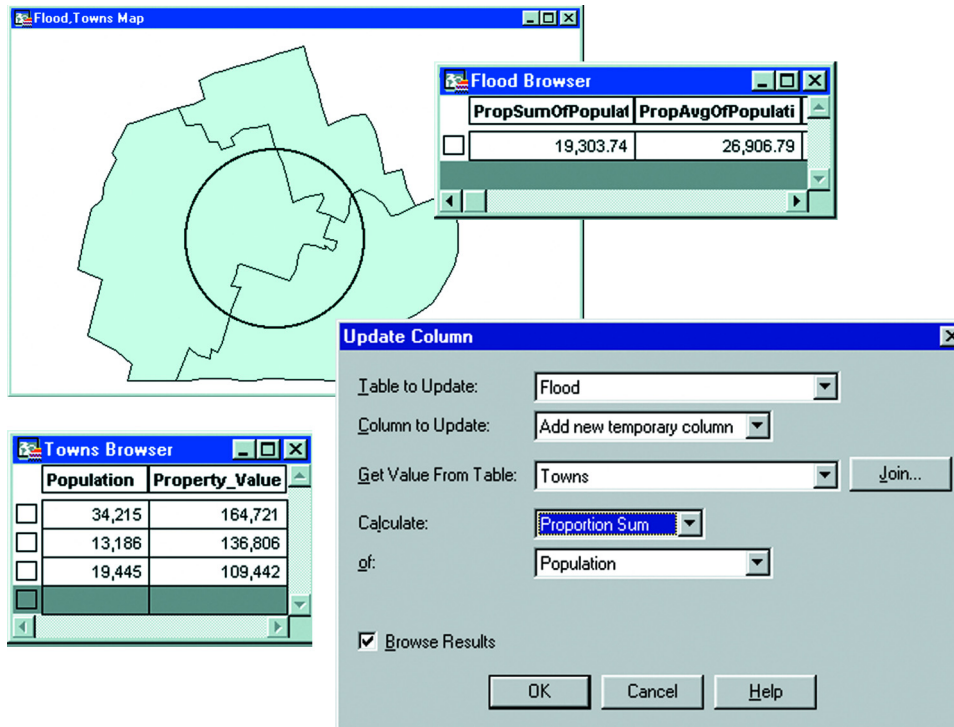
### Example Using Proportion Sum and Proportion Average

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.).



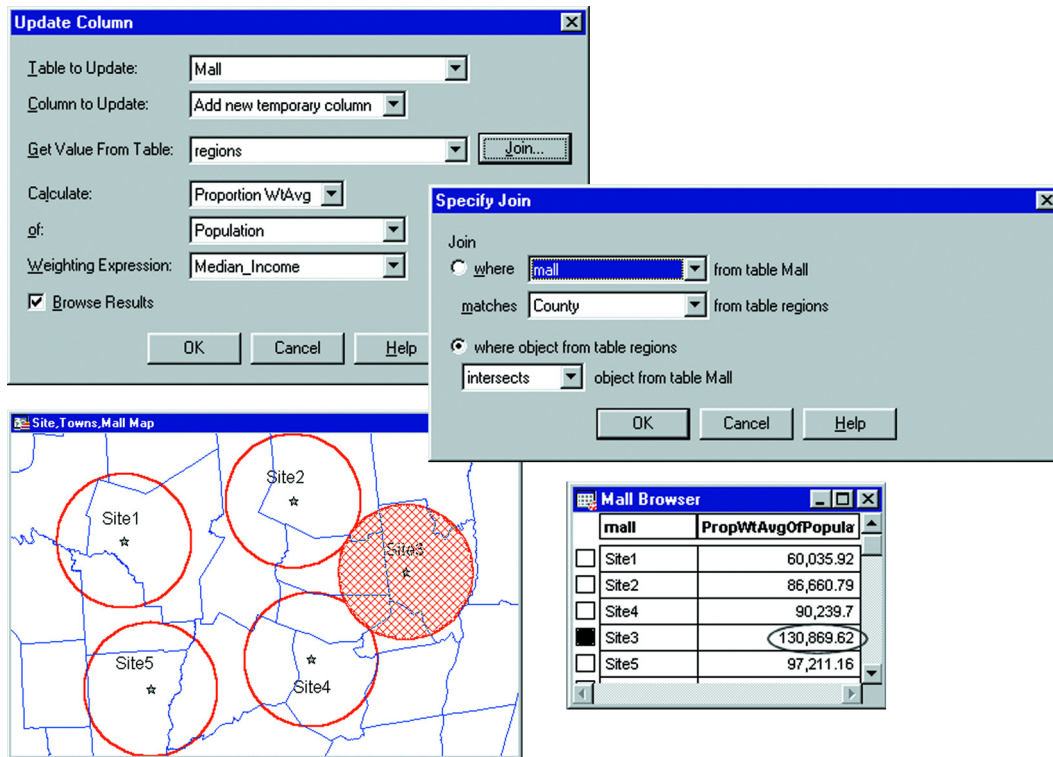
### Example Using Proportion Weighted Average

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.



### 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).

The screenshot shows the 'Mexico Browser' window with the following data table:

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 Chapter 8 on page 337**, or **Creating Expressions in Chapter 8 on page 328**.

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 . . . . . 266
- ◆ Working with Remote Spatial Databases . . . . . 266
- ◆ Accessing Remote Databases using ODBC . . . . . 277
- ◆ Opening a DBMS Table . . . . . 279
- ◆ Working with DBMS Tables . . . . . 290

## Working with Remote Tables and Databases

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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 101](#) 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.

## Working with Remote Spatial Databases

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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 267](#) 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 270](#) 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 270](#) 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 on page 272](#) 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 272](#) 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:

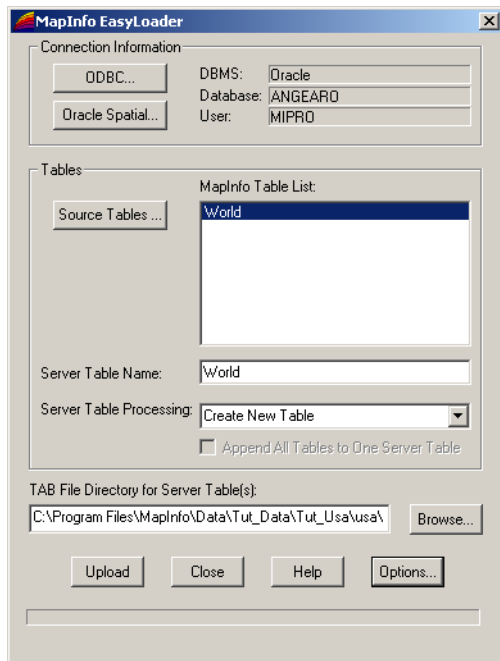
- XY tables (Oracle, Informix, Access, SQL Server)
- MICCODE tables (Oracle, Informix, Access, SQL Server)

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** checkbox. Select the **AUTOLOAD** checkbox 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.

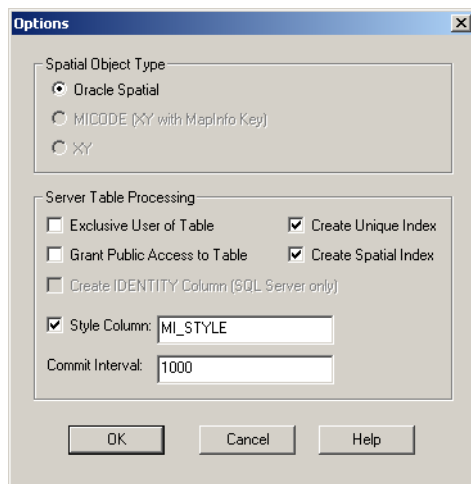
When you open the tool, the **MAPINFO PROFESSIONAL EASYLOADER** dialog box displays. The user interface enables you to connect to a server (using ODBC) or Oracle Spatial server and select the tables that you want to upload.



When you connect to a server using ODBC, select a data source (see **Creating New Data Sources (ODBC) on page 277**). 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** checkbox, 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 checkbox 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, select the **LOADED** checkbox 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** checkbox next to the tool.
2. 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.

<b>Spatial Index Type</b>	<b>Type Number</b>
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

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:

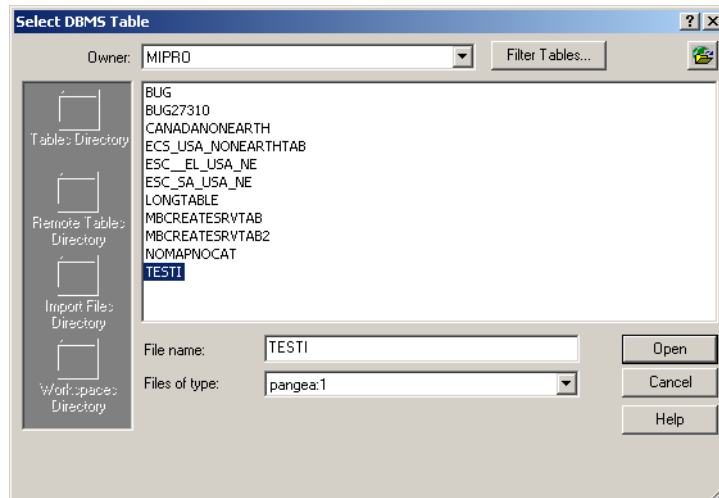
- The column(s) containing the spatial data to map the table (not applicable to relational Oracle SDO)
- The projection used by the remote database table
- The spatial index column from the remote database table (used by MapInfo Professional to speed access of the spatial data and improve performance)
- 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.

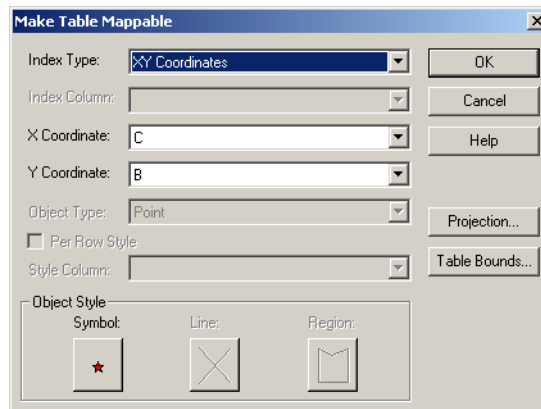
## Making a DBMS Table Mappable

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.

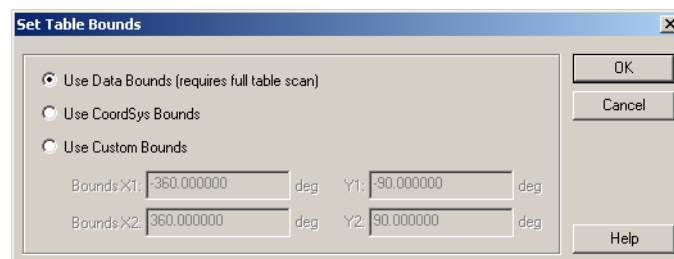


2. Open the appropriate remote connection if you have not done so already. The **OPEN TABLE** dialog box displays.
3. Select the table from the list and click **OK**. The **MAKE TABLE MAPPABLE** dialog box displays.



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)

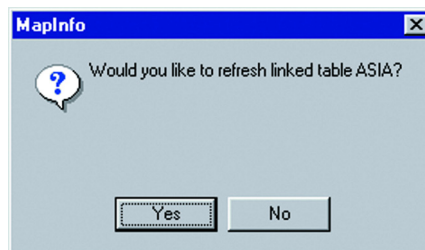
To make a DBMS table mappable for geocoding purposes:

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** checkbox 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

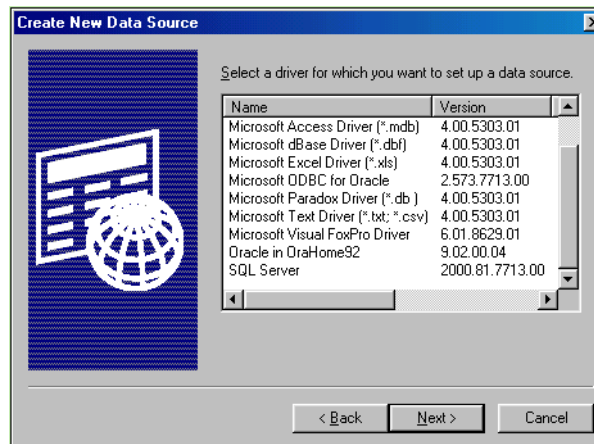
Open Database Connectivity is a standard for accessing disparate database systems. It is the oil that moves the wheels of inter-database communication. MapInfo is committed to making this important interface work for your organization.

### 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. You configure the data source by associating a DBMS driver with it. This association 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 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: *Mldrv17.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 101** directions.

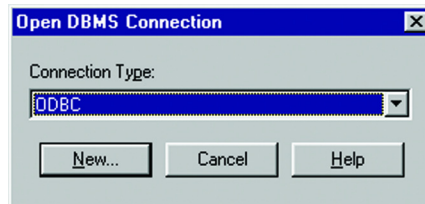
Use the **NEW CONNECTION** button from the **OPEN** dialog box or click the **OPEN DBMS TABLE** button from the DBMS toolbar to make a connection to a database. A series of dialog boxes assist you in opening a DBMS table.

The dialog box sequence that displays depends on what DBMS support components you have installed:

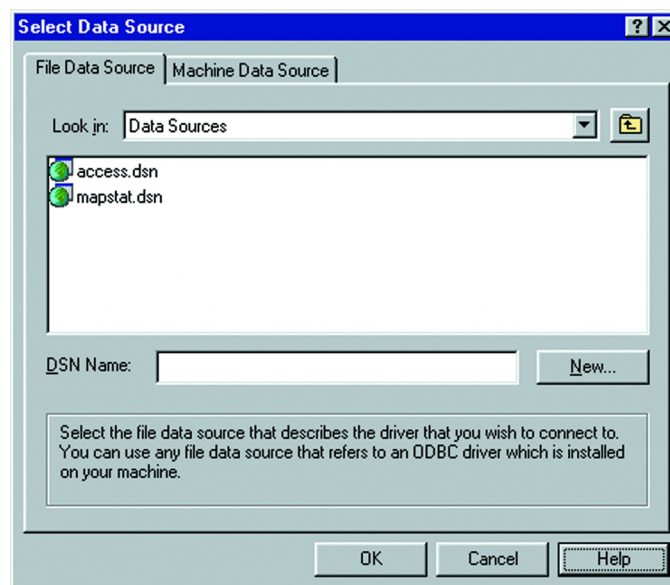
- Choose a Connection Type from the Connection Type list.
- Open a connection to the DBMS source.
- Select the table to open.
- Specify table options such as Column filter, Row filter, etc.



The **OPEN DBMS CONNECTION** dialog box displays and prompts you to select a table from the connected data source:



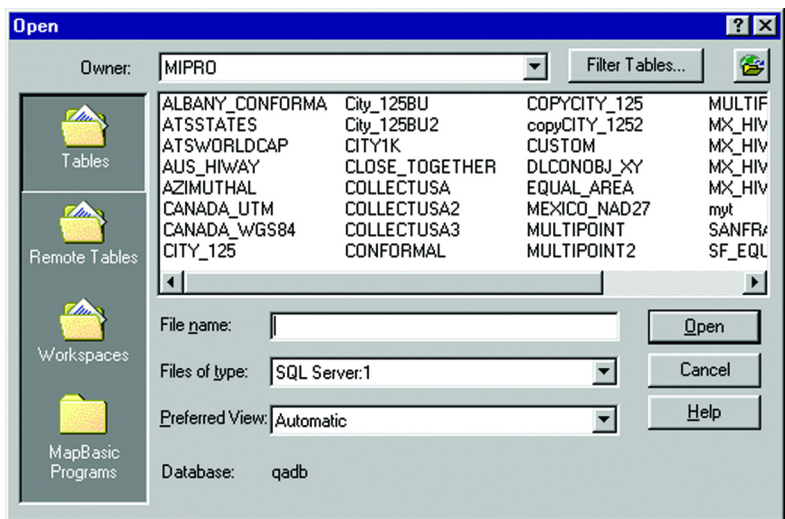
1. Choose a **CONNECTION TYPE** from the **CONNECTION TYPE** list. The connection types that appear in the list depend on what types of DBMS Support you have installed: MapInfo ODBC, Oracle, or both.
2. To make a new connection, click the **NEW** button. If your connection type is MapInfo ODBC, the **SELECT 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 277](#), 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.

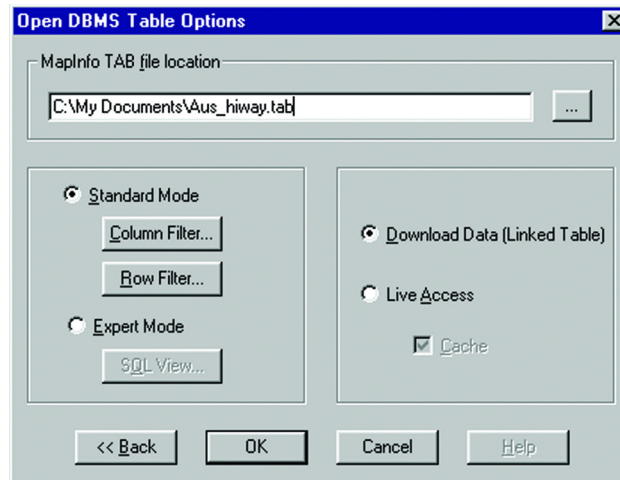


5. Click the name of the table you want to download to highlight it.
6. As an optional step, use the **FILTER** button to select which types of tables to list. The default shows Tables, View, and Synonyms, and hides System tables.
7. Click **OPEN**. The **OPEN DBMS TABLE OPTIONS** dialog box displays.

**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

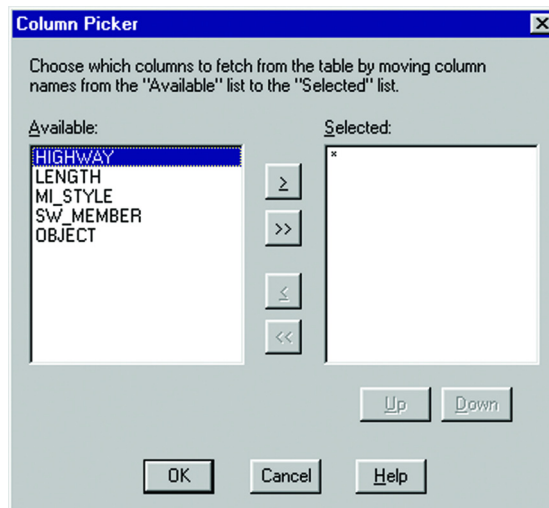
When you selected a table in the first dialog box, you selected all the rows and columns in that table. In this dialog box you can select specific columns to download. By default, all columns download.



**Note:** The default location of the \*.tab file is set in Remote Tables preferences.

To use the Open DBMS Table Options:

1. Specify the path name for the local table in the **MAPINFO TAB FILE LOCATION** path.
  - **To use the Standard Mode**, click the **COLUMN FILTER** button to specify the columns to download. 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.

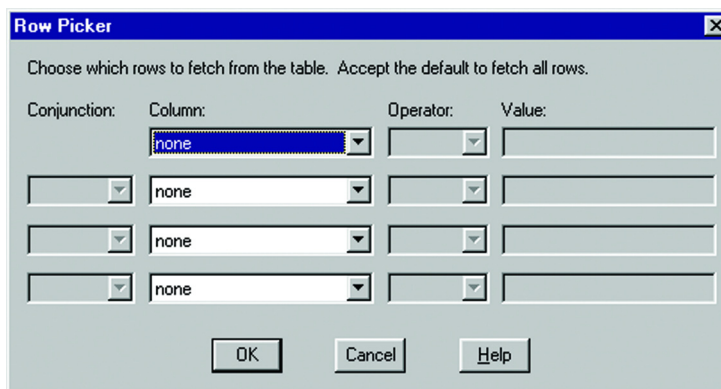
If the table is mappable, the Available list also displays an additional column called "OBJECT," which refers to the spatial column. You can select it to download point objects from the table. If the table is spatialized, it will download lines and polygons depending on what the table contains.

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](#) in the MapInfo Professional [User Guide \(Unabridged\)](#) on the Installation CD.

When you have completed executing your query, continue to [Completing the Open DBMS Table Options Dialog Box on page 284](#).

- 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 284](#).

- 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, for example, '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 285.](#))
2. For live access, the **CACHE** checkbox is displayed. Select the **CACHE** checkbox 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** checkbox, 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 285.](#))

3. Click **OK** to save the data to the table you specified.

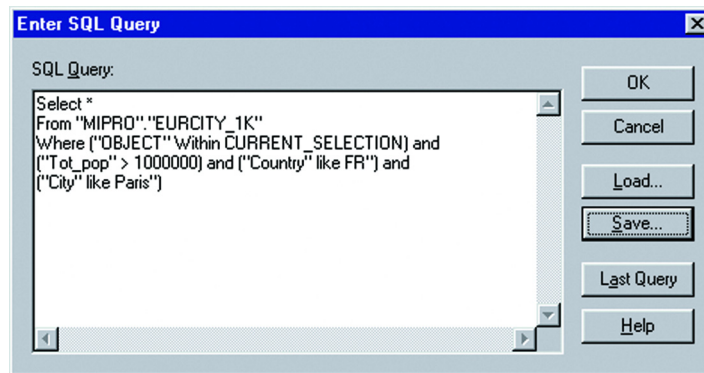
## Downloading DBMS Tables

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** checkbox is enabled.

2. For live access, the **CACHE** checkbox is displayed. Select the **CACHE** checkbox 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** checkbox 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 (for example, 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 for example, 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).

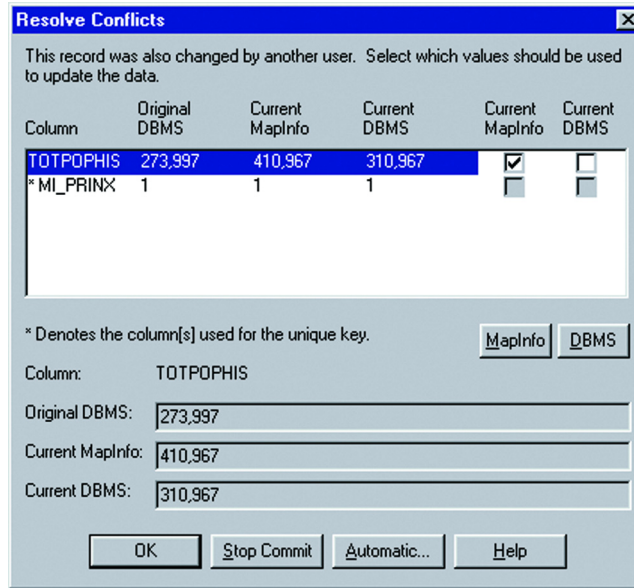
A *conflict* exists when the original state of the record does not match the server state. This implies that another user has updated this database since it was extracted by MapInfo Professional.

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



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 checkbox 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 checkbox 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
```

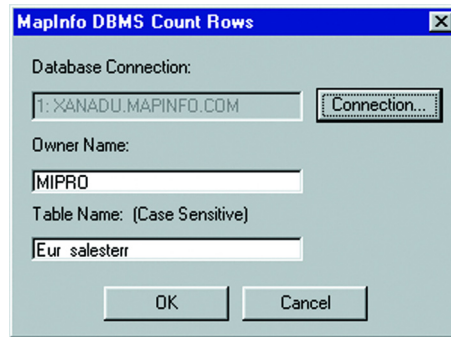
In new installations of MapInfo Professional 6.5 or later, use the EasyLoader tool to add the **NUMBER\_ROWS** column when it creates the MapCatalog.

To load the DBMS Count Rows tool, on the **TOOLS** menu, click **TOOL MANAGER**. Select the **LOADED** checkbox 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 . . . . . 294**
- ◆ **Drawing Objects . . . . . 295**
- ◆ **Drawing Polygons and Polylines . . . . . 297**
- ◆ **Drawing Symbols . . . . . 298**
- ◆ **Entering and Working with Text on the Map . . . . . 305**
- ◆ **Editing Objects . . . . . 305**

## 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 159](#).

### 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 <b>SHIFT</b> 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 <b>SHIFT</b> key while dragging the ellipse cursor. To begin an ellipse (or circle) from a “corner,” use the <b>CTRL</b> 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 <b>SHIFT</b> 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 <b>SHIFT</b> 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 <b>CTRL</b> key with the Rectangle tool.
	Rounded Rectangle	To draw a rounded square, hold down the <b>SHIFT</b> key. As with the Rectangle tool, use the <b>CTRL</b> key with the Rounded Rectangle tool to draw the object from the center outward.

Icon	Tool Button	Use Description
	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 <b>ADD NODE</b> button allows you to put additional nodes on an object for more precise editing.
	Line Style	Displays the <b>LINE STYLE</b> 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 <b>REGION STYLE</b> 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 <b>SYMBOL STYLE</b> dialog box where you can change the symbol type, color, and size of selected objects or set new defaults for future objects.
	Text Style	Displays the <b>TEXT STYLE</b> 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** checkbox 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 Printer Guide* on your MapInfo Professional 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 681**.

## 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 314**.

## Splitting Polylines at Nodes

To split a single-section polyline:

1. From an editable layer, select a single-section polyline
2. Click the **RESHAPE** button from the Drawing Tools.
3. Select one node (other than the first or last node).
4. Select the **OBJECTS** menu, then **POLYLINE SPLIT AT NODE**
5. 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.
6. After selecting the data disaggregation method, click **OK**. The selected polyline will be split at the node into two polylines.

Rules to keep in mind when splitting polylines:

- You must select a node in the polyline
- You cannot select a beginning or ending node of the polyline
- You can only select one node of the polyline for the split
- The object you select must be a polyline object
- You can only split single-section polylines

## 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** checkbox 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 \(page 299\)](#) 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.

## 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.



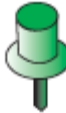

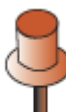



When you change the style of a custom symbol, the Effects options in the **SYMBOL STYLE** dialog box change. You can either show a background or apply a color.

- **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** checkbox 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.

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

Title	Image	File Size	Color Depth
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
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.

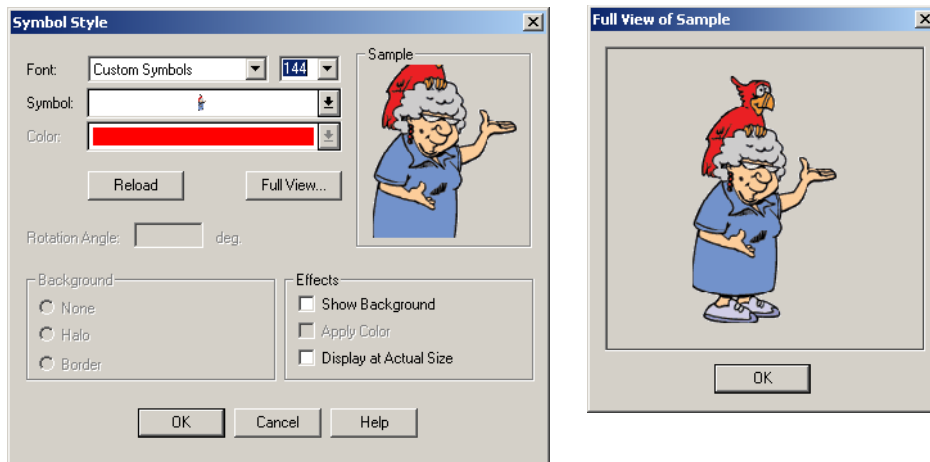
## Understanding the Custom Symbol Sizes, Shape, and Color Rules

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.

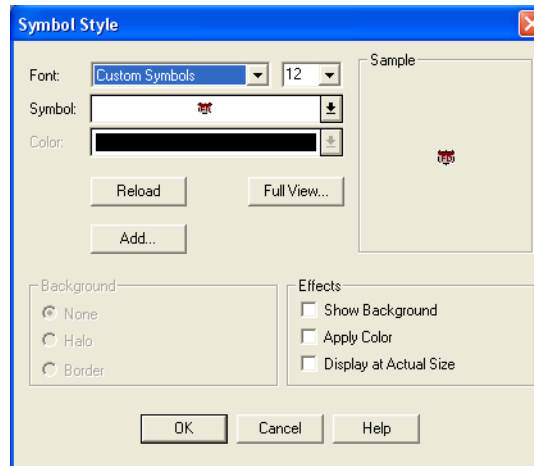
## Adding Your Own Custom Symbols

You can add custom symbols to the current style collection using the **SYMBOL STYLE** dialog box.

To add a custom symbol:

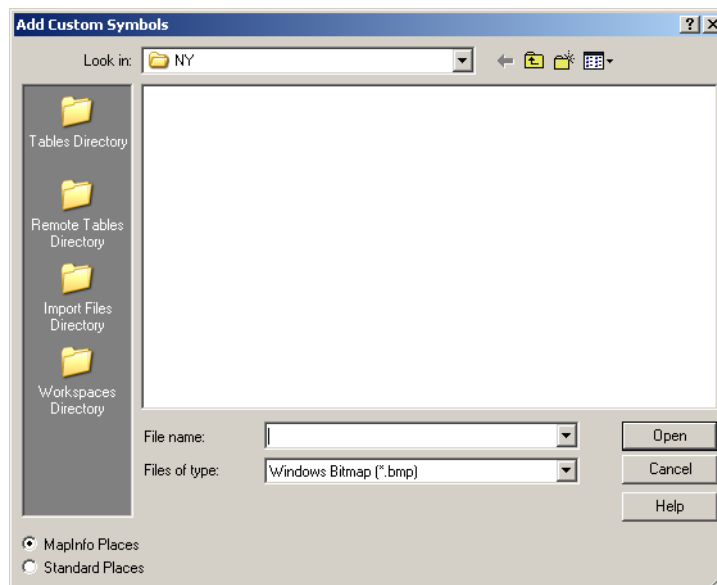
1. From the **OPTIONS** menu, select **SYMBOL STYLE** to display the **SYMBOL STYLE** dialog.

Figure: Symbol Style



2. In the **FONT** drop-down list, select **CUSTOM SYMBOLS** to activate the **ADD** button. The **ADD CUSTOM SYMBOLS** dialog box displays.

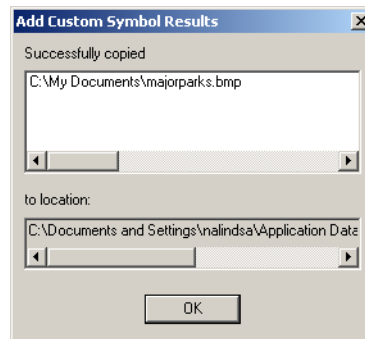
Figure: Add Custom Symbols



3. Go to the appropriate directory and select the **.BMP** file(s) you want to create custom bitmaps from and click **OPEN**. The **ADD CUSTOM SYMBOL RESULTS** dialog box displays.



Figure: Add Custom Symbol Results



4. Click **OK** to confirm what symbols you added and where they were added. You must place these files in the CustSymb directory, which is determined by the during MapInfo Professional's installation.

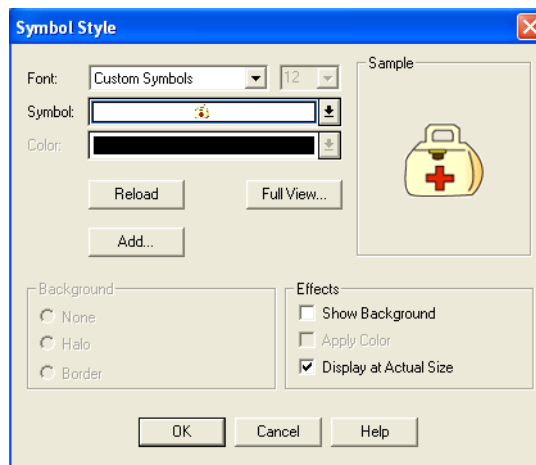
If you executed the Reload Symbols statement MapBasic command to reload custom symbols from a particular directory, then the **ADD CUSTOM SYMBOLS** dialog box adds the new symbols to that directory instead. For more about the Reload Symbols statement, see the in the MapBasic *Reference Guide*.

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:

- File name must be unique. You may have attempted to overwrite an existing .BMP file of the same name.
- Destination file name is too long (greater than MAX\_PATH, which is 260 characters for a 32-bit Windows system).
- Destination directory does not exist
- 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



From time to time, we add high-resolution (24-bit color) custom symbols and update 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 an image, change the font size.

## Entering and Working with Text on the Map

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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 (for example, 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 haloring 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.

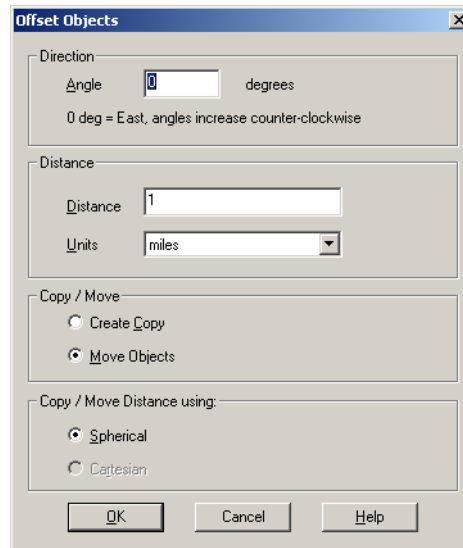
You can both move and offset the objects you select using this process. The difference between these two operations is whether MapInfo Professional makes a copy of the data (as in the case of copy) or simply moves the objects and stores the new value in the original table.

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 410](#).

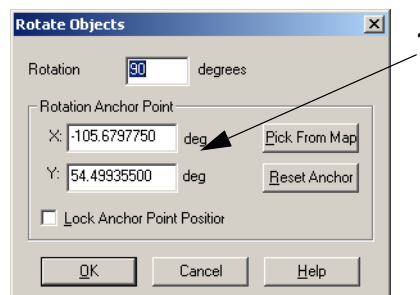
7. Click **OK** to copy the data and offset the objects you selected.

## 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 309](#) 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 open map. If a map is not open, you can select another tool (like the **SELECT** tool) and use that tool instead of the **PICK FROM MAP** functionality.

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** checkbox 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).

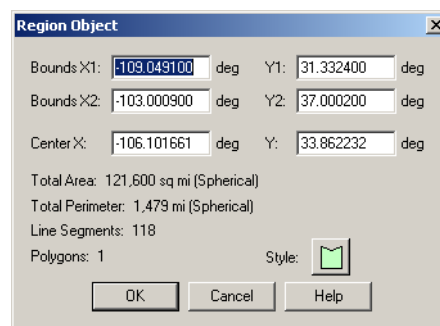
### **Understanding an Object's Default Anchor Point**

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.

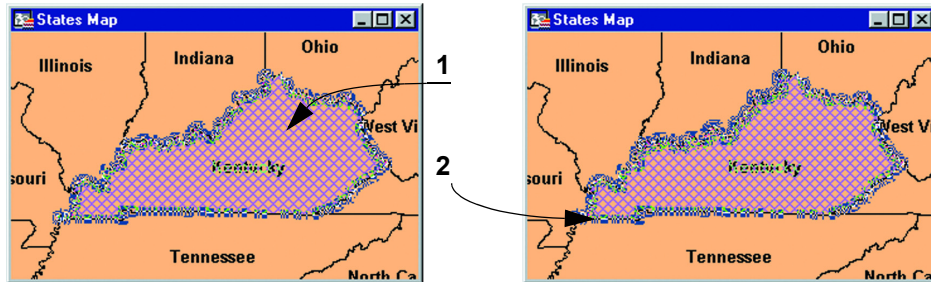
The **RESHAPE** command is very useful when you are creating sales territories or other merged boundaries. For example, you are merging postal code boundaries together to create school districts. Some postal code boundaries fall into more than one school district. Use the **RESHAPE** command to reshape the school district to incorporate a section of a postal code boundary.

### Moving the Endpoints of an Arc

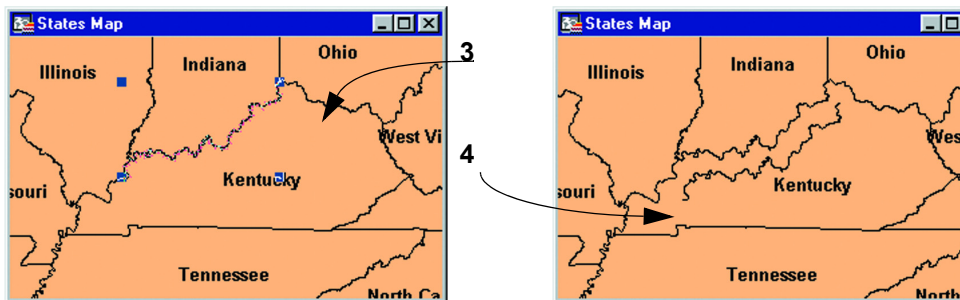
You can also change the endpoints of an arc with the Reshape command. Select the arc with the Select tool and choose Reshape. Grab either end of the arc and move it to the desired location. Reshaping an arc will not change the shape of the ellipse that it is part of, merely its endpoints.

### 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 Professional selects all nodes between following the shortest route. (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 and drag the polyline to a new location.

## Using “Snap To” to Select Nodes and Centroids

You can use nodes to reshape an object and align objects with each another. MapInfo Professional refers to this process as snapping to a node. 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”.

**Note:** You can also use the snap to capability to snap to visible centroids in region objects.

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. 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.

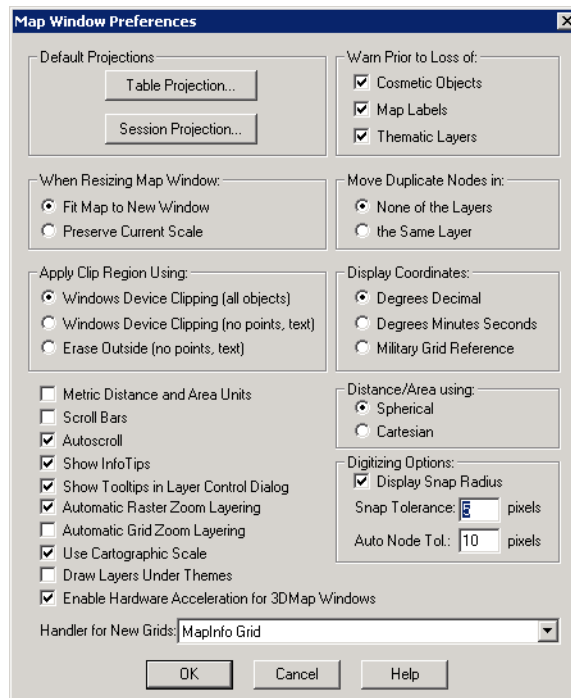
Snap to Nodes applies to all selectable layers—this is useful if you are drawing an object in one layer and want to attach it to an object in another layer. If you do not want to snap to objects in certain layers, make those layers unselectable. The Snap and Thin settings remove self-intersections and overlaps in your data based on values you set. 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 box after the table is saved or the user has left MapInfo Professional.

## Setting Snap Preferences for a Visible Snap Area

The **MAP WINDOW PREFERENCES** dialog box has a **DISPLAY SNAP RADIUS** checkbox that controls whether or not the snap radius displays 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. Remember to click **OK** to save your preferences.

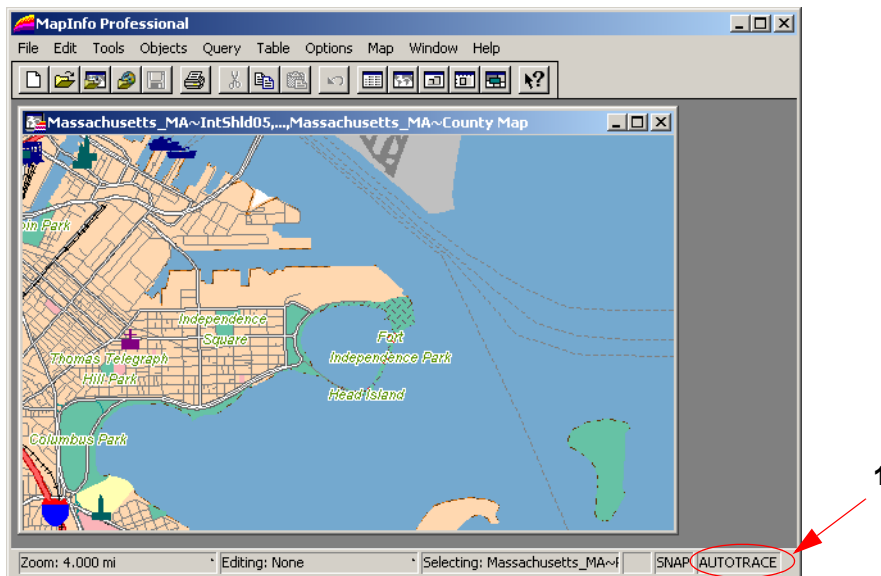
### Move Duplicate Nodes

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 easy to trace an existing polygon/polyline network, for example, a street, a county, or some other polyline or boundary. Turn on the AutoTrace mode, session-wide, by pressing the letter **T** in any Map or Layout window. A Status Bar entry displays showing that this mode is enabled.

Figure: AutoTrace Option in Status Bar



1 AutoTrace entry in Status Bar.

The rules that apply to AutoTrace are:

- To enable the AutoTrace mode, you must be using a “poly” tool such as **ADD POLYGON** or **ADD POLYLINE**
- You must press **S** to enable the Snap feature to use the AutoTrace feature

You can use the **SHIFT/CTRL** key functionality for this mode as existed in older versions of MapInfo Professional. 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. 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).

## 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 commands 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:

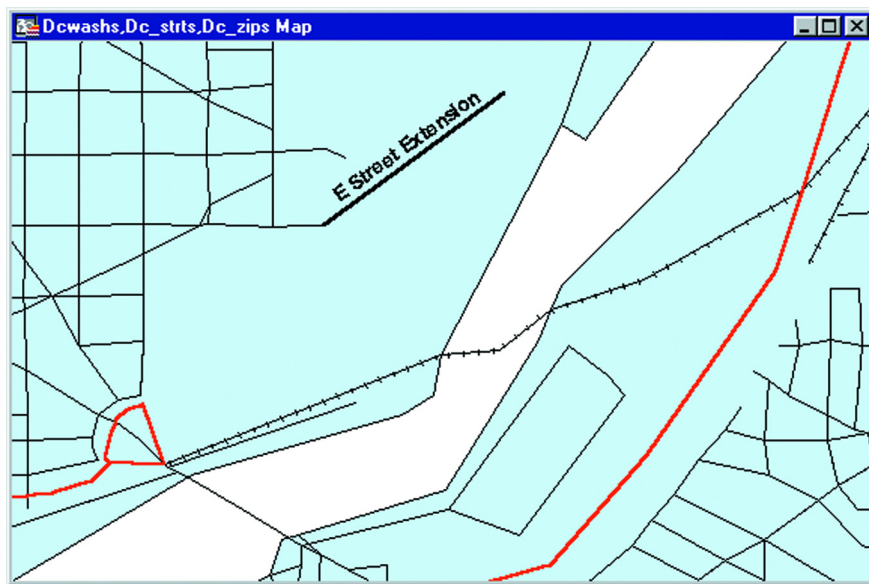
- FromLeftStarting point of address numbers, left side of the street.
- ToLeftEnding point of address numbers, left side of the street.
- FromRightStarting point of address numbers, right side of the street.
- ToRightEnding point of address numbers, right side of street.
- TypeThese numbers indicate 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.

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.

1. 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](http://www.mapinfo.com/miprotutorial). 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.

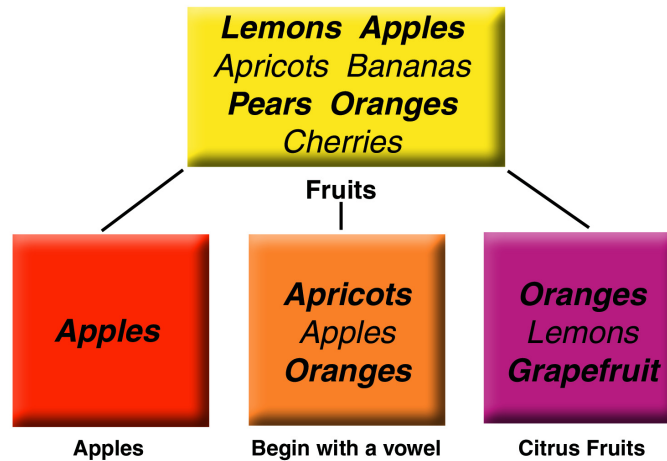
## In this Chapter:

- ♦ **Selecting your Data in MapInfo Professional. . . . . 320**
- ♦ **Querying Your Data in MapInfo Professional. . . . . 327**



## 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.

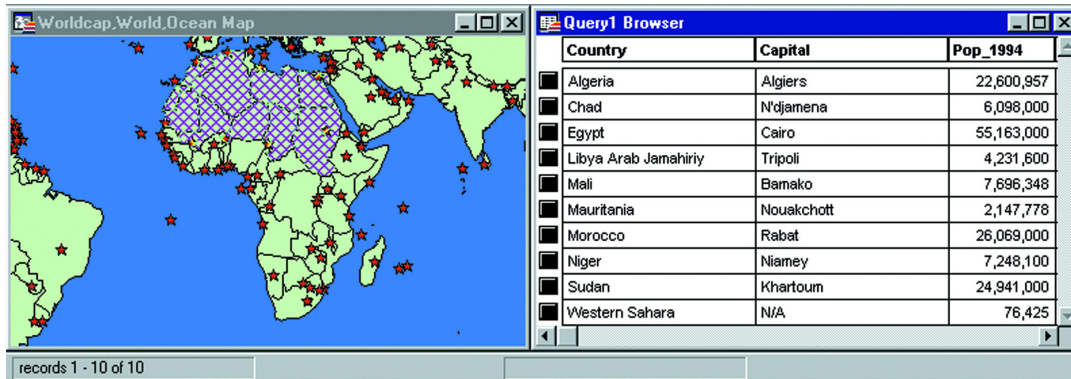
For example, you have a table of customer records. You could create a subset of all customers who live within a 50 mile radius of Prague. Or, you could create a subset of all customers who purchased over \$1000 of merchandise. Or, you could create a subset of all customers whose last name begins with 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 330](#) and [Using SQL Select to Query Data on page 333](#).

## 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** checkbox 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 the Select tool, Radius Select tool, Marquee Select tool, Polygon Select tool, Boundary Select tool, and 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.

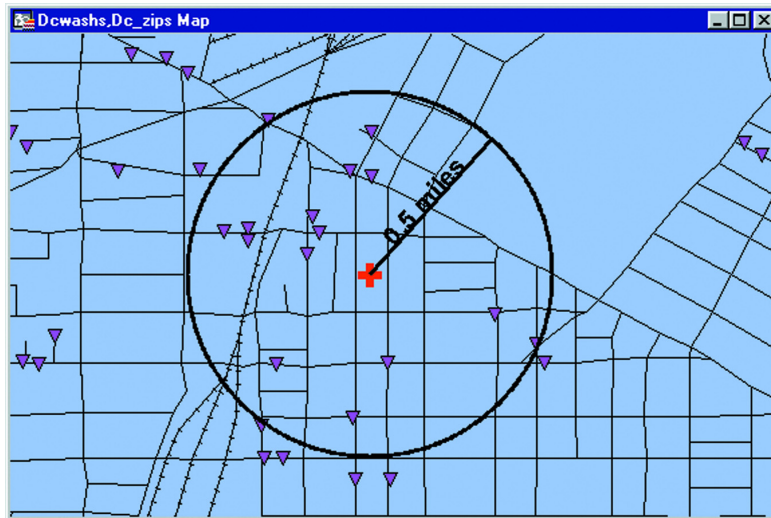
1. Select the object. The object is highlighted and bounded by four edit handles and a fifth handle below the lower right corner.
2. Click the fifth handle (rotate handle) and hold down the mouse button. Rotate the highlighted box to the desired angle. A rubber banding box is drawn representing the rotated 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.

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 (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 (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.

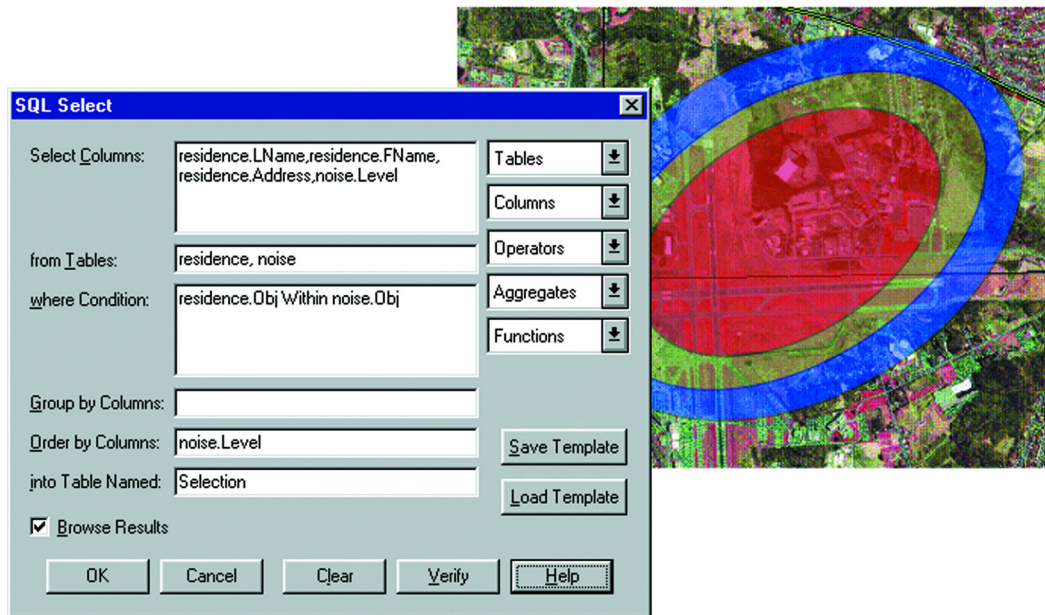
To cancel the selection of one object or record from a group of selected objects or records, hold down the **SHIFT** key and click the object or record with the Select tool. When you click it, the selection is cancelled.

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.

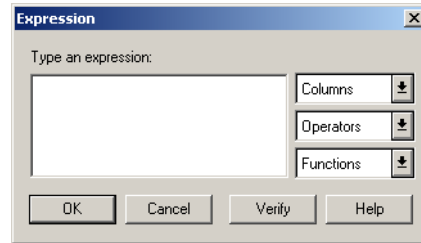
You can also perform mathematical operations on your data. For example, you want to create a temporary table of all apartments that have a total cost of less than \$800. Total cost is equal to the sum of the rent and the monthly utilities.

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:

- $AVG\_DIFF < -10 \text{ Or } AVG\_DIFF > 10$

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 573](#).

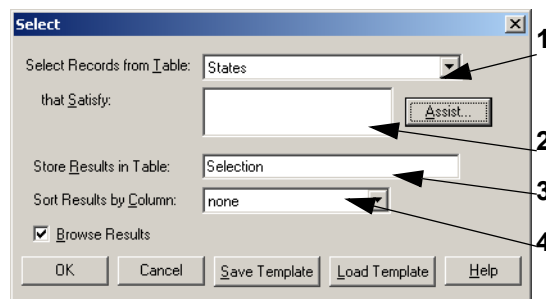
### Verify

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.



*1 Select the table from which to select records. 2 Create the expression to select records. 3 Choose a storage place for results. 4 Choose column for sorting.*

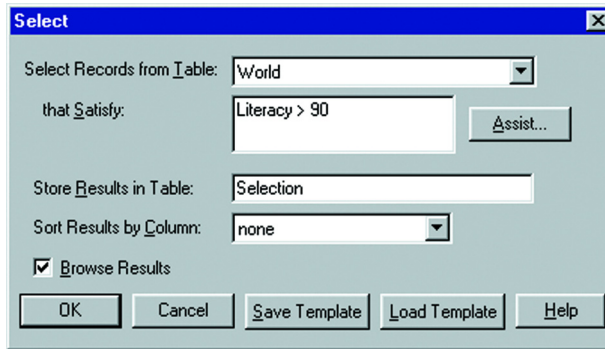
2. To see a list of the records you have selected, select the **BROWSE RESULTS** checkbox.
3. MapInfo Professional creates a Browser of the new selection table.

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**.

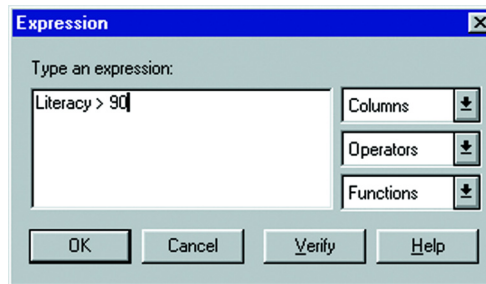
### Example: Selecting

MapInfo Professional makes finding information and locations easy. You can use the **SELECT** feature to create subset databases. As an example, we use the **WORLD** table to select countries with a literacy rate greater than 90%.

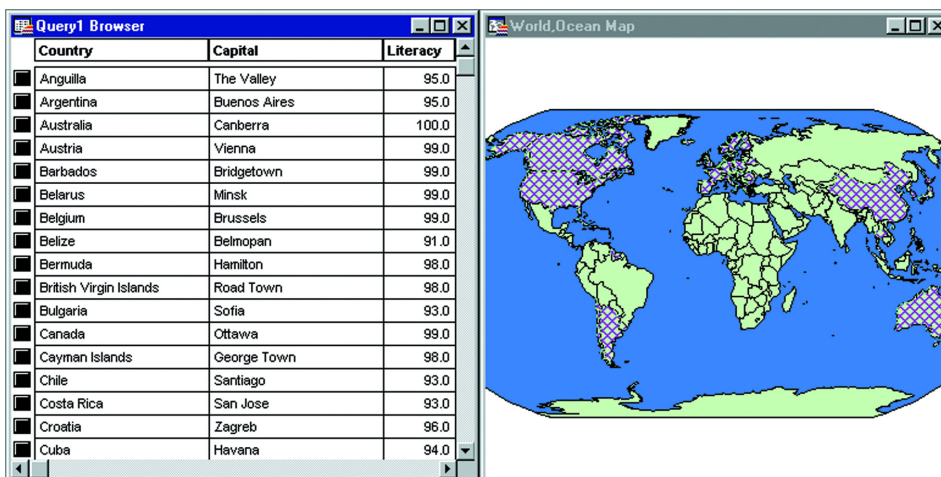
1. Open the **WORLD.tab** table.
2. On the **QUERY** menu, click **SELECT** to display the **SELECT** dialog box.



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** checkbox.
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

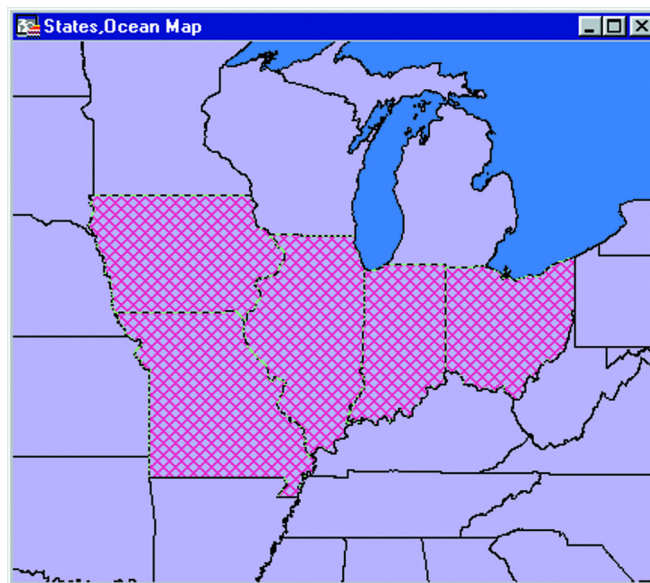
Many of the data sets that are used with MapInfo Professional include more objects and information than necessary for some projects. In many cases it is easier to work with a subset of the complete data product. For example, if you were tracking crime statistics for a county by census tract, you would not need the census tracts for the entire state.

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 333**. 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 TABLES** 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.

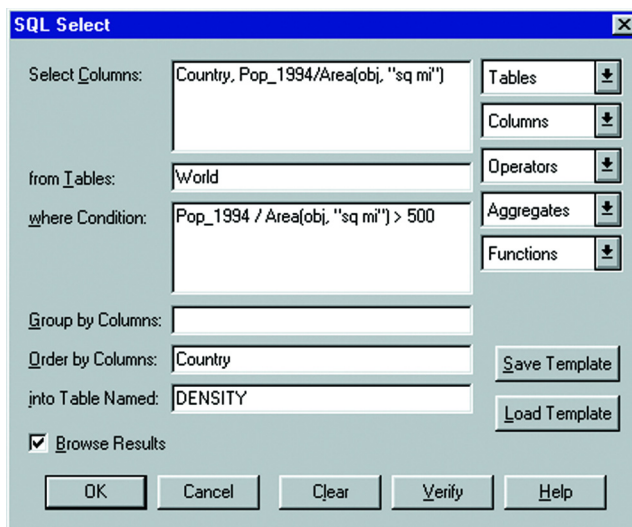
The Order by Columns box allows you to specify the order the records in the query table will display. By selecting Country, MapInfo Professional will list the records in alphabetical order, according to country name.

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** checkbox 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 face, 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).

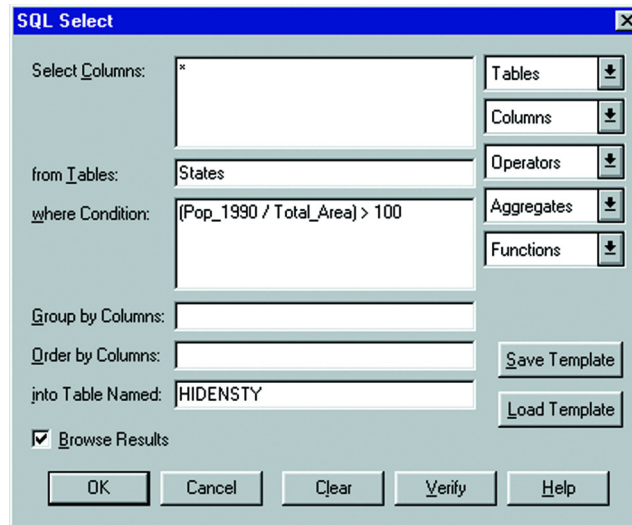
Country	Pop_1994/Area(Object, 's
American Samoa	793.228
Antigua & Barbuda	704.471
Aruba (Neth.)	1,247.47
Bahrain	7,212.79
Bangladesh	2,128.66
Barbados	1,962.4
Belgium	842.138
Bermuda	4,965.99
Cape Verde	1,662.23
Comoros	1,452.82
El Salvador	664.747
French Polynesia	753.874
Germany	578.033
Gibraltar	11,641.42
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.





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** checkbox must be selected in the Startup preferences. MapInfo Professional selects this checkbox 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, which 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")`

To rename the column, add the new name to the Select Columns box when 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. 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.

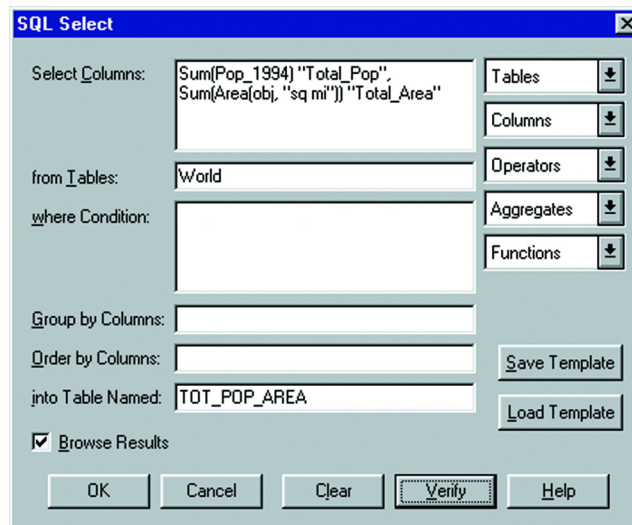
- Select **SUM** from the **AGGREGATES** drop-down list.
- Select **AREA** from the **FUNCTIONS** drop-down list. After you select Area, the cursor will be on the inside of the end parenthesis [)]. Move it to the outside with the **RIGHT ARROW** key.

**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 the **WHERE CONDITION**, **GROUP BY COLUMNS**, and **ORDER BY COLUMNS** fields 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** checkbox.



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.

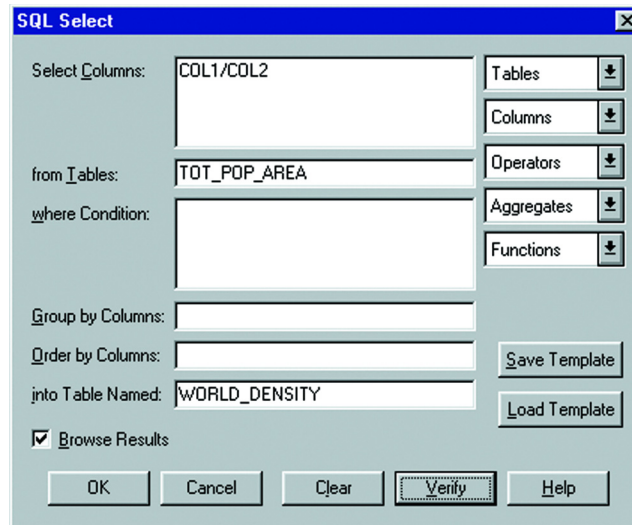
Total_Pop	Total_Area
5,157,461,605	6,093,155,249

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.

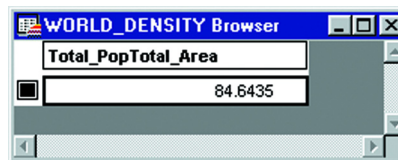
Notice that when you select Total\_Pop, COL1 appears in the **SELECT COLUMNS** field. This is the column number of that field. When choosing derived columns from a previous query, MapInfo Professional uses the column number instead of the name. Columns can be referred to by name or number, where the 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 the **WHERE CONDITION**, **GROUP BY COLUMNS**, and **ORDER BY COLUMNS** fields 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** checkbox.



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

SALES_REP	MONTH	SALES
Cathy	May	900
Julie	May	1100
John	June	900
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 group records.
- **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.

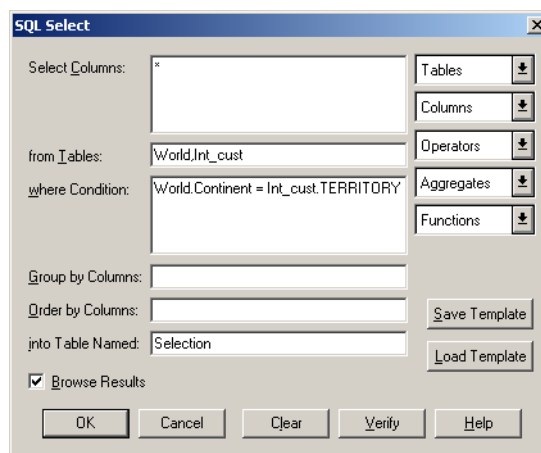
Whenever you are working with multiple tables, you must put a statement in the Where Condition telling MapInfo Professional how to match up the rows in the different tables. For example, you have the WORLD table that contains countries and a table of economic statistics (Eco\_Stats), also broken down 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:

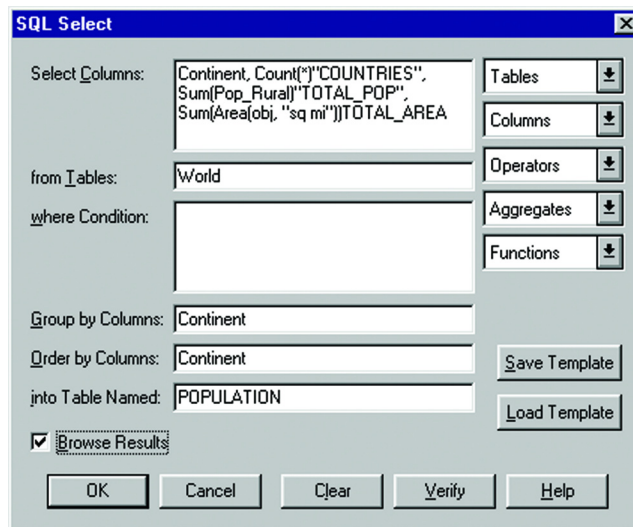
1. Open the **WORLD.TAB** table, and maximize its display by clicking the **MAXIMIZE** button.
2. On the **QUERY** menu, click **SQL SELECT** to display the **SQL SELECT** dialog box:
3. In the From Tables Box, choose **WORLD** from the **TABLES** drop-down list.
4. In the Select Columns box, choose **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) creates a derived column that computes the world population.
8. Press the **SPACEBAR** once and type the column alias "Total\_Pop". The Sum(Population) column appears 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. The cursor will be on the inside of the end parenthesis [)]. Move it to the outside with the **RIGHT ARROW** key. Sum(Area) creates 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 appears 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	COUNTRI	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	8,663,488.77
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](http://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:

The screenshot shows the 'SQL Select' dialog box with the following configuration:

- Select Columns:** APARTMNT.Address, APARTMNT.AptNumber, TENANTS.Name
- from Tables:** APARTMNT, TENANTS
- where Condition:** APARTMNT.AptNumber = TENANTS.AptNumber
- Group by Columns:** (empty)
- Order by Columns:** (empty)
- into Table Named:** Selection
- Browse Results

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:

The screenshot shows the 'SQL Select' dialog box with the following configuration:

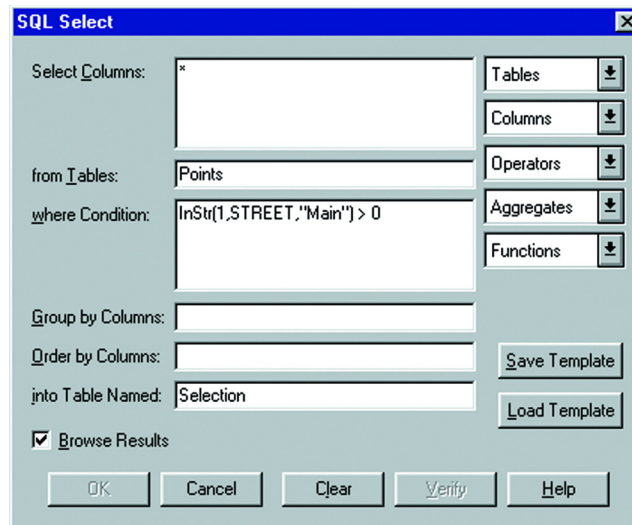
- Select Columns:** \*
- from Tables:** APARTMNT
- where Condition:** APARTMNT.AptNumber = Not In (Select AptNumber From TENANTS)
- Group by Columns:** (empty)
- Order by Columns:** (empty)
- into Table Named:** (empty)
- Browse Results

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 appends 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

To find the position of the word “test” in a given text string, the InStr function will look like this:

INSTR(1,“This is a test of the Instr function “,”test”)

When this statement is executed, the value 11 is returned.

**Note:** If the string that you are searching for does not exist, the value 0 is 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)`

2. 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](http://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:

1. On the **QUERY** menu, click **SQL SELECT**.
2. Fill in the **SQL SELECT** dialog box:

**Note:** RowID is a function, not a column name in the Soils table.

3. To select records that have an even record number, on the **QUERY** menu, click **SQL SELECT**.
4. Fill in the **SQL SELECT** dialog box:

**Note:** RowID is a function, not a column name in the Soils table.

5. 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.

1. On the **QUERY** menu, click **SQL SELECT** and fill in the **SQL SELECT** dialog box.

The screenshot shows the 'SQL Select' dialog box with the following fields and values:

- Select Columns: Id\_Num,Count(\*)
- from Tables: EMPLOYEE
- where Condition: (empty)
- Group by Columns: 1
- Order by Columns: 2 desc
- into Table Named: Selection
- Browse Results

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.

The screenshot shows the 'SQL Select' dialog box with the following fields and values:

- Select Columns: LName, FName, Distance(-101.679209,35.550036, CentroidX(obj),CentroidY(obj),'mi' "DISTANCE"
- from Tables: EMPLOYEE
- where Condition: IdNum in (Select COUNT\_BY\_ID\_NUM from where col2>1)
- into Table Named: CUSTDIST
- Browse Results

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.

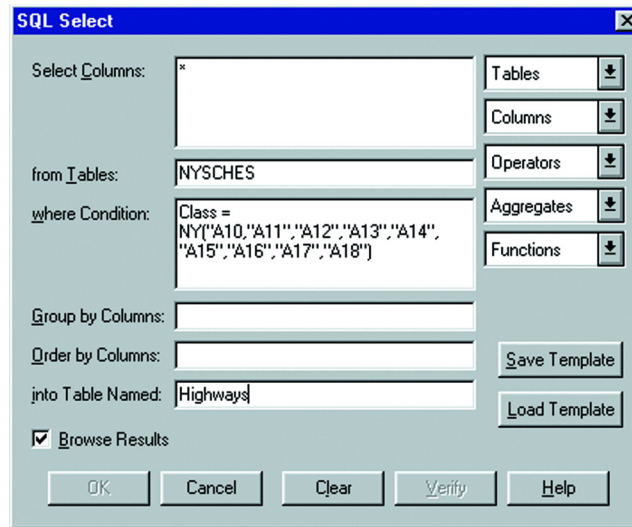
3. Click **OK**. The resulting query table contains last names and first names plus a new column called DISTANCE which records the distance between the fixed location (-101.697209, 36.050036) and the point associated with each row of the table.
4. To save the results in a permanent table, on the **FILE** 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.

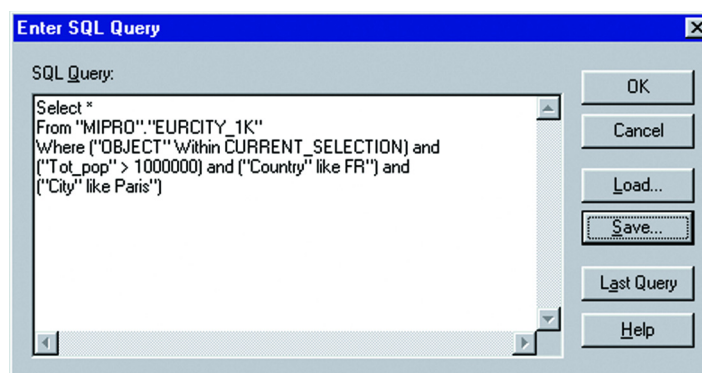
3. On the **FILE** menu, click **SAVE COPY AS** and save the HIGHWAYS table. The HIGHWAYS table can now be added to your map as a separate layer.

**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.

For instructions on entering SQL queries using the Expert button, see the MapInfo Professional *User Guide (Unabridged)* on the Installation CD.

## 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** . . . . . 356
- ◆ **Using Thematic Mapping to Analyze Information** . . . . . 358
- ◆ **Types of Thematic Maps** . . . . . 362
- ◆ **Working with Thematic Maps and Legends** . . . . . 372
- ◆ **Updating Columns using Thematic Mapping** . . . . . 373
- ◆ **Bivariate Thematic Mapping** . . . . . 376
- ◆ **Working with Legends** . . . . . 380
- ◆ **Working with Grid Surface Maps** . . . . . 382
- ◆ **Working with 3D and Prism Maps** . . . . . 390

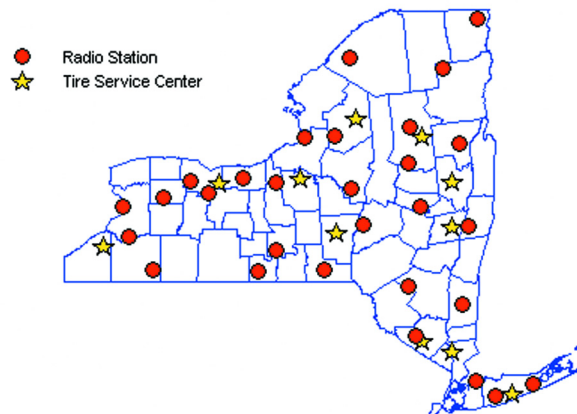
## MapInfo in Action

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 320](#), and [Querying Your Data in MapInfo Professional in Chapter 8 on page 327](#).

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.

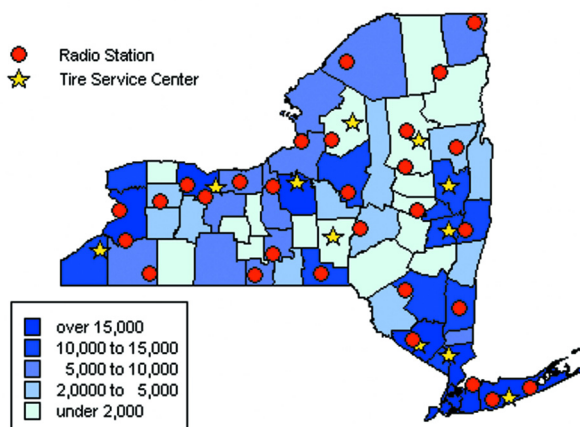


Using MapInfo Professional, you can quickly and easily bring this information into focus and make informed decisions about which radio stations to use to advertise your tire service.

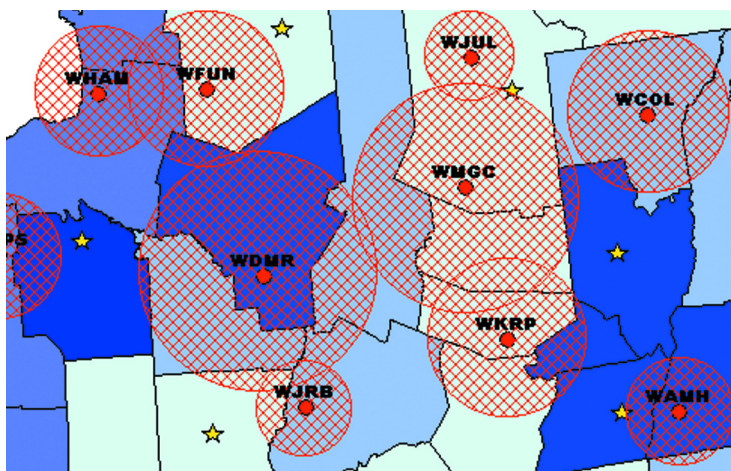
In this example, you need to display the service centers on a map in relation to the radio stations, looking for the stations that reach the areas where your centers are located.

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

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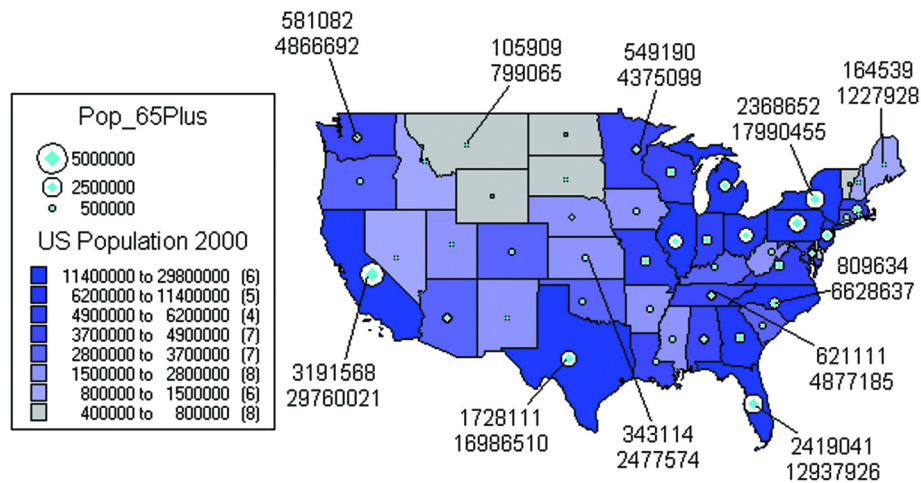
*Thematic mapping* is the process of enhancing your map according to a particular theme. At the cornerstone of the theme is the data in your table. Themes represent your data with shades of color, fill patterns, symbols, bar and pie charts, and grids.

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 (for example, 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 327](#), and [Creating Expressions in Chapter 15 on page 573](#), 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):

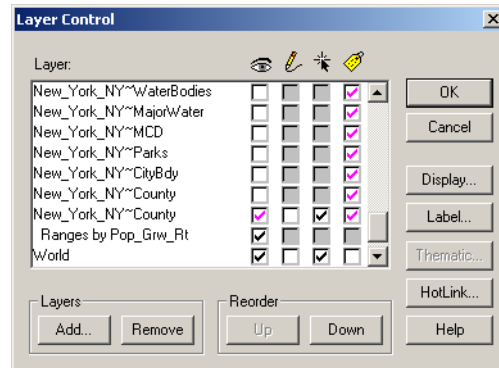
1. Pies, Bars, or Graduated Symbol thematic layer.
2. Dot Density thematic layer.
3. Ranged thematic layer – where Color or Size Attributes are applied.
4. Ranged (or Individual Value) thematic layer – where All Attributes are applied.
5. Major layer or base layer.
6. Grid thematic layer.

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.

*Layer Control (Showing Thematic Layer above Base Map)*



*Thematic layers are always drawn after their base layer. Therefore, they appear above their base layer in the LAYER CONTROL list. They 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 in your analysis.

## Types of Thematic Maps

With MapInfo Professional you can create seven types of thematic maps:

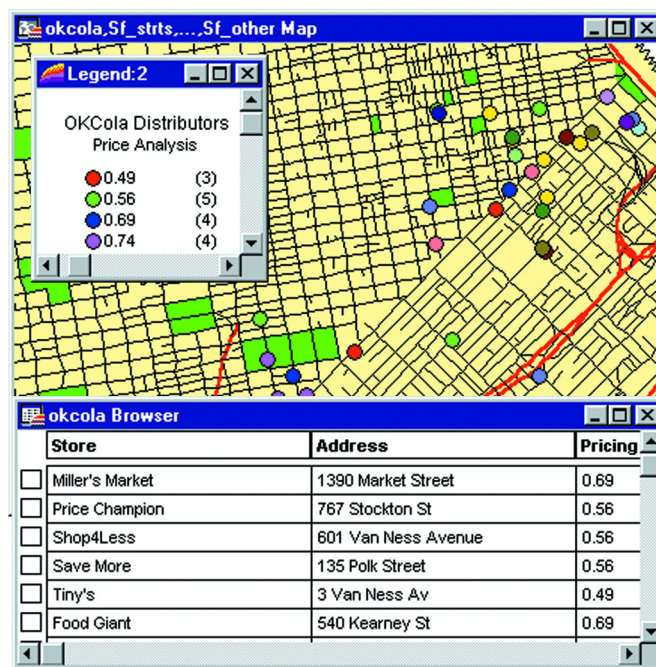
- Ranges
- Bar Charts
- Pie Charts
- Granulated
- Dot Density
- Individual
- Grid

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. They 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.

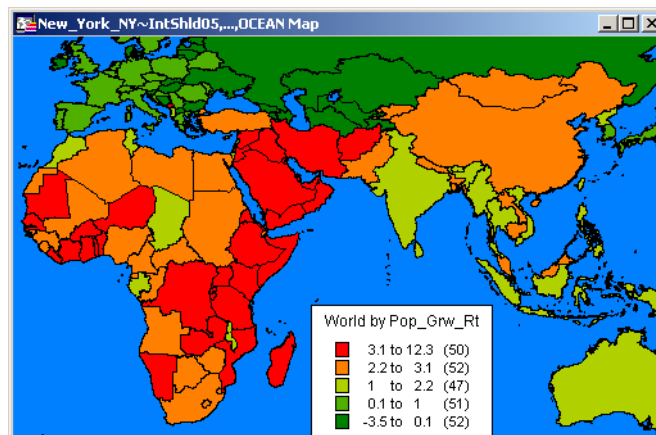
If you are shading your points, lines or boundaries using nominal data, you can shade *only* by individual values. Nominal data is either non-numerical data (name, type of cuisine served, or brand of automobile sold) or numeric data where the numbers represent non-numeric data like an ID number. Dates 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.

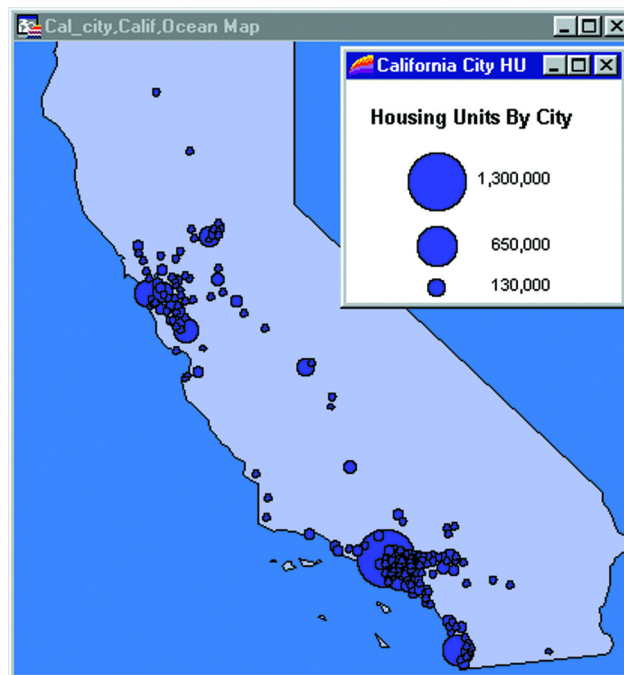
### Customizing Range Styles and Inflection Point

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 378](#) for more on using an inflection point.

## Graduated Symbol Maps



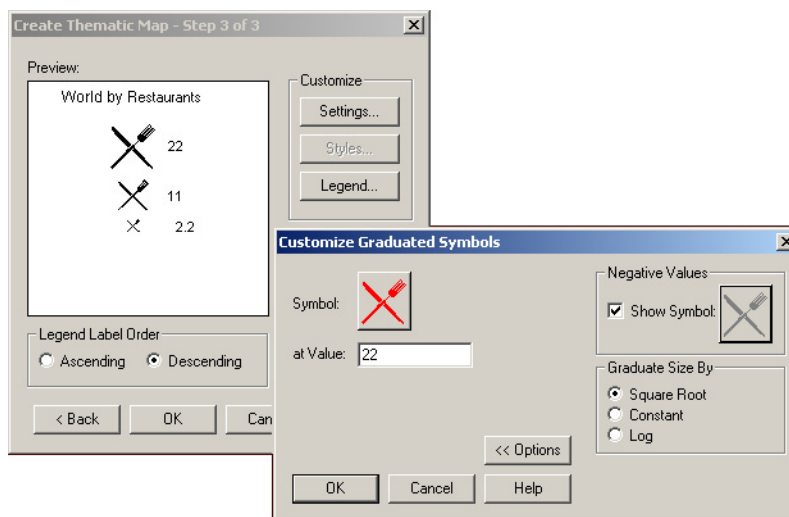
Graduated symbol maps use symbols to represent different values. You can use graduated symbols regardless of the type of map object with which you are working.

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.

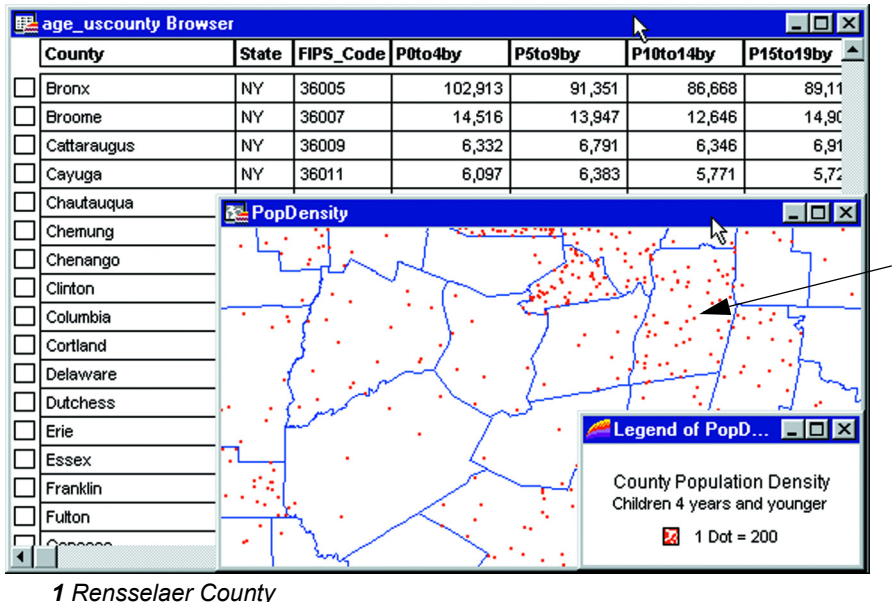
You can also display symbols for negative data values. To change it, click **OPTIONS** in the **CUSTOMIZE GRADUATED SYMBOLS** dialog box. There is a separate symbol picker so that you can make this symbol as distinct from the symbol for positive values as you want. When you click the icon a different **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.

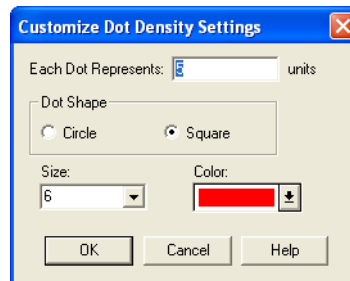
A second option is to change the size of the dots according to your needs, either large or small. If you are working with large populations, or large counts of something, make the dot size smaller so that the distribution of dots is easier to see. Conversely, if you are working with a small data set, 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. In this dialog box, you can 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. You can create multiple dot density maps on the same layer by varying these options.

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.

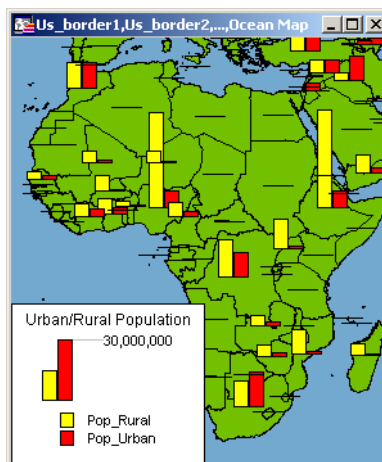
Figure: Customize Dot Density Settings



## 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.

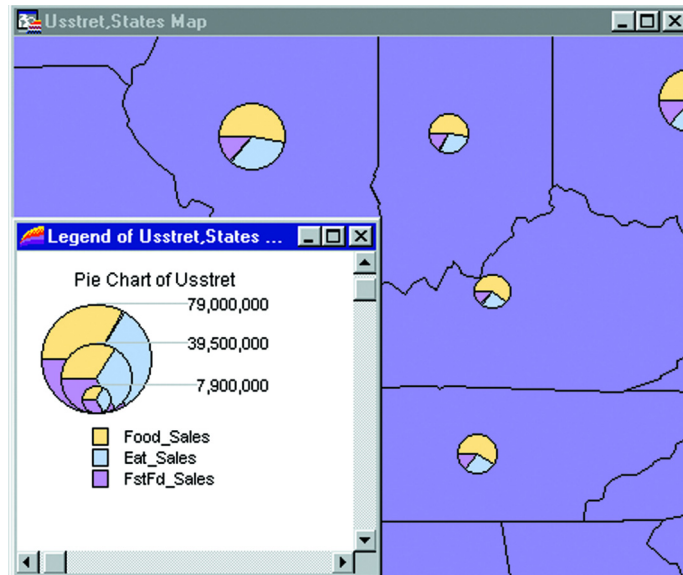


You can customize the color of each bar, create a frame around each chart, and fill the empty space inside the frame with a pattern or color. In addition, you can change the bar chart's orientation, such as displaying horizontal bars instead of vertical (the default). You can also control where to display 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 maps using pie charts 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 wedge across all pies. Pie charts 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 graduate the size of the pies according to the sum of their components. Half pies distribute your data across half a pie instead.

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## Working with Thematic Maps and Legends

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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 MAP** 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 (for example, 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 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 Columns using Thematic Mapping

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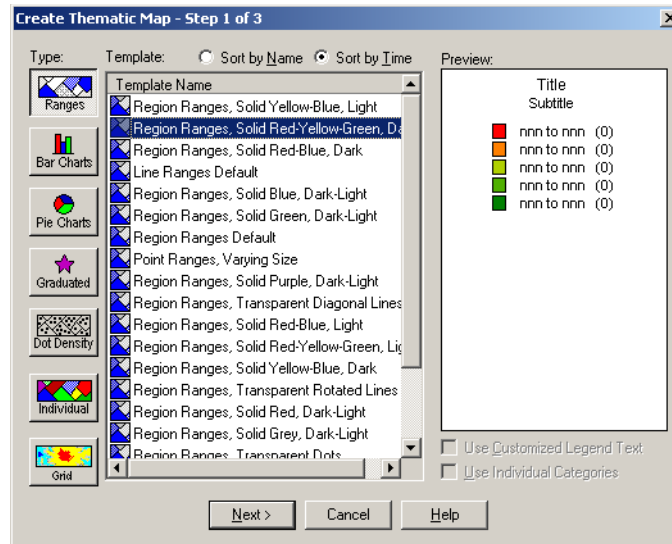
As explained earlier in this chapter, you can use data from another table to construct your thematic map using Update Column. Update Column creates a temporary column in your base table and automatically inserts data into it for your map. This data can be a field taken directly from another table, or 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.

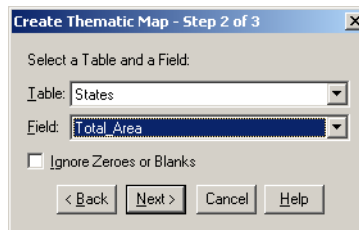
**Note:** Some of the files used in this example may be from the MapInfo Professional Tutorial data and is only available from the MapInfo web site, [www.mapinfo.com/miprotutorial](http://www.mapinfo.com/miprotutorial).

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.



3. Choose **RANGES** and select a template name from the list. This is the style of the thematic map you are creating. Click **NEXT** to display the **CREATE THEMATIC MAP STEP 2 OF 3** dialog box.



4. 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.

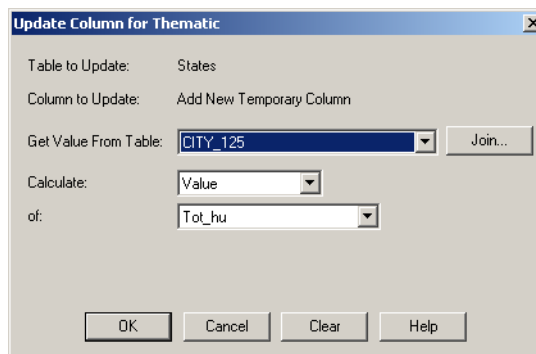


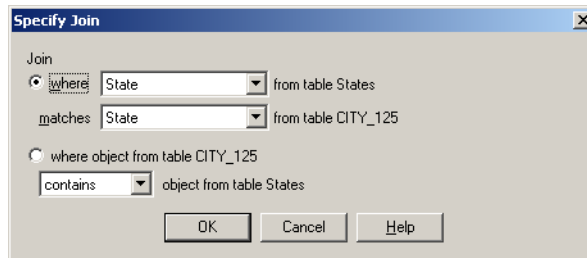
Table to Update is already set to STATES and Column to Update is automatically set to Add New Temporary Column.

5. 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.

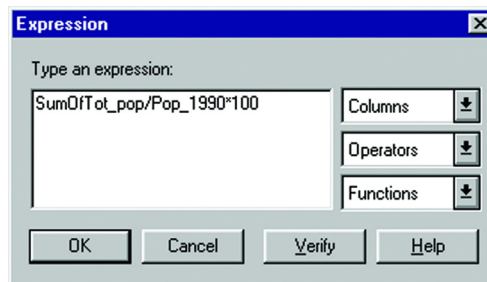
Since in our example, we are looking for the percentage of the population living in urban areas in the United States, we need to calculate the total of the CITY\_125 population; that is, we must calculate the total of the population of each city in a each state. We need to put that sum into the temporary column.

6. 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.
7. 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.

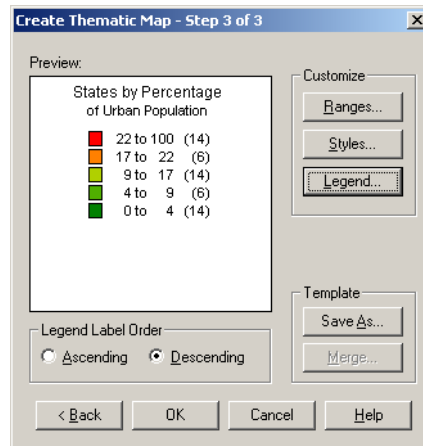
8. Choose **OK**. MapInfo Professional calculates the sum and returns you to the **THEMATIC – STEP 2 OF 3** dialog box. The **FIELD** list box displays the temporary column you created: **SumOfTot\_pop**.  
However, before we create the map, we still need to calculate the percentage of the total population 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.



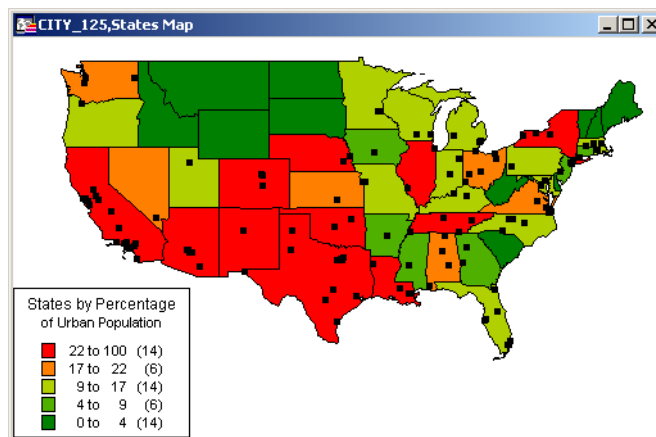
The expression  $\text{SumOfTot\_pop/Pop\_1990} * 100$  will give you the answer as a percent.

10. In the Type an expression box, type:  
 $\text{SumOfTot\_pop/Pop\_1990} * 100$
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 396](#) 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.

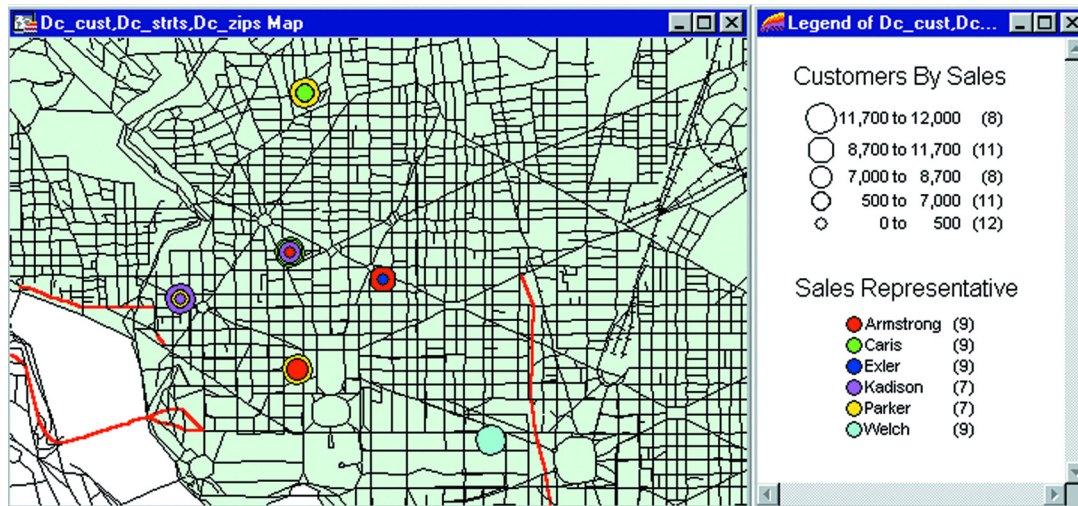
Third, you must create a separate thematic map for each variable. For the Individual Values map, use the table of customers as the table and choose Sales\_rep as the field to which to assign values. MapInfo Professional assigns each sales representative a different color.

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.

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 382](#) 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 Columns using Thematic Mapping on page 373](#). Since here we are focussing on the Inflection Point options, the process will cover that aspect of this map in more detail.

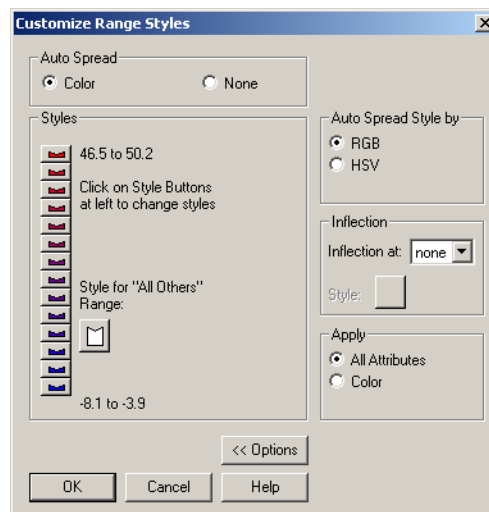
To enhance a map using an inflection point:

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 range style. 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.

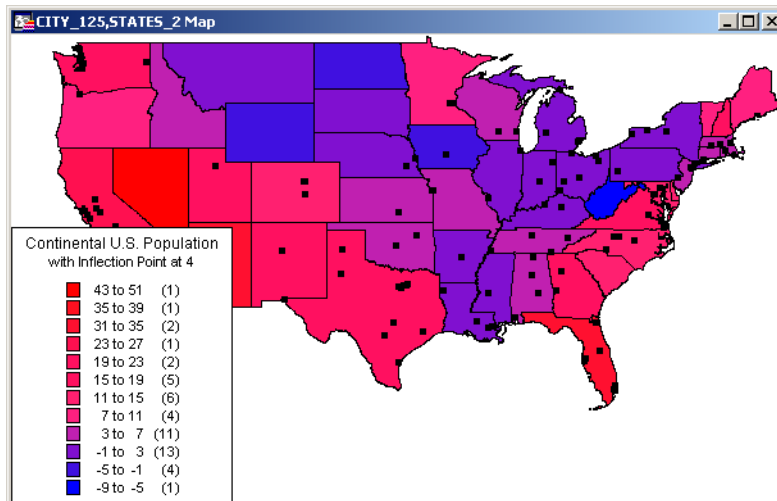
In the **INFLECTION AT** box, choose 2 for the second range, as you determined above. The default is **NONE**, meaning no inflection point.

- 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:

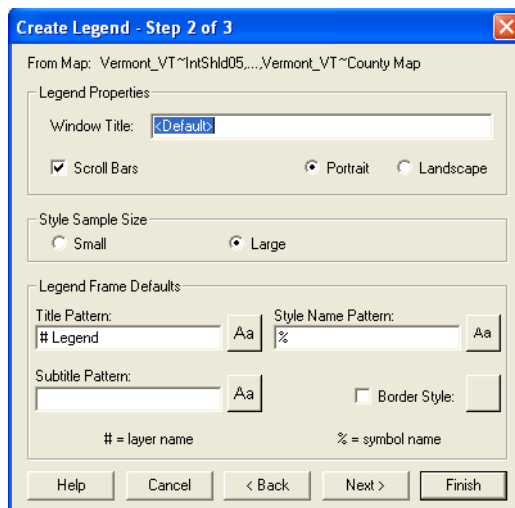
- On the **MAP** menu, click **CREATE LEGEND**. The **CREATE LEGEND – STEP 1 OF 3** dialog box displays.

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 481](#).

### Selecting the Sample Size for a Cartographic Legend Window

You can control the sample legend sizes that appear in Cartographic Legend windows. 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**.

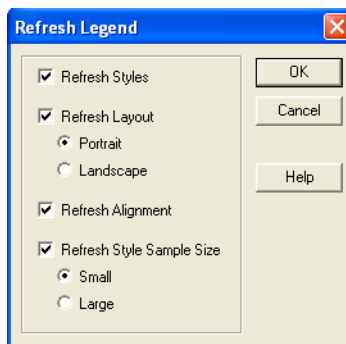
Figure: Create Legend - Step 2 of 3



To change the style sample size of an existing Cartographic Legend window:

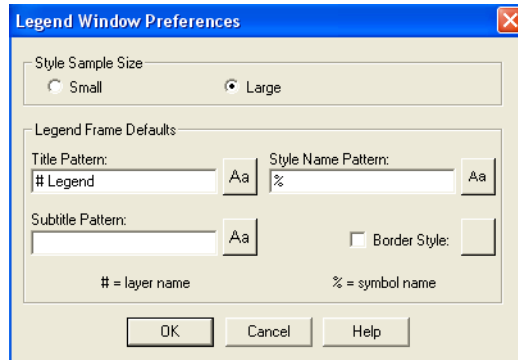
1. From the **LEGEND** menu, select **REFRESH** to display the **REFRESH LEGEND** window.
2. Select **REFRESH STYLE SAMPLE SIZE** and select either **SMALL** or **LARGE**.
3. Click **OK** to refresh the legend.

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



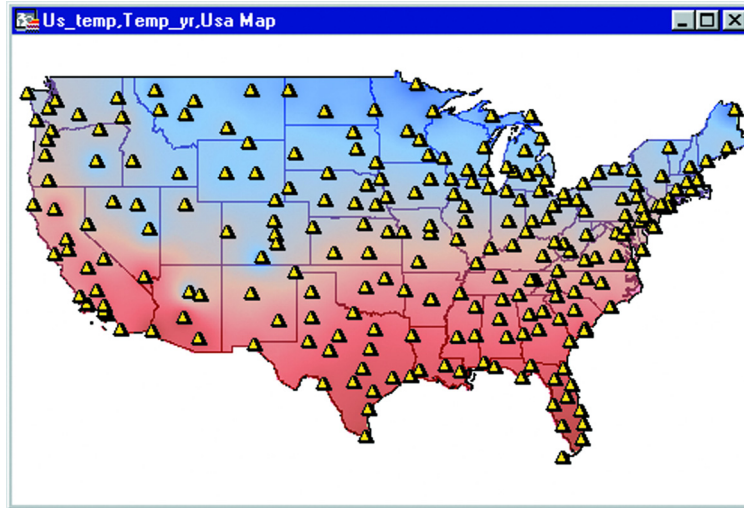
## What are Thematic Legends?

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 358](#).

## 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 (for example, 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, for example, 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

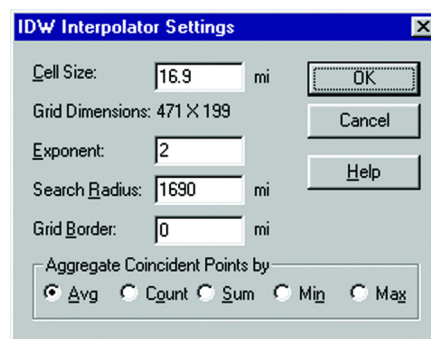
This section shows how to write your own read/write grid handler. MapInfo Professional provides two interpolators for creating grid themes: Inverse Distance Weighting (IDW) and Triangulated Irregular Network (TIN).

### *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.

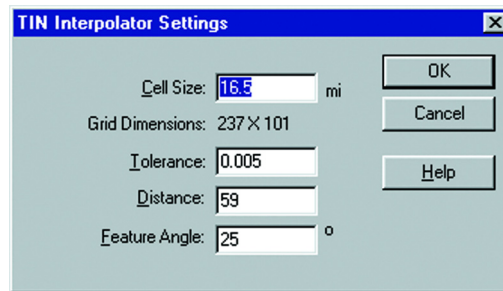
You can also choose an aggregation method for the z-values of source data points that are in the same grid cell. Choose from: average, count, sum, min, and max.

### ***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

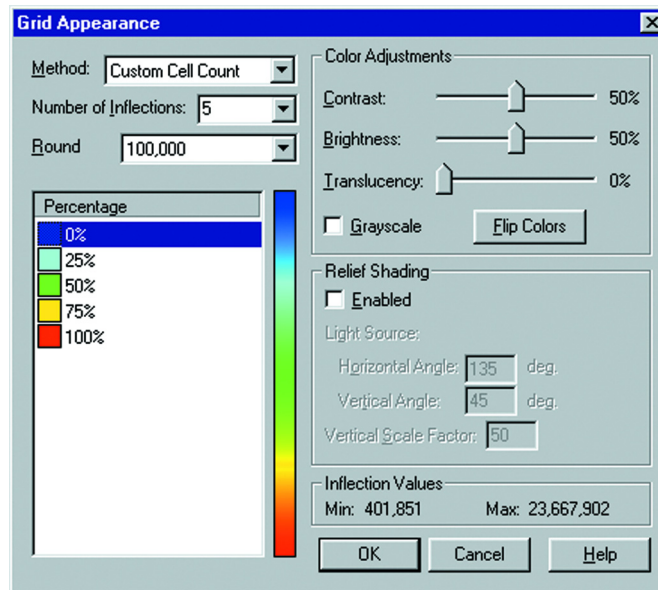
Once the cell values are calculated, MapInfo Professional groups them into a color spectrum that is bounded by the minimum and maximum values in the table. The grid’s appearance is controlled in the **GRID APPEARANCE** dialog box, which you can access by clicking the **STYLES** button in Step 3.

## 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.

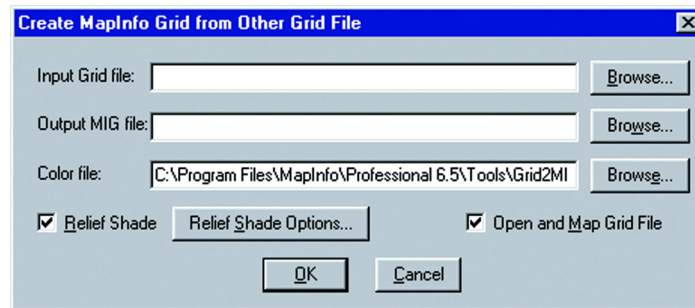
### Converting Grid Files

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:

1. From the **TOOLS** menu, choose **TOOL MANAGER**, and select the **LOADED** checkbox next to the Grid Tools tool.

- Then choose **TOOLS > GRID TOOLS > CREATE MAPINFO GRID FROM OTHER GRID FILE** to display this dialog box.



- Select the input and output grid files and the color file.
- Use the corresponding **BROWSE** buttons to navigate to their respective locations.
- Select the **RELIEF SHADE** checkbox 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.
- Select the **OPEN AND MAP GRID FILE** checkbox to have MapInfo Professional display the grid in a Map window.
- Click **OK**.

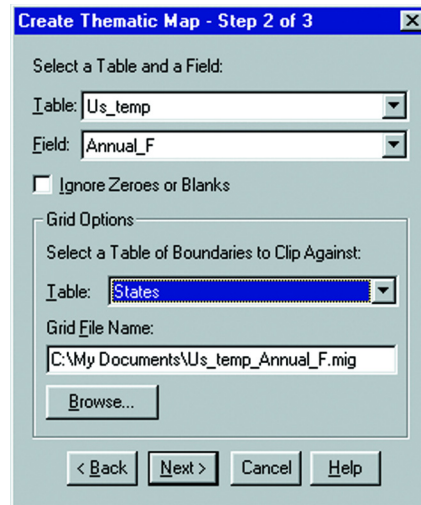
### Other Grid Tools

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.

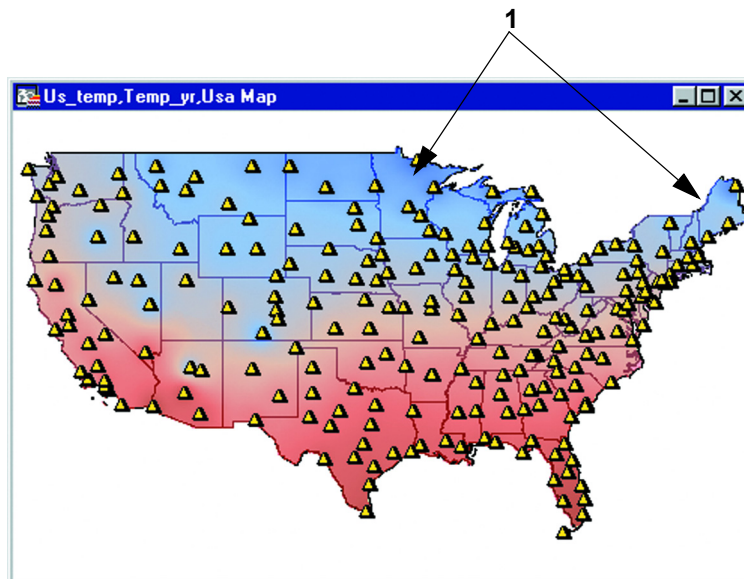
Finally, loading Grid Tools places a grid “info tool” on the Tools toolbar that you can use to display the x, y, and z coordinates of a mouse-click location in a grid layer. Click the button to activate it, and then click anywhere on your grid layer to display the coordinates for that location.

### Clipping a Grid Map

MapInfo Professional’s grid tool 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.



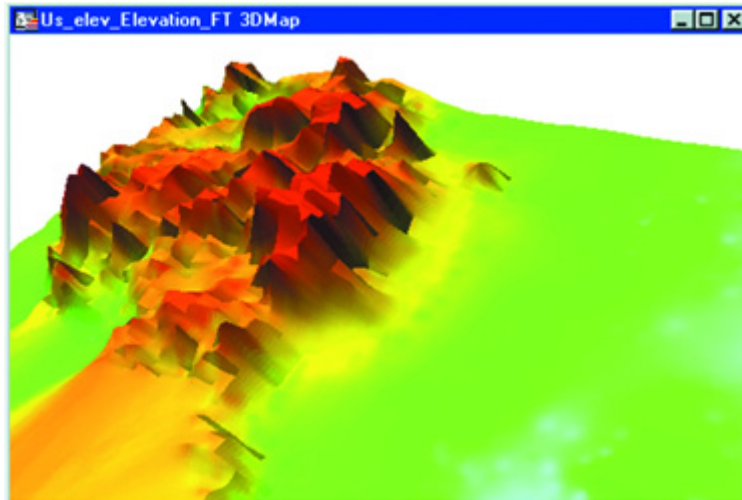
1 Areas with missing grid cells

## 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 394](#).

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.



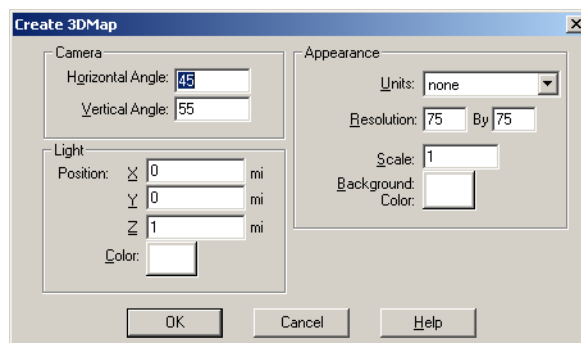
Use the Create 3DMap command (**MAP > CREATE 3DMAP**) to create a 3D view of a Grid Thematic map when the Grid Thematic map is in the active window. You can rotate, zoom, and pan the 3D view. Additionally, you can clone the 3D view. The 3DMap window is a stand-alone window. If you modify the tables in 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

For more information on creating a Grid Thematic map or to open an existing grid layer, see [Working with Grid Surface Maps on page 382](#).

To create a 3DMap:

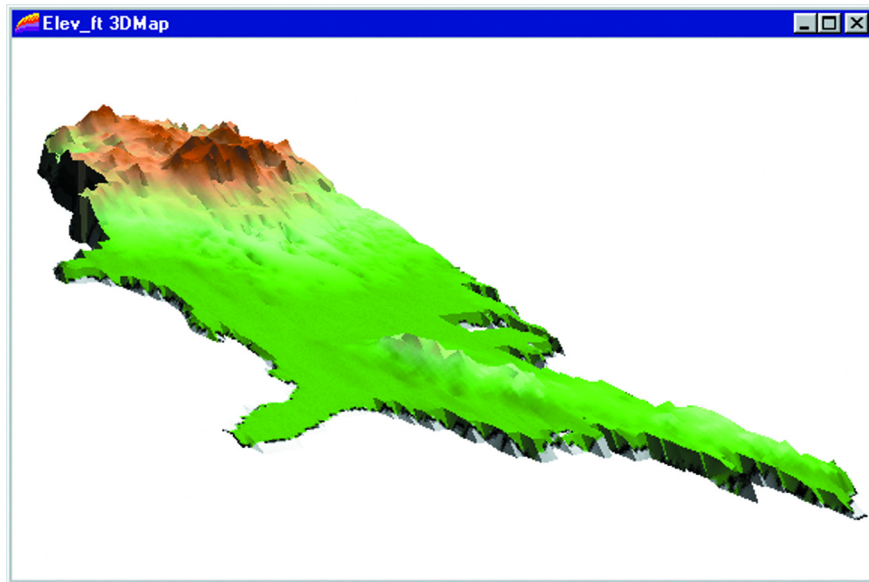
1. Choose **MAP > CREATE 3DMAP**. The **CREATE 3DMAP** dialog box displays.





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.
2. 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:

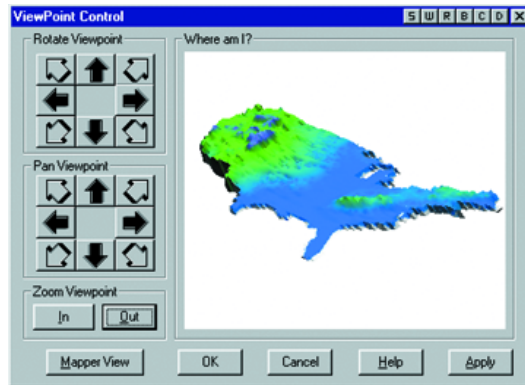
**Refresh Texture:** Regenerates the image used for the texture on the grid. Use this option if you change or update the tables or objects used in the 3DMap.

**Clone View:** Creates a clone of the 3DMap window.

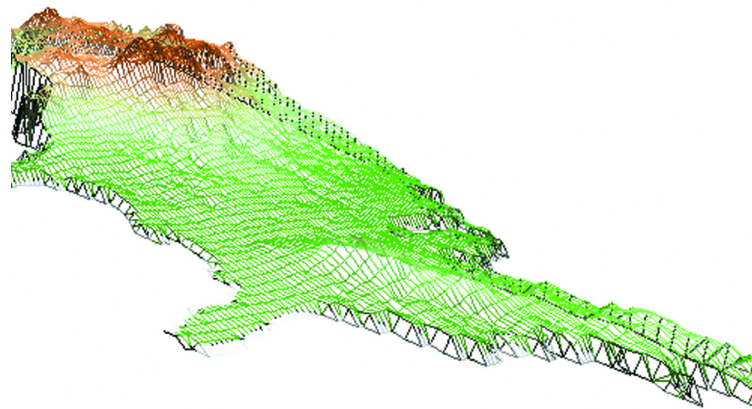
**Previous View:** Returns to the previous view of the 3DMap.

**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.

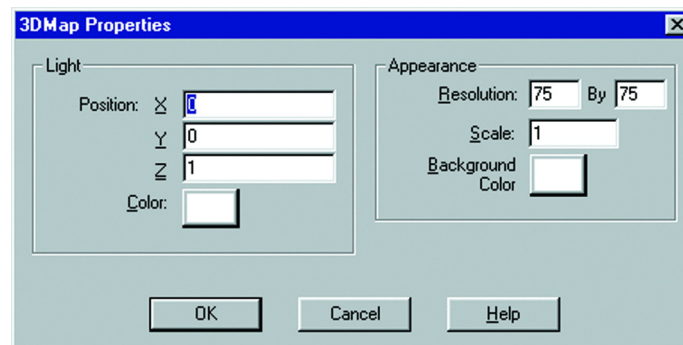


**WireFrame:** Toggles between a wireframe and surface representation of the grid. Additionally, cloned 3DMap windows have the surface representation of the grid, even if the cloned window is in wireframe mode. To toggle the wireframe mode on and off, press the **‘W’** key on the keyboard while the 3DMap 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.

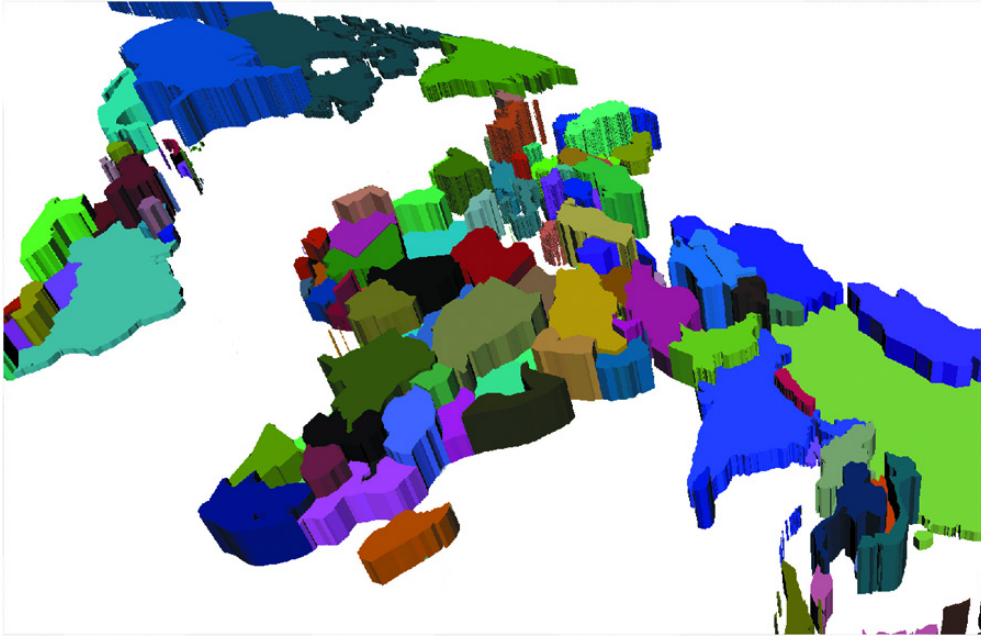
Prism maps are created using region layers. Other closed objects such as rectangles, ellipses, and rounded rectangles are also included in the Prism map, as well as the region portion of Collection objects. Point objects are not included in the Prism Map.

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 (for example, 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.

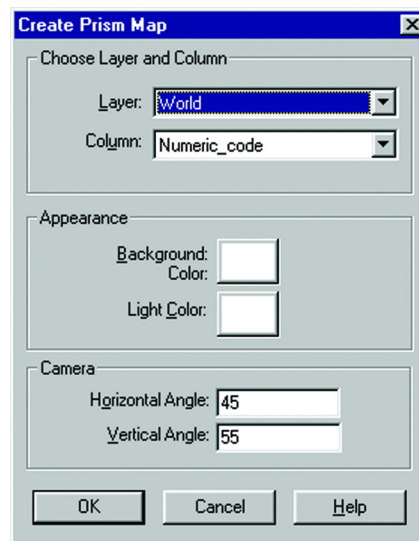
The commands in the **3DWINDOW** menu for Prism maps are the same as those for 3DMaps. You can control the view of the map, create a duplicate view, and set the map’s point of view, enabling you to choose the angle that will best emphasize the prism effect of the raised geographies.



### 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 376](#).

## 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.

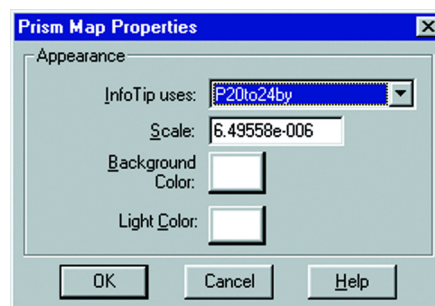
Sometimes an object in a Prism map displays the incorrect texture or image. This usually occurs when the geometry of an object has changed for some reason, for example, as a result of map clipping, moving the object, or adding or removing nodes. Use the Refresh Texture command in the **3DWINDOW** menu 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** ..... 400
- ♦ **Editing Objects using the Set Target Model**..... 408
- ♦ **Creating Territories by Combining Objects** ..... 414
- ♦ **Creating and Manipulating Objects** ..... 424



## 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.

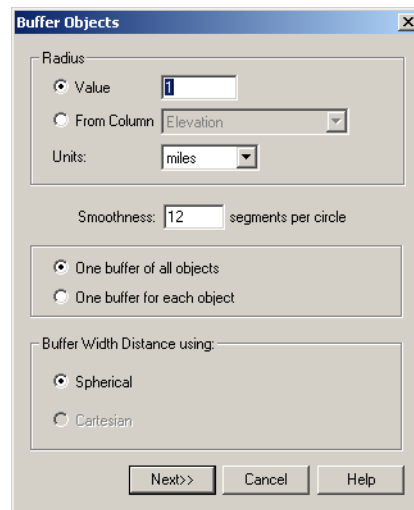
### Understanding Buffers

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.

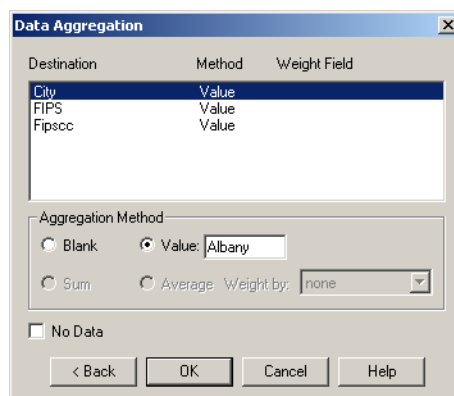
If you select **EXPRESSION**, the **EXPRESSION** dialog box displays. Specify the expression you want MapInfo Professional to use to calculate the buffer radius and click **OK** to return to the **BUFFER OBJECTS** dialog box.

- **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.

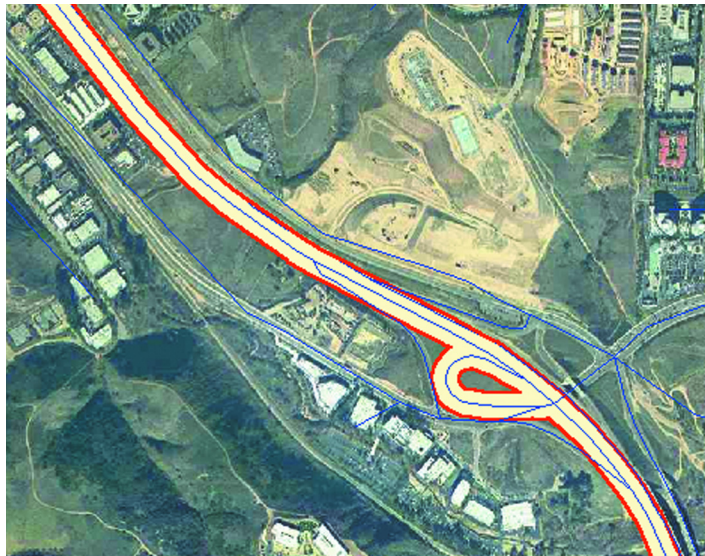
The more segments you enter, the smoother the curve. The fewer segments, the more jagged the curve. More segments produce a smoother curve; fewer segments make a more jagged curve.

- **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 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, select the **NO DATA** checkbox. 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 checkbox if you want no data aggregated to any column.
6. After setting the appropriate data aggregation parameters, click **OK**. MapInfo Professional calculates the buffer according to the parameters you set 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.



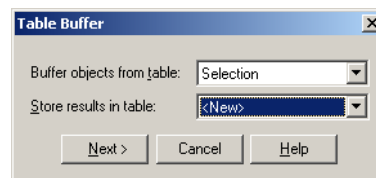
### Saving your Buffer as a New Layer

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 418](#). 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.



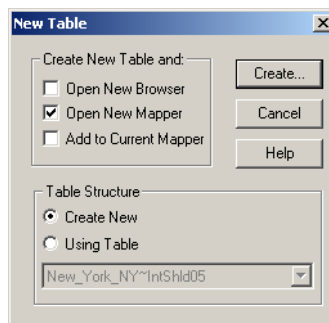
3. Do one of the following:
  - To buffer the selected object, leave the **SELECTION** object selected in the **BUFFER OBJECTS IN TABLE** drop-down list box.
  - To buffer objects from a particular table, select the table in the **BUFFER OBJECTS IN TABLE** drop-down list box.
4. Select the type of table 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 403](#).
  - If you chose **<TABLENAMES>**, go to [Saving a Buffer to an Existing Table on page 404](#).

### ***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 402](#) before you begin this operation.



1. Use the New Table check boxes to indicate where you want the new buffer to display. You can click more than one checkbox.
 

**OPEN NEW BROWSER** — Click this checkbox to display the new buffer in a new Browser window only.

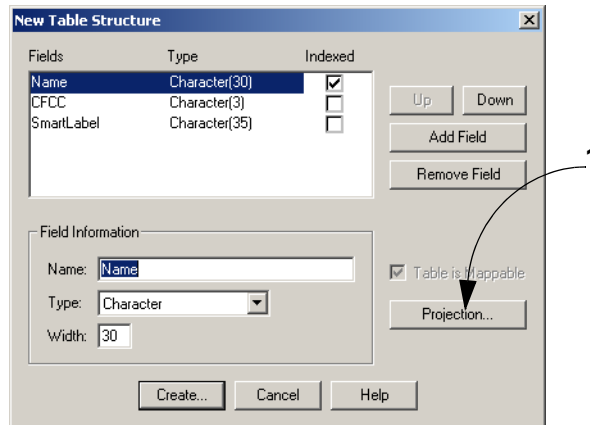
**OPEN NEW MAPPER** — Click this checkbox to display the new buffer in a new Map window.

**ADD TO CURRENT MAPPER** — Click this checkbox 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 checkbox to specify a new table structure and create the new fields in the **NEW TABLE STRUCTURE** dialog box.

**USE TABLE** — Click this checkbox 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.



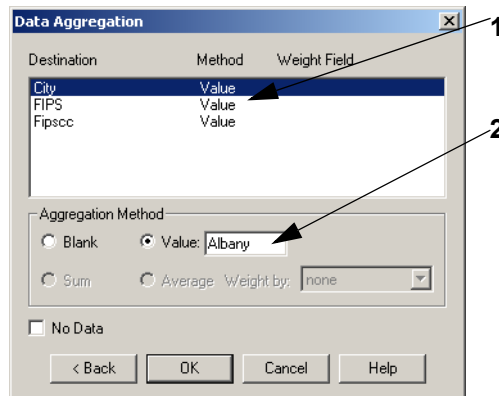
Click the **PROJECTION** button to set the table's projection. For more about this, see [Coordinate Systems, Projections, and their Parameters on page 521](#).

4. Click the **ADD FIELD** button and enter the field name, select the field type, and enter the field width for each new field until your table structure is complete.
5. Click **CREATE** to create the table and display the buffer. 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 402](#) before you begin this operation.

1. When you choose to store the table results in the existing table, the **DATA AGGREGATION** dialog box displays.



1 Click a field here.

2 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** checkbox. 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 400](#).

**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

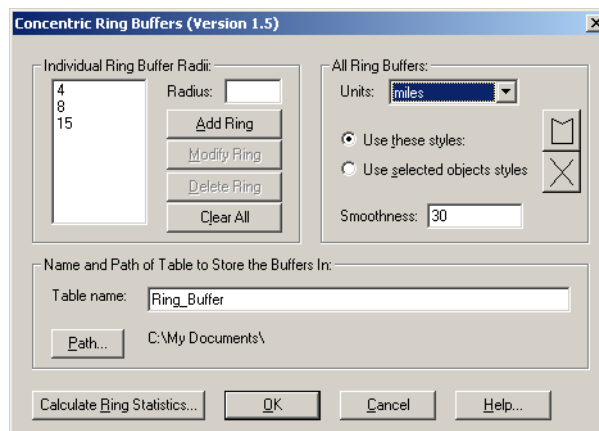
In the [Creating a Buffer on page 400](#), you learned how to create a buffer around one or more objects. Concentric ring buffers allow you to create multiple buffers of different radii around an object or a set of selected objects.

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.
2. Find the **CONCENTRIC RING BUFFER TOOL** in the list, and check the **LOADED** and **AUTOLOAD** boxes next to it.
3. 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:

1. In the Map window, select the object(s) you want to place buffers around.
2. On the **TOOLS** menu, point to **CONCENTRIC RING BUFFERS** and click **CREATE RING BUFFERS**. The **CONCENTRIC RING BUFFERS** dialog box displays.



3. 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.
4. Select the units of each radius in the **UNITS** drop-down list.
5. 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.
6. 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.
7. 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.



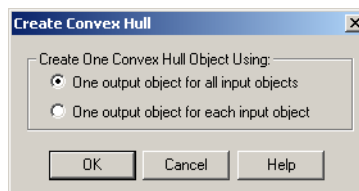
## Convex Hull Buffers

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.

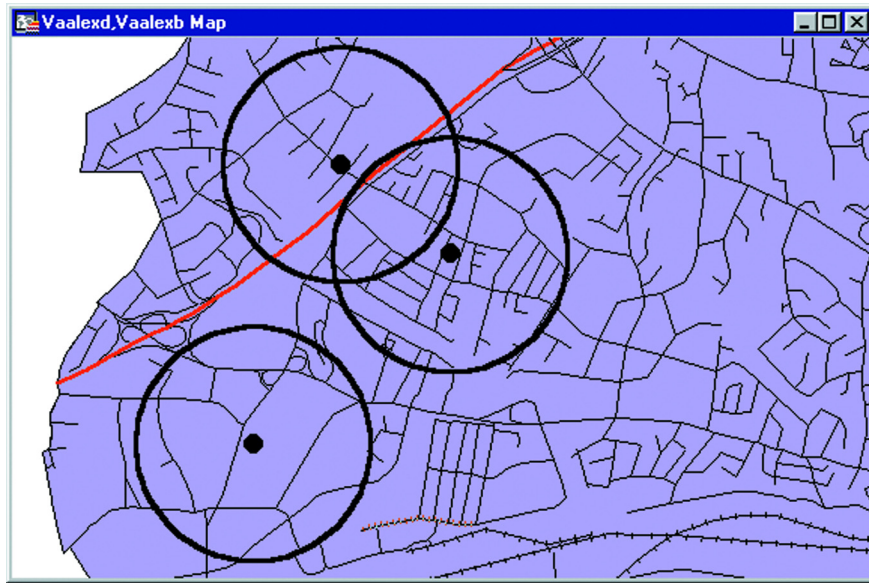
The convex hull object is selected when it displays. To change the fill of the convex hull object, do one of the following:

- 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** checkbox. 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.

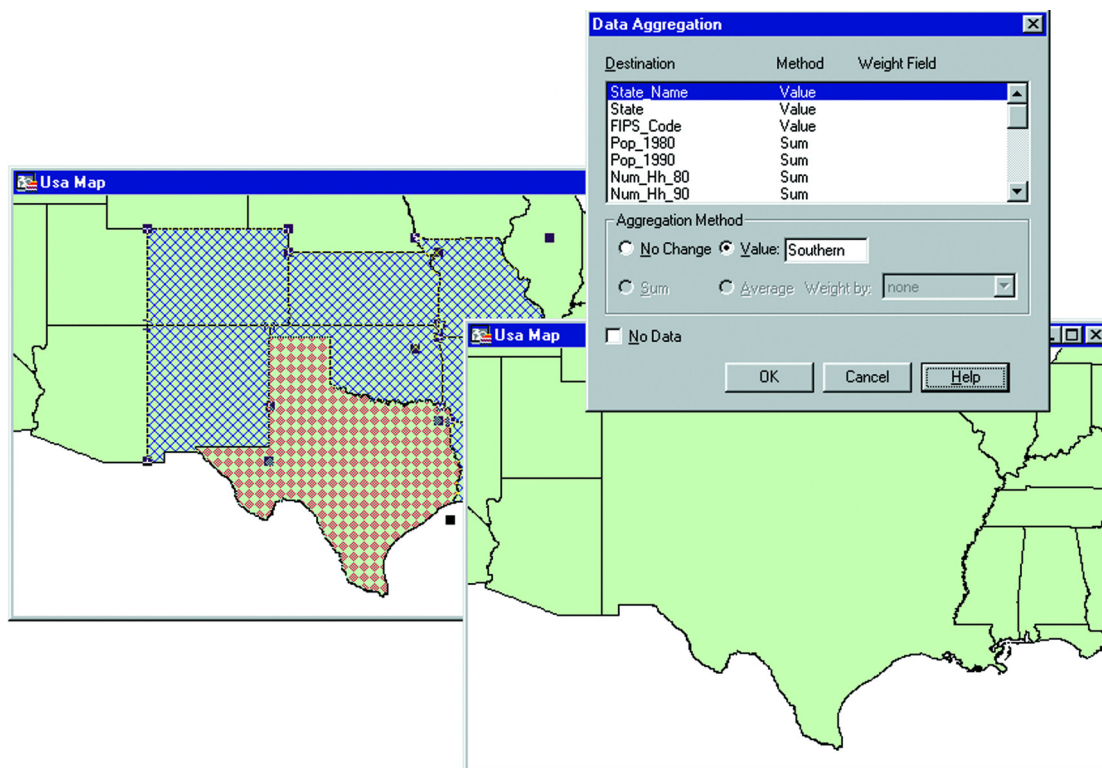
To combine map objects using Set Target:

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 410](#).

**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
- **CTRL-CLICK** for non-consecutive fields.

When you have chosen the aggregation methods for each field, click **OK**.

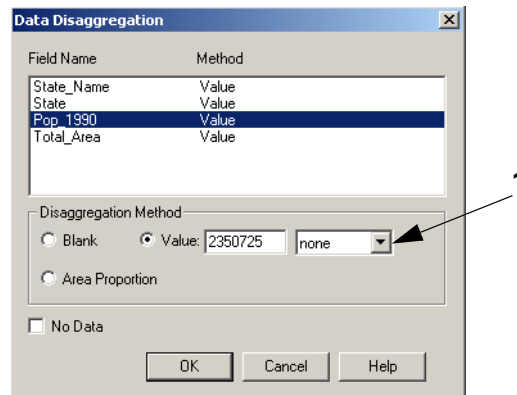


MapInfo Professional computes the new object and displays it as a single object. Use the Info tool to view the aggregated data (if any) associated with the object.

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 410](#) 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.



1 Column Name field

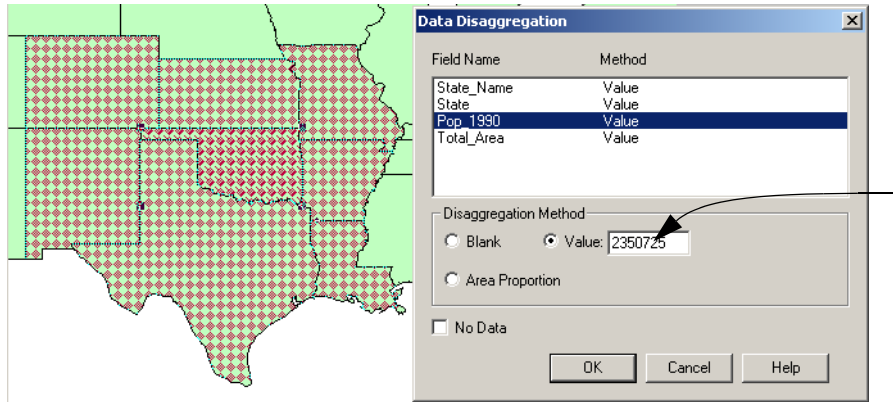
The **AREA PROPORTION** radio button is active if the selected field is numeric. Also the **VALUE** entry field is enabled when you select the **VALUE** radio button and the drop-down list contains “none”.

## 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 14 on page 516](#). For example, 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.



1 Value Edit field.

- Highlight each field and select the appropriate disaggregation method in the Destination list. You can select the **NO DATA** checkbox 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 410](#).

- 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
- CTRL-CLICK** for non-consecutive fields

- 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.

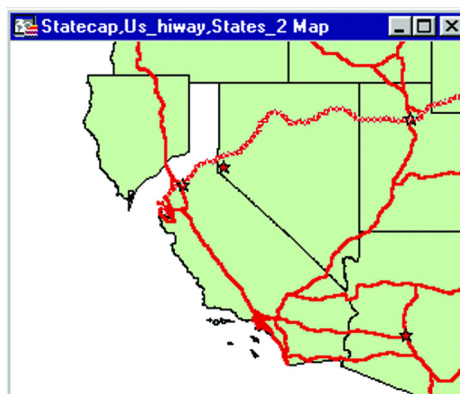
You cannot use Polyline Split on text objects or to cut objects that are not in editable layers. To split a map object:

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 14 on page 516*.

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

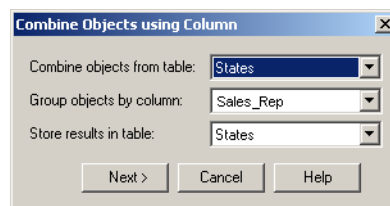
- SALES\_REP: Sales representative assigned to that state
- CUSTOMERS: Number of customers per state
- AVG\_SALES: Average spent per customer

You would like to aggregate the data in the following manner:

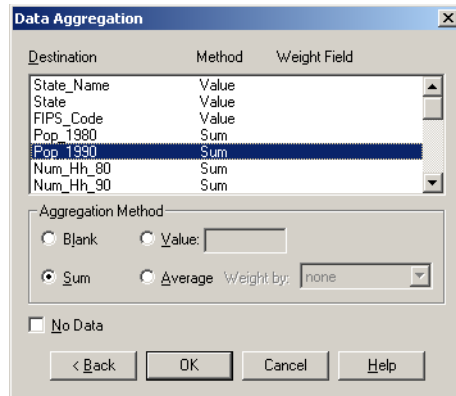
- SALES\_REP: Combine all records that list Benita as the sales representative
- CUSTOMERS Sum up the number of customers in the sales territory
- AVG\_SALES: Average the amount spent per customer in the sales territory

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 chose **<NEW>** from the **STORE RESULTS IN TABLE** drop-down list to create a new table for the combined objects, a series of dialog boxes prompt you to create the new table.
  - If you specified an existing table, you need to specify how to combine the data. To aggregate your data, click **NEXT** 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** 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 418](#).

- Select a column from the list and select the data aggregation method for that column by selecting one of the following:

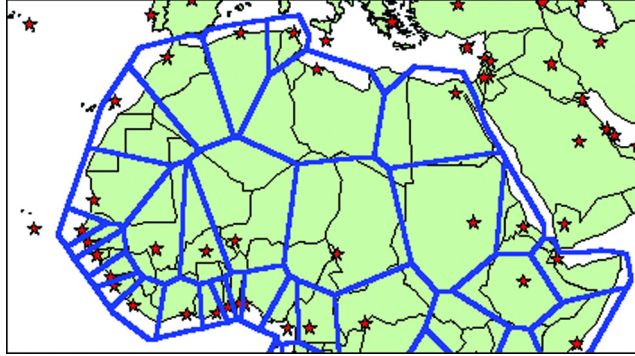
**Note:** Not all of these data aggregation methods display. The options depend upon the kind of data you are aggregating and whether the columns match.

- Click **BLANK** to store blank values in the selected columns.
- Click **VALUE** to enter an appropriate value 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
- CTRL-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** checkbox. Selecting this checkbox disables the column selection in the **DATA AGGREGATION** list.



This 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.

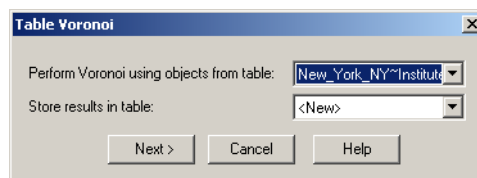
**Note:** You cannot place Voronoi polygons in the Cosmetic Layer.

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 432](#). This is not required.
3. On the **TABLE** menu, click **VORONOI**. The **TABLE VORONOI** dialog box displays.

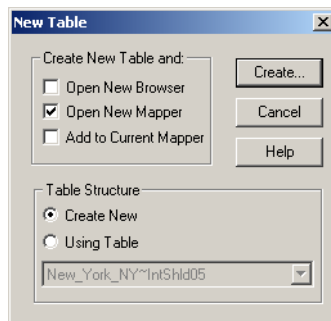


4. Select the layer you want to create the Voronoi polygon with in the **PERFORM VORONOI USING OBJECTS FROM TABLE** drop-down list. If you selected points you want to use to create this polygon, choose the "Selection" entry in this list.
5. Select the table type for the results of the Voronoi polygon 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 419](#).
  - If you selected the **<TABLENAMES>** option, go to [Save the Voronoi Polygon to an Existing Table on page 420](#).

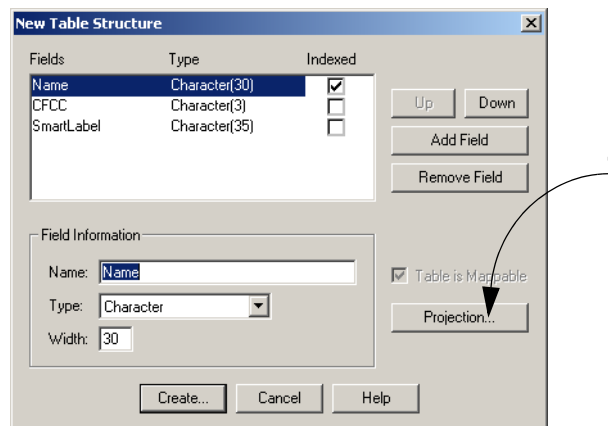
### Save the Voronoi Polygon to a New Table

To save the Voronoi Polygon to a new table:

1. In the **NEW TABLE** dialog box, follow these directions:



2. Use the **NEW TABLE** 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 checkbox to display the new Voronoi polygon in a new Browser window only.
  - **OPEN NEW MAPPER** — Click this checkbox to display the new Voronoi polygon in a new Map window.
  - **ADD TO CURRENT MAPPER** — Click this checkbox 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 [Coordinate Systems, Projections, and their Parameters in Chapter 14 on page 521](#).

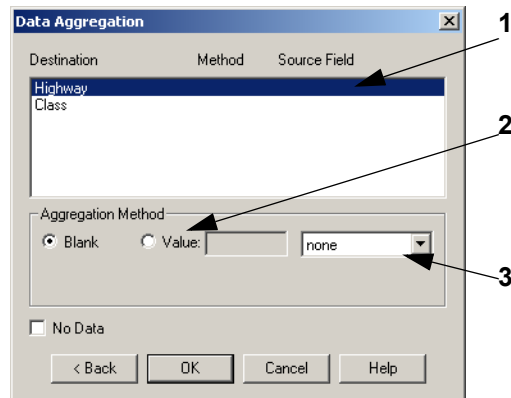
**Note:** If there are entries in this dialog box, you are copying the table structure of an existing table. If you opted to create a new table structure, there are no fields to list.

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.

6. 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.
7. 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

1. When you choose to store the table results in the existing table, the Data Aggregation box displays.



1 Select the field here. 2 Specify the data aggregation method here. 3 If the columns in the tables you are combining do not match, specify the source column in this field.

**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. 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 410](#) for these details.

3. If the new table information should add no data to the existing table, select the **NO DATA** checkbox to disable the other field options.
4. 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.

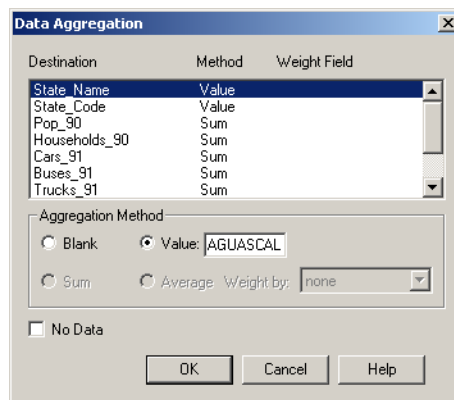
A Multipoint object consists of a number of points that have been grouped into a single object. The Multipoint object displays in a Browser window as a single record, and all the points within the object have the same symbol. One method you can use to create a multipoint object is to select a group of 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, for example, a Collection object that contains only polylines is automatically converted to a multi-polyline 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.

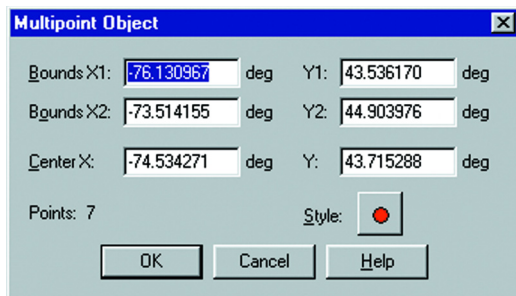


**Note:** Text objects cannot be used as input in a Combine operation.

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.

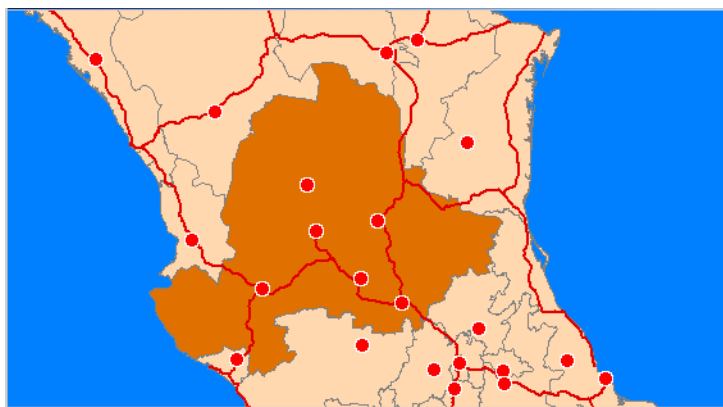
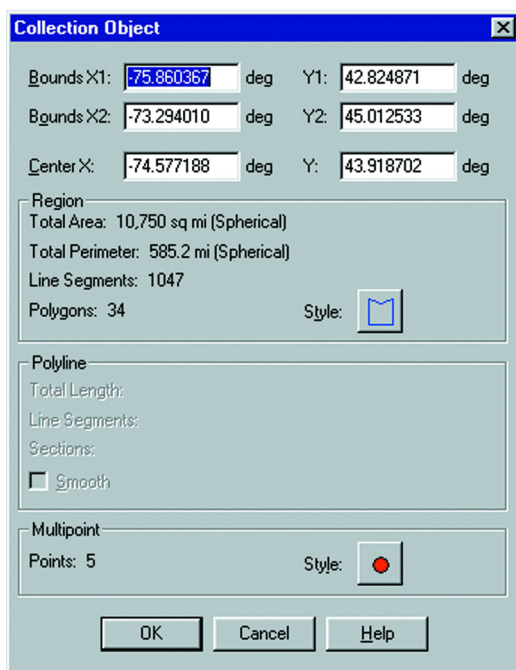
Any point objects selected are combined to form a multipoint object. Any polyline objects selected are combined to form a new region object. The resulting multipoint (if one exists), polyline (if one exists) and region (if one exists) are grouped together to form a new collection object.

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.



## 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

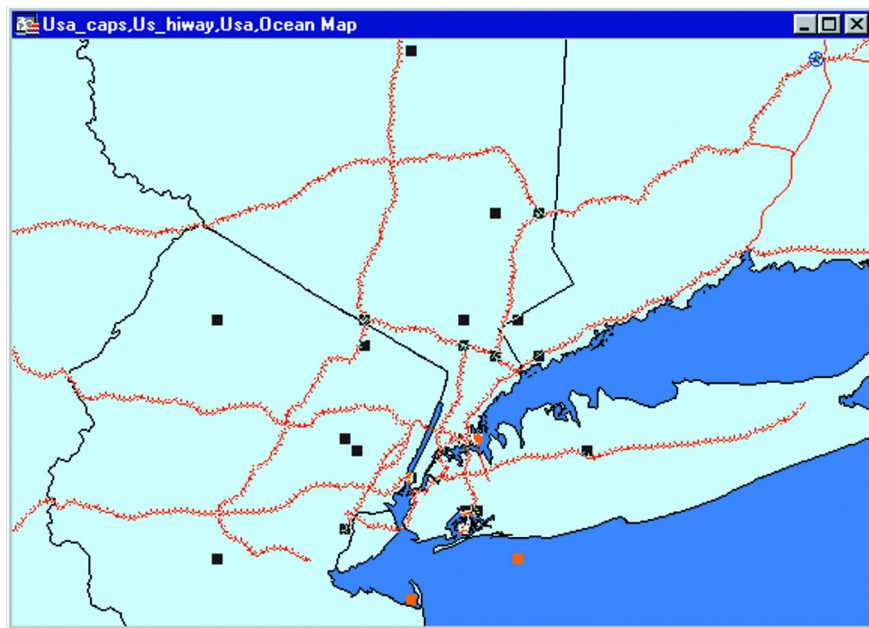
Use the Enclose command to create regions from polygonal areas formed by intersecting polylines. You can form a new region network anywhere where the polylines form an enclosed area. For example, you could create regions from a road net, where the regions are the parcels of land between the roads.

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.

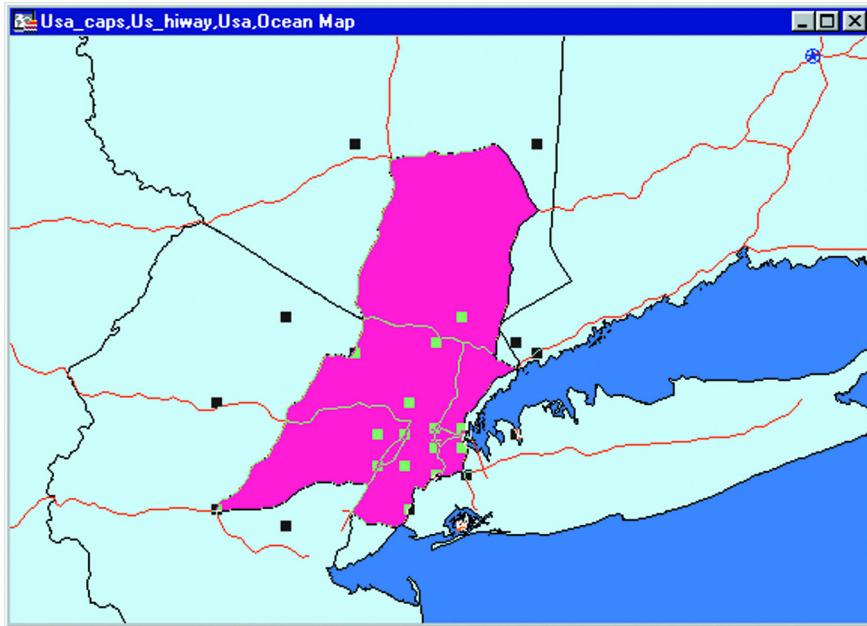
To use the Enclose command, your Map window must be active, it must contain an editable layer, and objects in the editable layer must be selected. This is a highway map of the greater New York City metropolitan area. A number of the highways have been selected.



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 (for example, 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 427** section.

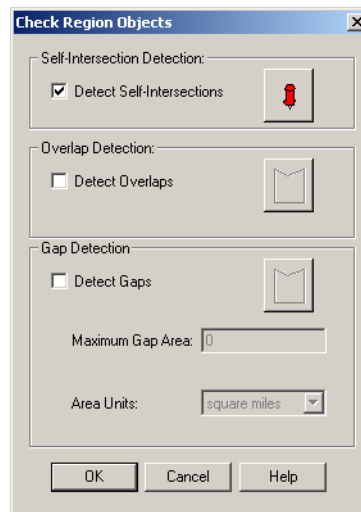
The Self-Intersection Detection option helps you to check your regions for areas that cross over themselves, which could cause errors later on. When you use this option, Check Regions creates a point at the location where the data may self intersect. To change the symbol used to indicate self intersections, 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** checkbox. The **SYMBOL STYLE** button enables. The checkbox is set by default.
5. To check for region overlaps, select the **DETECT OVERLAYS** checkbox. The **STYLE** button for Overlap Detection enables. The checkbox is cleared by default.
6. To check for gaps, select the **DETECT GAPS** checkbox. The **REGION STYLE** button, the **MAXIMUM GAP AREA**, and the **AREA UNITS** are activated. The checkbox 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** checkbox 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.

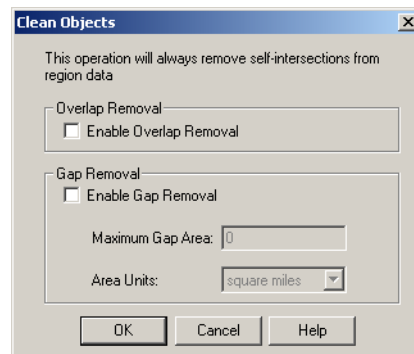
## Cleaning Objects

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.

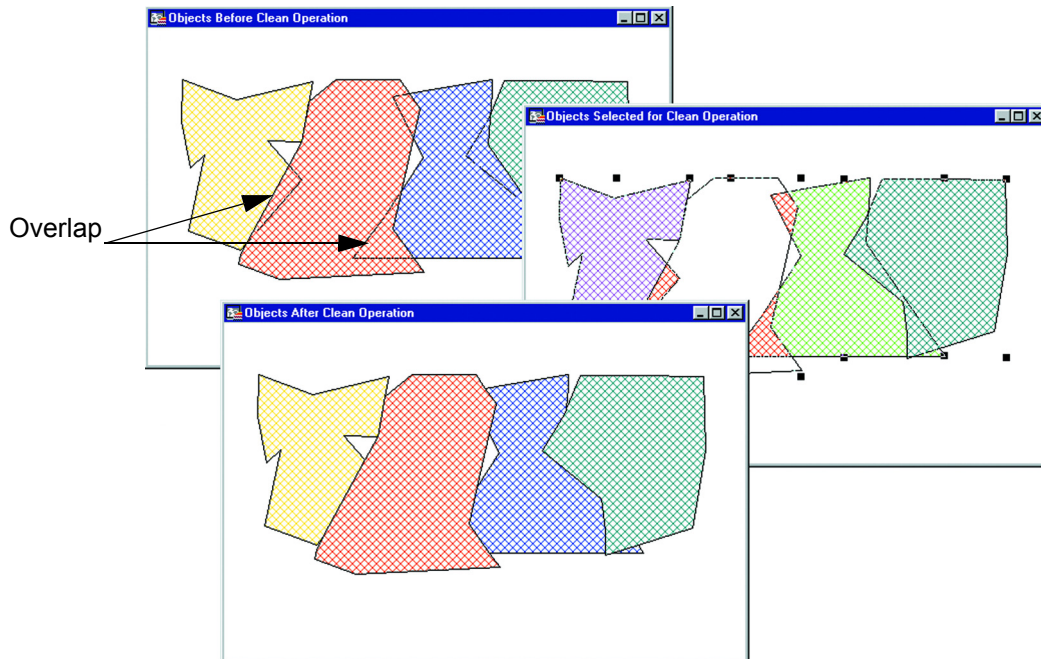
**Note:** All of the objects selected must be closed objects (for example, regions, rectangles, rounded rectangles or ellipses).

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** checkbox 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** checkbox 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.

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:

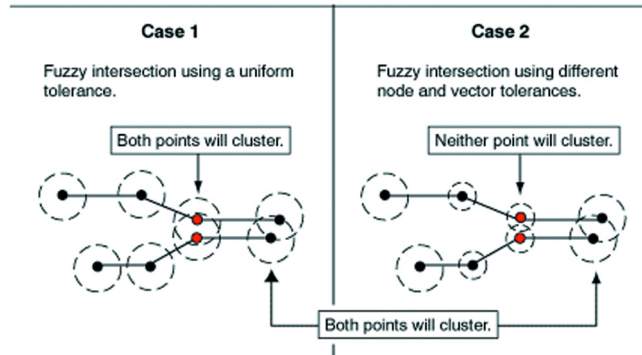
- The Inter-Object Node Snap – Snaps nodes from different objects together.
- The Node Thinning/Generalization – Removes nodes from objects while retaining their shape. When you thin region objects, shared boundaries are retained.
- Polygon Area Thinning – Removes small polygons from selection.

Snap/Thin is available whenever objects are selected in an editable table. These objects must either be all closed or all linear objects. You cannot use Snap/Thin a mix of closed and linear objects.

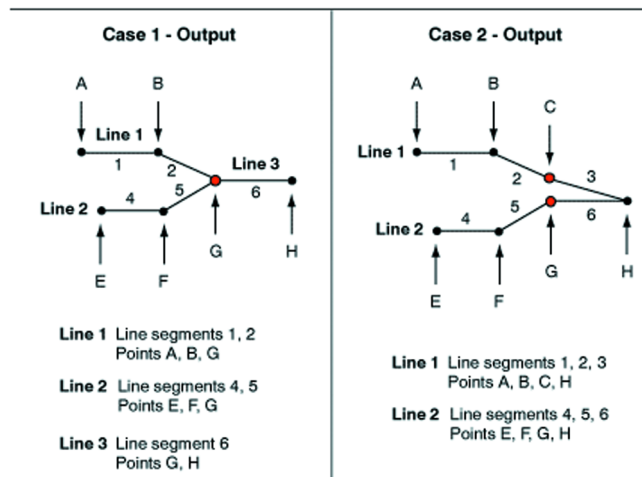
### Inter-Object Node Snap

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** checkbox 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** checkbox 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** checkbox 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 have the overlap removed, but which region retains the overlap, and which region it is removed from often are 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.
- Polyline objects 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.
- 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 checkbox, 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 **NO DATA** to prevent input table columns from being carried to the output table.
7. Select a Disaggregation method: **VALUE**, **BLANK**, or **AREA PROPORTION** and click **OK**.



## Erasing Objects

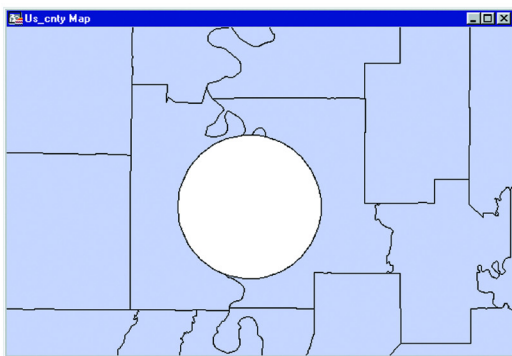
You have two choices in the **OBJECTS** menu when you want to remove some portion of the target map object. Use **ERASE** to erase the portion of the target object that is overlapped by the cutter object. Use **ERASE OUTSIDE** to remove the portion of the target object that is *not* overlapped by the 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.

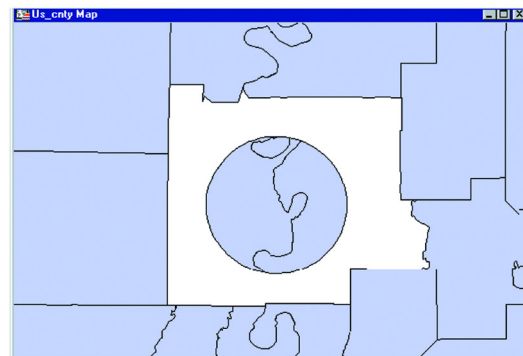
Both the Erase and Erase Outside commands support point, multipoint, and collection objects.

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
  - **CTRL**-click for non-consecutive fields
6. Click **OK**.



1



2

*1 End result of Set Target - Erase. Circular object is removed. 2 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.

## In this Chapter:

- ◆ **Identifying the Right Type of Graph** ..... 436
- ◆ **Graphing Your Data** ..... 439
- ◆ **Working with Multi-Table and Multi-Variable Graphs** .... 445

## Identifying the Right Type of Graph

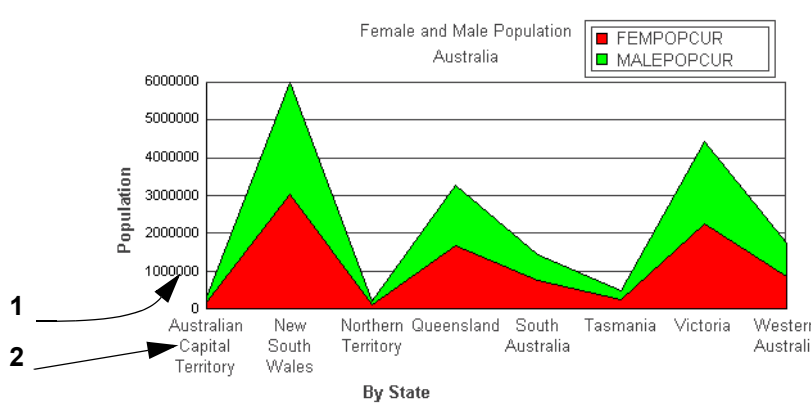
Think about this. What do you need your graph to tell your audience? This determines the type of graph you should select. In MapInfo Professional, you can choose from 10 different graph types. Each type of graph includes at least one graph template that you can use to create your graph. Each graph type, 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.



1 Y Axis 2 X Axis

#### 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.

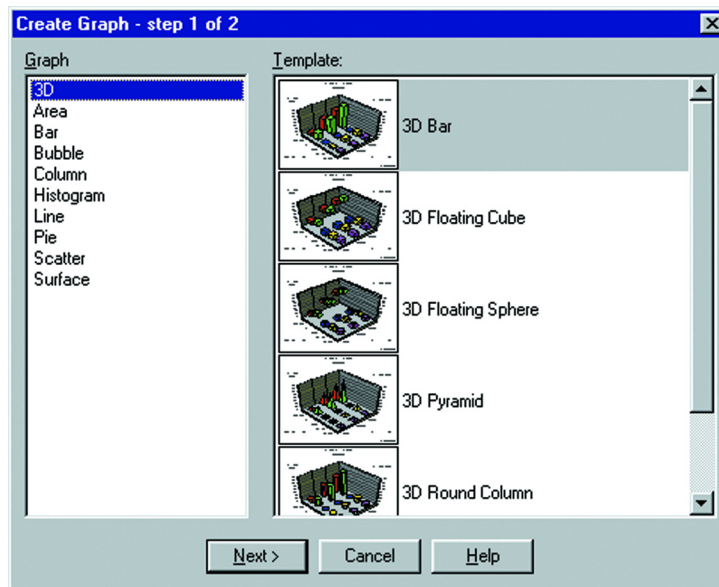
### Creating a Graph using the Graph Wizard

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.

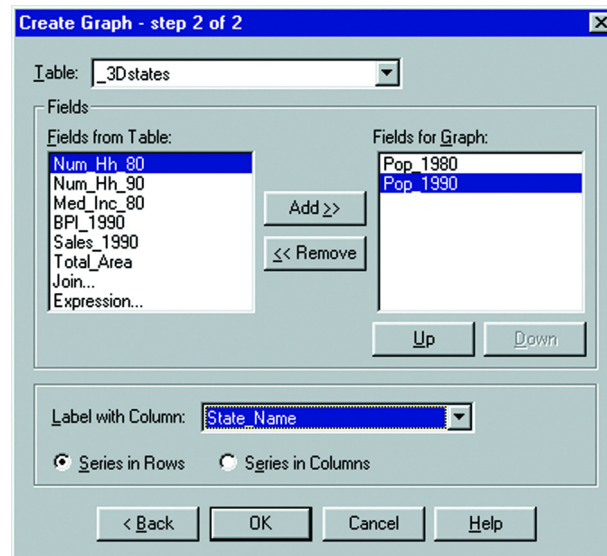
Here, select the graph type and the graph template you would like to use.



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 450](#) 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

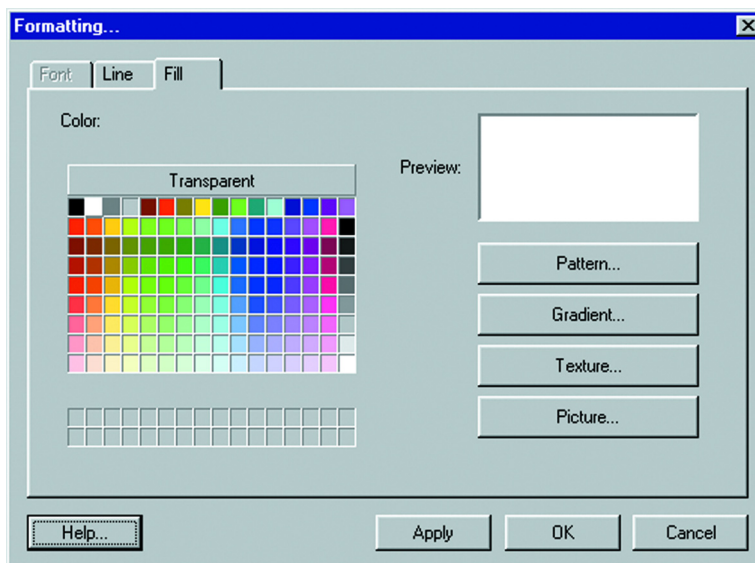
To move a graph object, click it in the Graph window and drag it to the desired location. You can move the titles, data labels, and the legend. To resize the legend, select it to display legend handles. Click and drag on one of the edit handles to make the legend larger or smaller.

## 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.

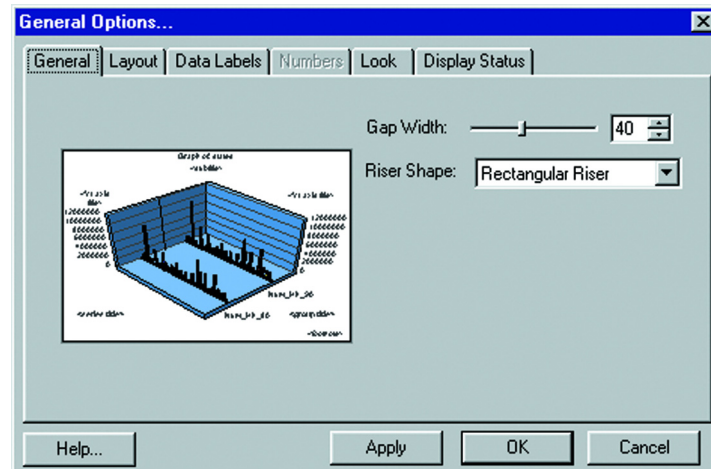
## Formatting Graph Objects

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.



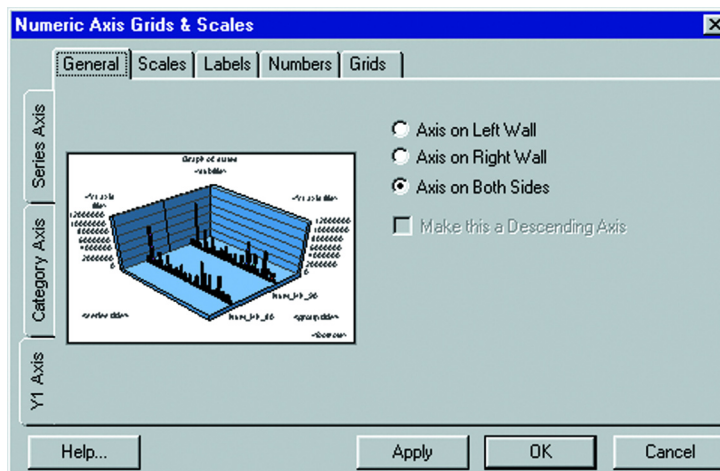
## Layout and Display

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).



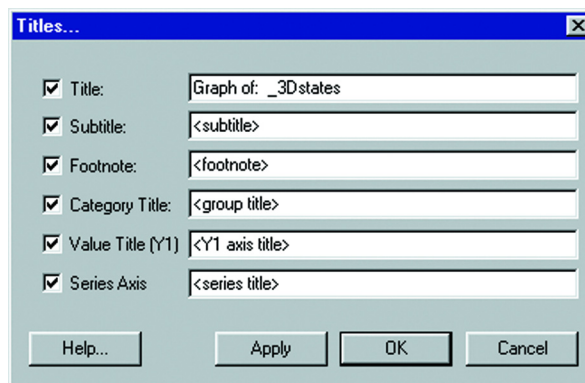
When you select an axis tab, the tabs at the top of the dialog box will change to reflect the available formatting options for that axis. Each axis is described in this section:

- **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.



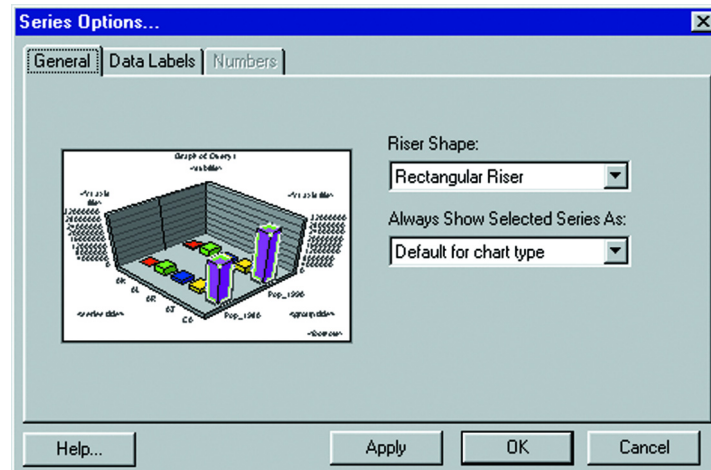
The text boxes next to those titles become available. You can use the default titles or create your own. Choose from these titles:

- **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 and 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.



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 changes in each of the dialog box tabs and click **OK**. You can also apply changes as you go by clicking the **APPLY** button. Apply saves 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 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:

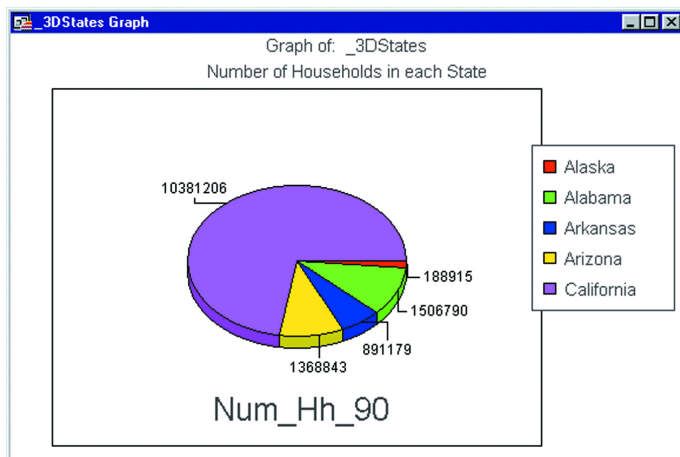
- **GENERAL** – Contains general formatting options for a series for each type of graph. For instance, in 3D column graphs, you can change the riser shape; in bubble graphs and other graph types that may use markers such as line graphs, you can change the shape of the markers. In pie graphs, you can 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.

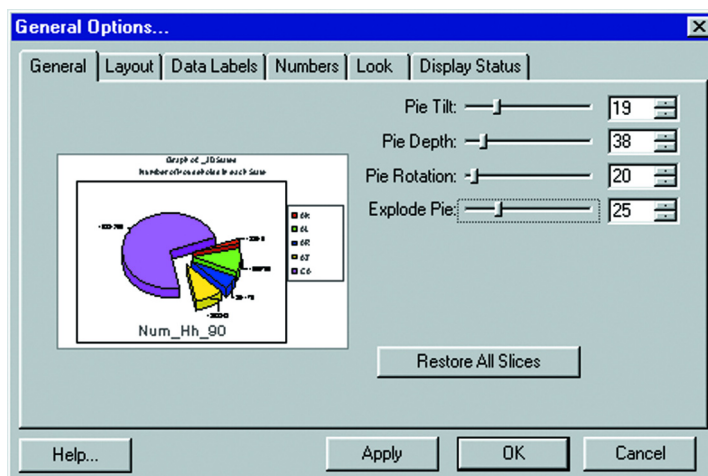
### Exploding a Pie Graph

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.



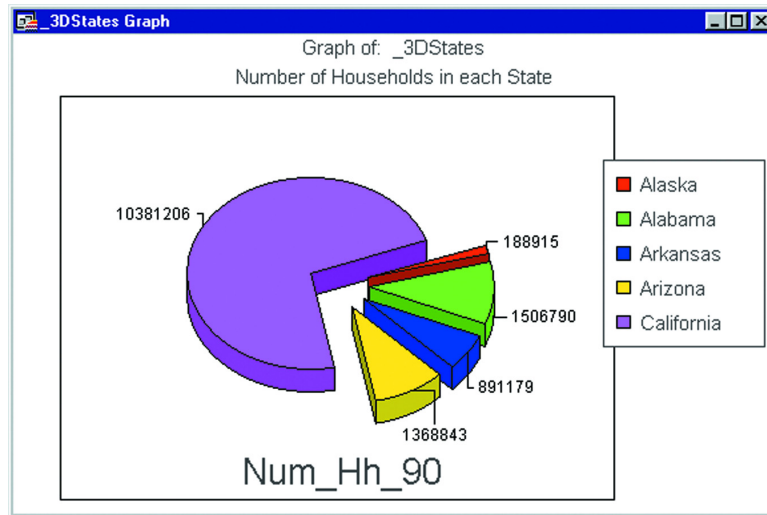
**Note:** Some of the files described in this example may refer to MapInfo Professional Tutorial data, which is available on the MapInfo web site, [www.mapinfo.com/miprotutorial](http://www.mapinfo.com/miprotutorial).

The General Options for pie graphs enable you 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.



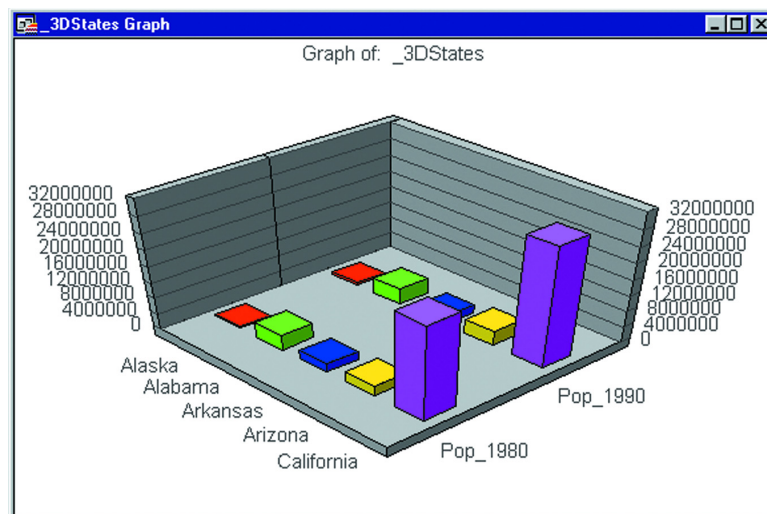
You can also rotate the pie or explode the pie. When you explode the pie, you detach all the slices away from the center. You can also detach an individual slice away from the pie center using the Series Options (on the **GRAPH** menu, click **SERIES**).

The next graph shows the same pie graph, based on the General Options settings indicated above.

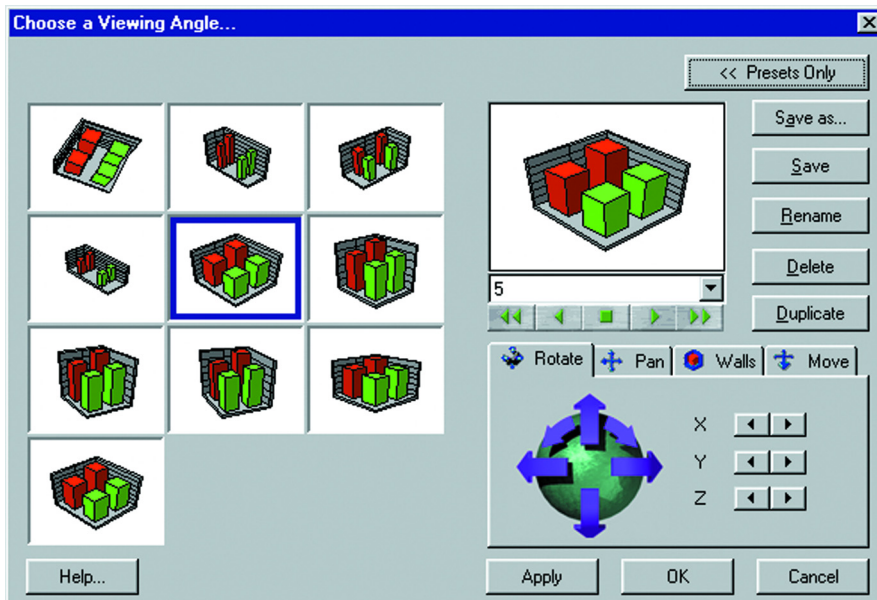


### 3D Graphs - Using the 3D Viewing Angle

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.



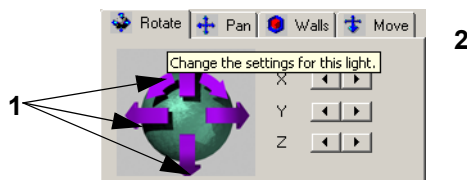
When you choose the **3D VIEWING ANGLE** option, preset angles for your graph display. You can choose one of these, or use the Advanced options to create your own angle, position, and rotation. The **ADVANCED** portion of the dialog box displays additional controls that allow you to scroll through the 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

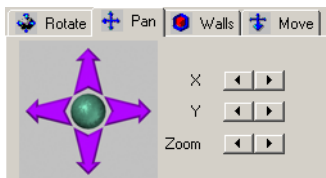
Use the options Rotate, Pan, Walls, and Move at the lower right of the dialog box to manipulate the graph. In the **ROTATE** tab, you can click directly on the arrows to rotate your graph in the direction indicated by the arrow. A preview of the graph in its new position displays above. You can also rotate the graph one click at a time using the **X**, **Y**, and **Z** buttons.



1 Click an arrow to rotate the graph. 2 Click the X, Y, and Z arrows to rotate the graph one click.

### Panning Your 3D Graph

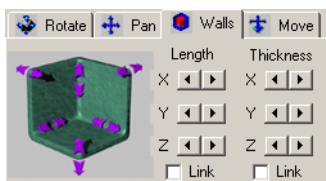
Use the Pan tab options to move the graph across the window. Again, click directly on the arrows to move the graph in the direction indicated by the arrow, or use the **X** and **Y** buttons to move the graph one click at a time. Use the **Zoom** buttons to zoom the graph in and out.





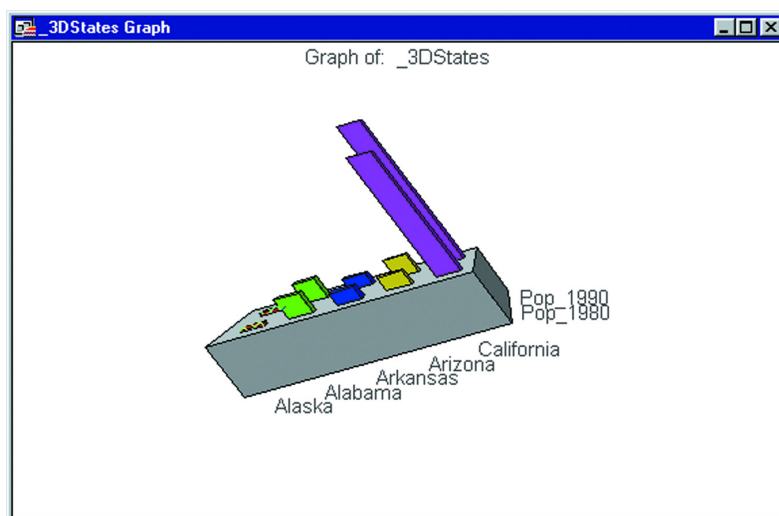
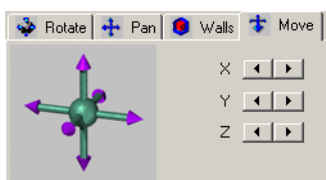
### Customizing Cube Walls

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.

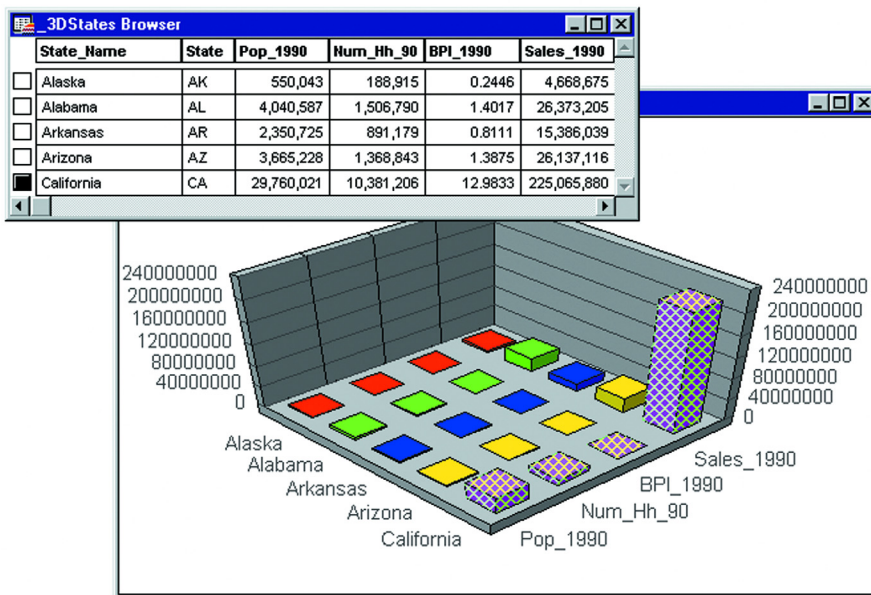
All of the **3D VIEWING ANGLE** options have been used in this graph. The graph has been rotated about 90 degrees from the earlier example. The **PAN** and **MOVE** options have also been used to position the graph. And the **WALLS** option has been used to increase the thickness of the floor of the 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.

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, for example, 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 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 <b>3D VIEWING ANGLE</b> dialog box (on the <b>GRAPH</b> menu, click <b>3D VIEWING ANGLE</b> ).
Gradients	Files correspond to the preset gradients available in the <b>CHOOSE GRADIENT</b> dialog box (on the <b>GRAPH</b> menu, point to <b>FORMATTING</b> and click <b>FILL TAB</b> ).
Pictures	Files correspond to the pictures available in the <b>CHOOSE PICTURE</b> dialog box (on the <b>GRAPH</b> menu, point to <b>FORMATTING</b> and click <b>FILL TAB</b> ).
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 <b>CHOOSE GRADIENT</b> dialog box (on the <b>GRAPH</b> menu, point to <b>FORMATTING</b> and click <b>FILL TAB</b> ).

## Location Preferences

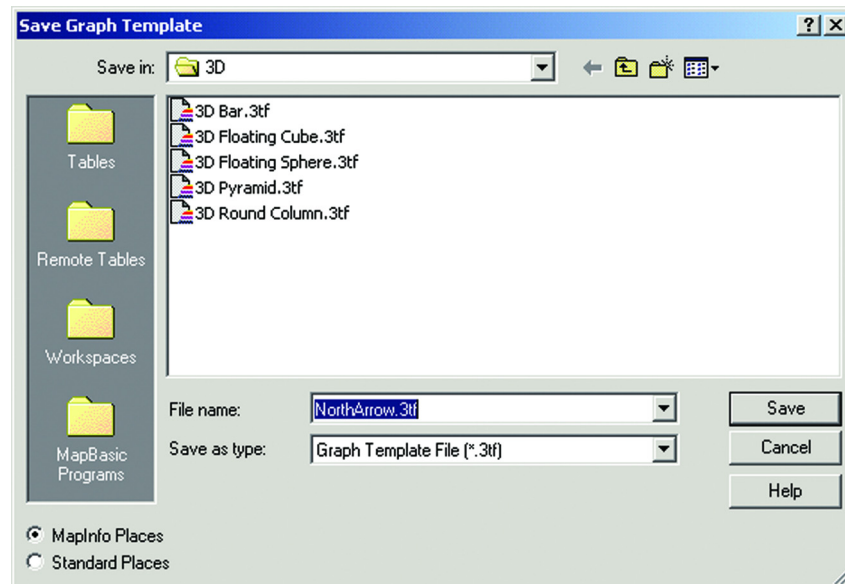
Using the Directory preferences, you can change the location where MapInfo Professional looks for all the support files. To do so:

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 the latest version, 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** ..... 454
- ◆ **Labeling Your Map** ..... 458
- ◆ **Working with Layouts** ..... 468
- ◆ **Creating a Cartographic Legend** ..... 481
- ◆ **Printing and Exporting Your Results** ..... 497

## Changing a Map's Style

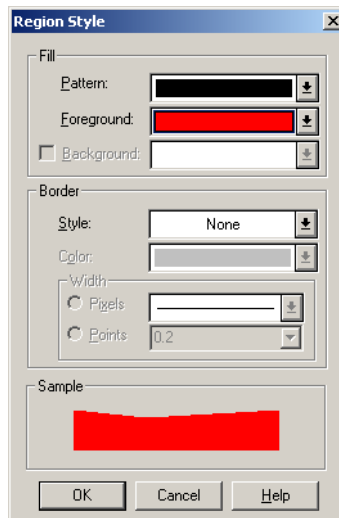
Changing the look of the map is an important part of making it more effective. In this section, we review how to change the way your map looks one piece at a time. For a more comprehensive change in your map's appearance, see [Creating Thematic Maps, Legends, and Other Maps in Chapter 9 on page 355](#).

### Changing a Region's Style

To change the style of a region:

1. 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.



2. 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**, 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 chose the solid 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.

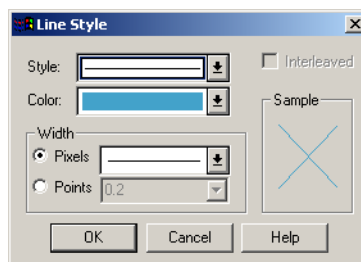
**WIDTH** — Choose the border line width. In the **PIXELS** field, enter a number from 1-7, each number represents a line width in pixels. In the **POINTS** field, select or enter a point size.

**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:

- Do one of the following to display the Line Style dialog box:
  - 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**.



- 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** checkbox. 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

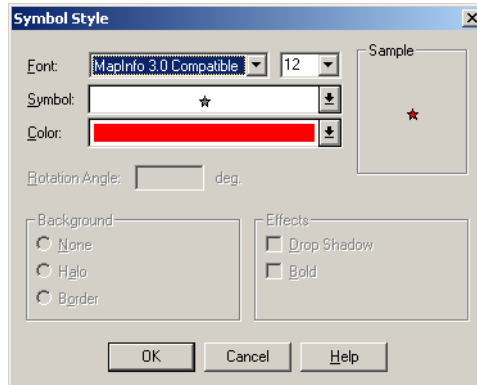


## Changing a Symbol's Style

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.



*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 checkbox to draw the symbol in boldface.
- **DROP SHADOW:** Click this checkbox to draw a drop shadow under the symbol.
- **SHOW BACKGROUND:** Click this checkbox to display the custom bitmap symbol with the background with which it was created.
- **APPLY COLOR:** Click this checkbox to replace all non-white bitmap pixels with the color you select from the Color palette.
- **DISPLAY AT ACTUAL SIZE:** Click this checkbox to display the image at the actual size.

## Sample

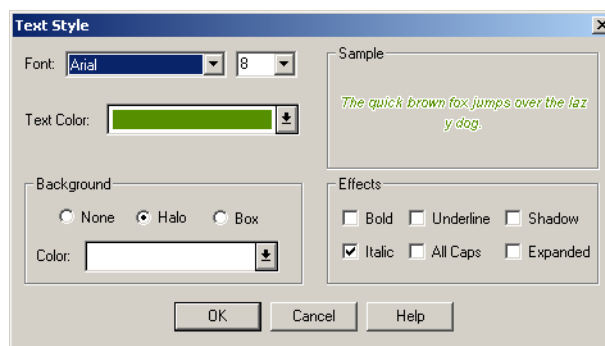
When you select a symbol style, it displays in this box to show you a sample of the symbol using the designated selections.

## 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 checkbox to display text in boldface.

**ITALIC** — Select this checkbox to display text in italic.

**UNDERLINE** — Select this checkbox to display text underlined.

**ALL CAPS** — Select this checkbox to display text in all upper case letters.

**SHADOW** — Select this checkbox to display a grey “drop” shadow under the text.

**EXPANDED** — Select this checkbox to insert double spaces between each letter in the text.

**Sample**

The results of the options you choose show in this box.

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## Labeling Your Map

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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 464](#) 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 305](#).

The Autolabeler tool, available from the Tool Manager (on the **TOOLS** menu, click **TOOL MANAGER**), creates labels as text objects in the Cosmetic Layer. 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 adds 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.

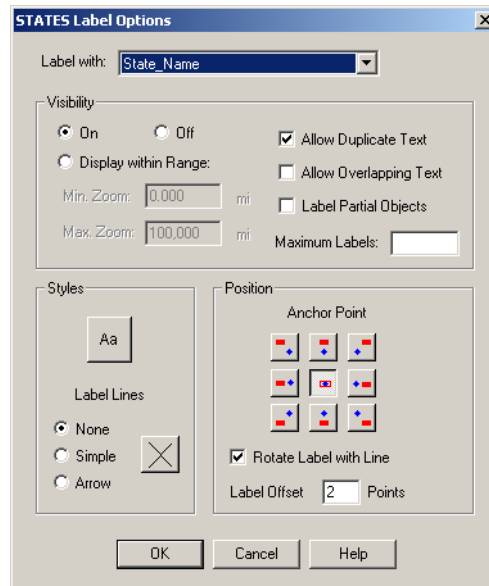
To activate labels for a layer(s):

- Select the layer or layers in the **LAYER CONTROL** dialog box and select the **AUTO LABEL** checkbox 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** checkbox 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** checkbox to allow duplicate labels for different objects to display, for example, 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** checkbox to allow labels to be drawn on top of each other. Some labels do not display because they overlap labels that are have been given higher priority on the map.

**LABEL PARTIAL OBJECTS** — Select the **LABEL PARTIAL OBJECTS** checkbox 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, 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
<b>Bold</b>	Uses bold text to create the label.
<b>Italic</b>	Uses italic text to create the label.
<b>Underline</b>	Places a line underneath the text.
<b>All Caps</b>	TEXT DISPLAYS IN ALL CAPITAL LETTERS.
<b>Shadow</b>	Creates a shadow behind the text. (not shown)
<b>Expanded</b>	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 (for example, part of a region, or a street, etc.).
- Click **BOX** to create a background box behind the text.

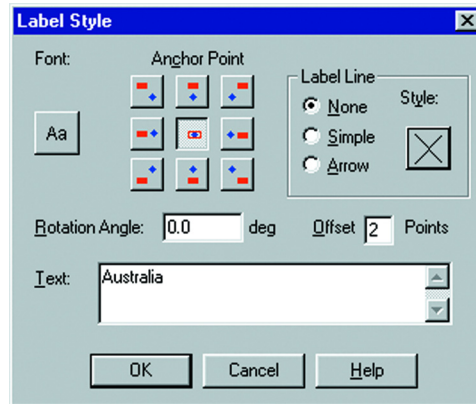
When you choose either the **BOX** or **HALO** backgrounds, the **COLOR** list is activated. Click it to display a palette of colors for the halo or the background. The color you choose corresponds to the button that is currently activated. The color displays in the box and in the Sample. Click **OK** to accept a color.

## 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 Labeler 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 the **TEXT LABEL** button 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** checkbox 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** checkbox 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 also adds the **TEXT LABEL** button to 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.

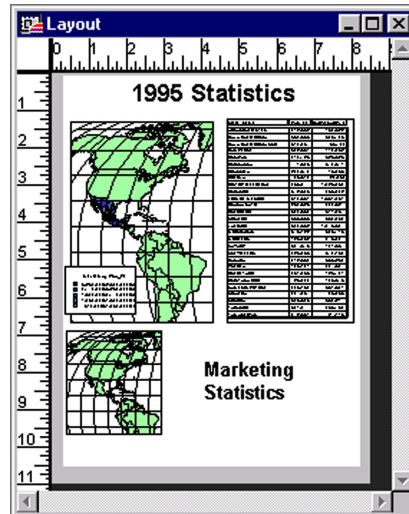
## Working with Layouts

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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** checkbox.

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 **CTRL** 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 using 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](http://www.mapinfo.com/miprotutorial).

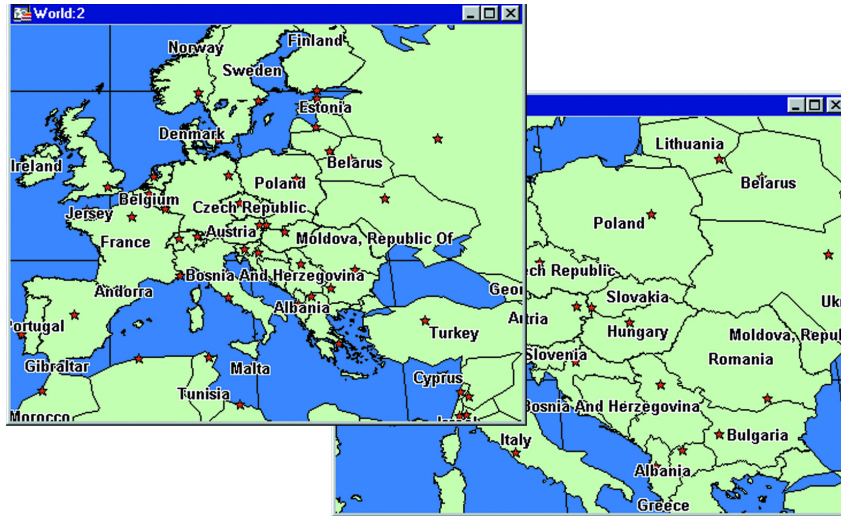
To create multiple views of the same map:

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.





*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** checkbox 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 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** checkbox 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.

<b>Situation</b>	<b>Description</b>
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 <b>NEW LAYOUT WINDOW</b> 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.

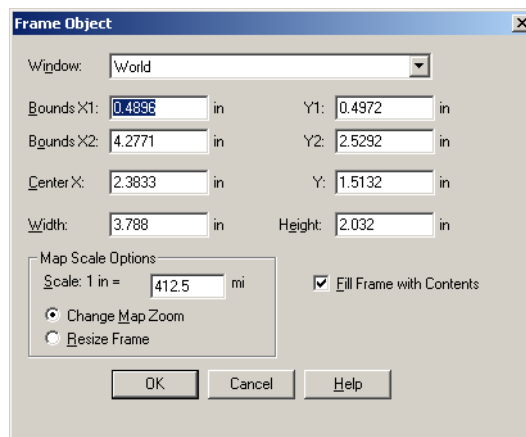
### Adding Windows to Current Layout – Using the Frame Tool

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** checkbox 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 checkbox 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** checkbox 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 (for example, 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.

1. 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.
2. 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

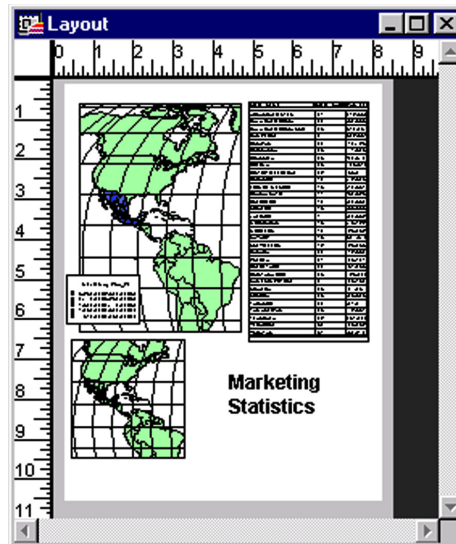
Each alignment can be performed with respect to each object or to the entire layout. When you choose the entire layout, the objects are aligned with respect to the top, bottom, left, and right edges or margins of the layout.

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

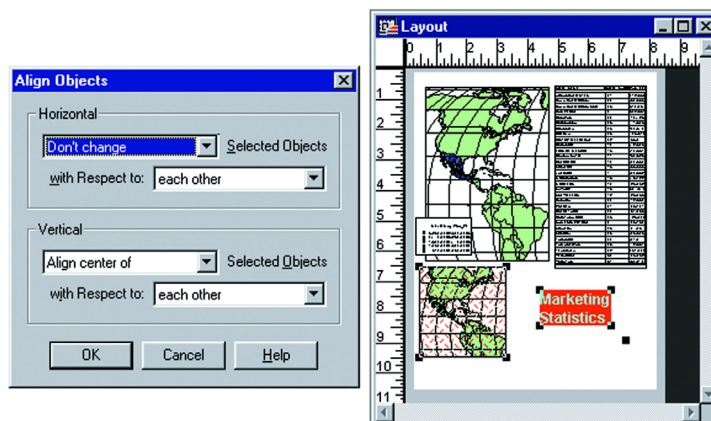
Consider this example. You have several elements in the Layout window: one large map, one small map showing a different view, a browser, and some text. You have them in the general position you want, but you want to line them up precisely to make a professional looking layout. In this case you want to 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:

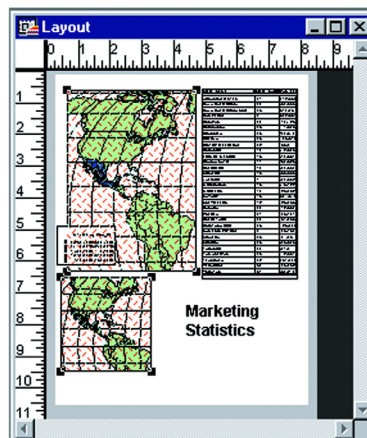
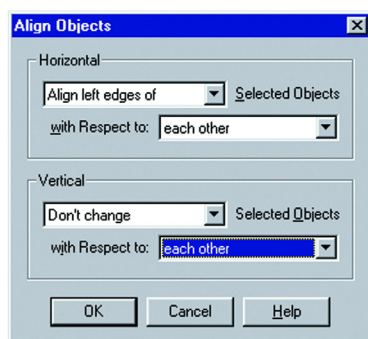
1. Select the small map first.
2. Shift-click to select the text without cancelling the selection of the small map. (You can also use the Marquee Select tool to select both at once.)
3. On the **LAYOUT** menu, click **ALIGN OBJECTS**.
4. Align the two objects so that they are vertically centered with 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.



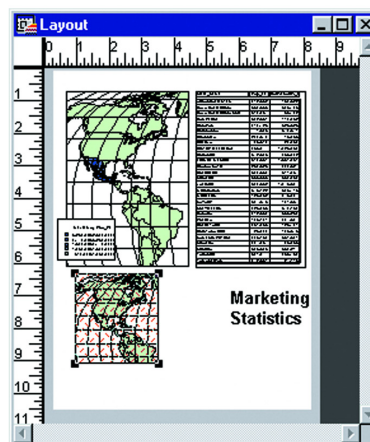
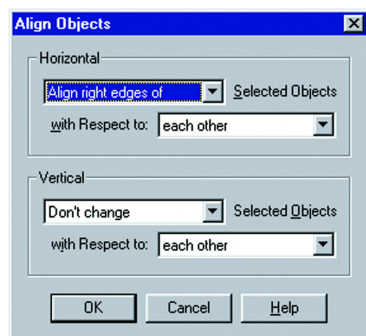
Now you want to align the large and small maps so that their left edges are horizontally aligned with respect to each other. Select the two objects and on the **LAYOUT** menu, click **ALIGN OBJECTS**. In the **ALIGN OBJECTS** dialog box choose Align left edges of and with respect to each other in the 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.

**Note:** The Map Window Preference setting **USE CARTOGRAPHIC SCALE** affects the entries in the **CHANGE VIEW** dialog box.

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.

$$(\text{Map Zoom in Miles} * 5280 * 12) / \text{Scale} = \text{Necessary Frame Width}$$

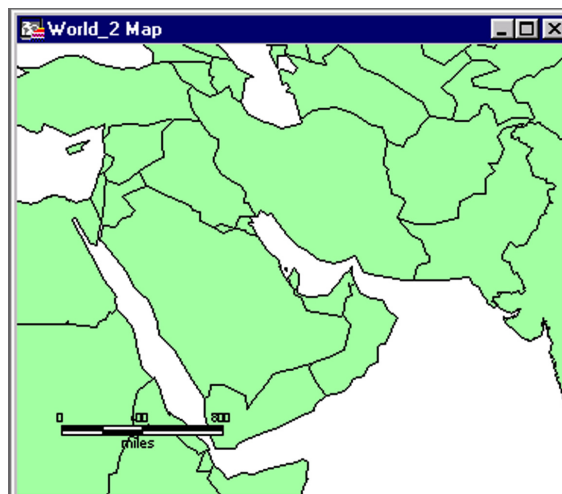
For example, you need to make a map that will be in a scale of 1:100000, and you must view a twenty mile zoom level. You need to determine the frame size that will accommodate the scale and zoom. Calculate the following:

$$(20 * 5280 * 12) / 100000 = 12.67$$

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 Scale Bar

If you want to include scale on your map or layout for a general reference of distances, use the Scale Bar tool. The Scale Bar 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.

MapInfo Professional adds a **SCALEBAR** button  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** checkbox is only available in the Set up Scale Bar options. On the **TOOLS** menu, point to **SCALEBAR** 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 checkbox 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** checkbox, the ScaleBar is accurate only along its curve and only if the Spherical calculation method is used.
  - If you do not select the checkbox, 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 ScaleBar tool that is placed on the **TOOLS** toolbar when the ScaleBar tool is loaded enables you to create a ScaleBar and position the left edge of it anywhere on your layout. Click the **SCALEBAR** tool, and click the Layout where you want to position the left edge of the ScaleBar. Follow **step 2** to **step 5** above to complete the ScaleBar.

**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, for example, 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.

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## Creating a Cartographic Legend

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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?

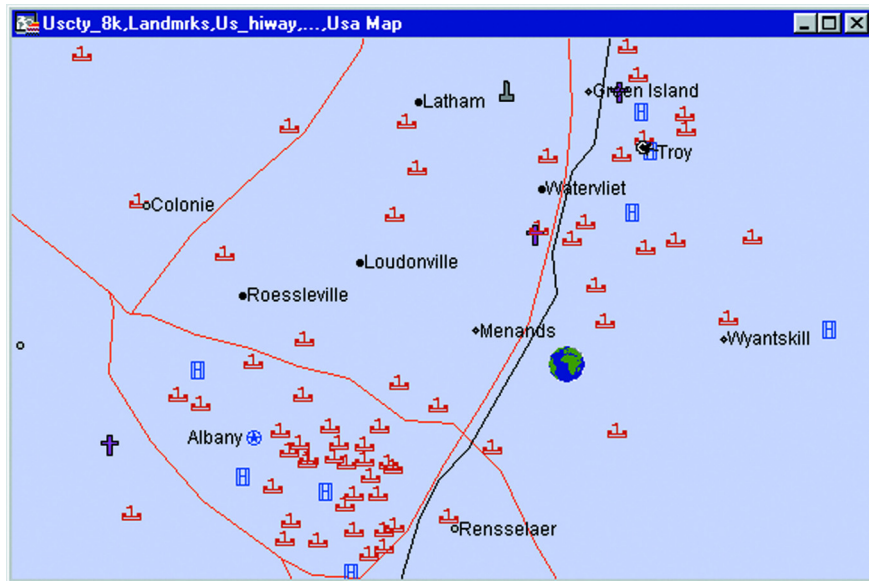
Cartographic legends are based on the map layers in your Map window. Each legend in the legend window corresponds to a layer on the map, and each legend is enclosed in a legend frame within the legend window. The attributes for each legend frame, such as the title and label styles can now be derived 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.

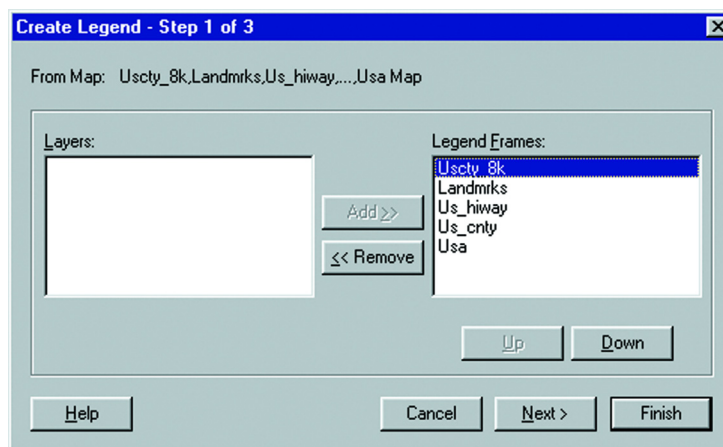
### Creating a Cartographic Legend

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.

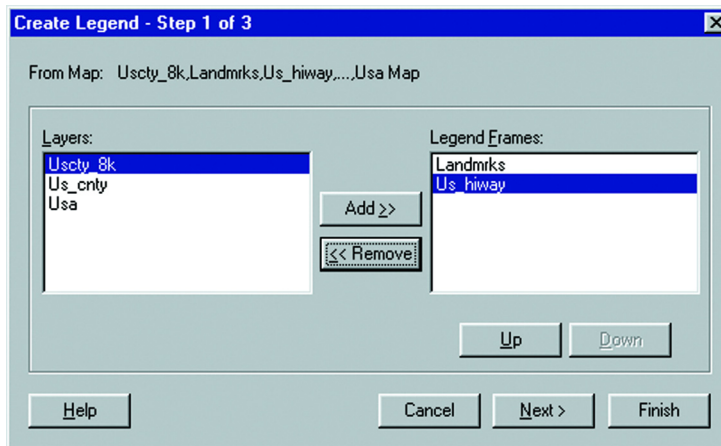


To create a cartographic legend:

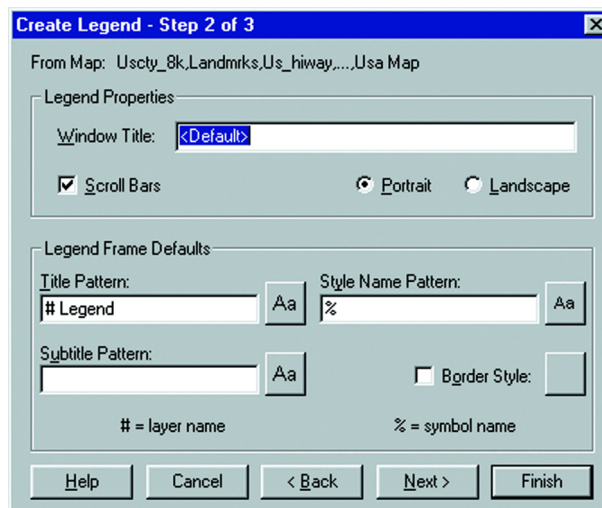
1. Make sure your Map window is active and on the **MAP** menu, click **CREATE LEGEND**. The **CREATE LEGEND – STEP 1 OF 3** dialog box displays.



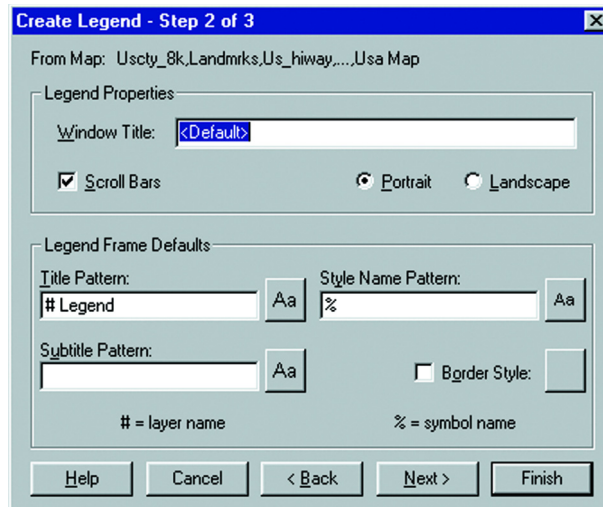
2. Select the layers you want to include in the legend using the **ADD** and **REMOVE** buttons. Each layer corresponds to one frame in the legend.  
To remove a layer, click the layer in the Legend Frames group to select it and click the **REMOVE** button. In our example, we'll remove the USA, US\_CNTY, and US\_CTY 8K layers. That leaves only the landmarks and highways layers in the legend.



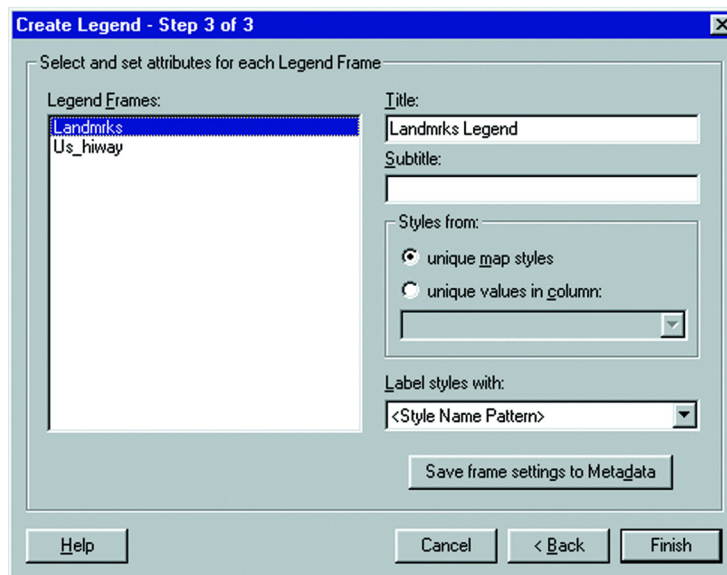
3. The frames appear in the legend in the order in which they appear in the Legend Frames group. You can change the order of the legend frames using the **UP** and **DOWN** buttons.
4. Click **NEXT**. The **CREATE LEGEND – STEP 2 OF 3** dialog box displays.



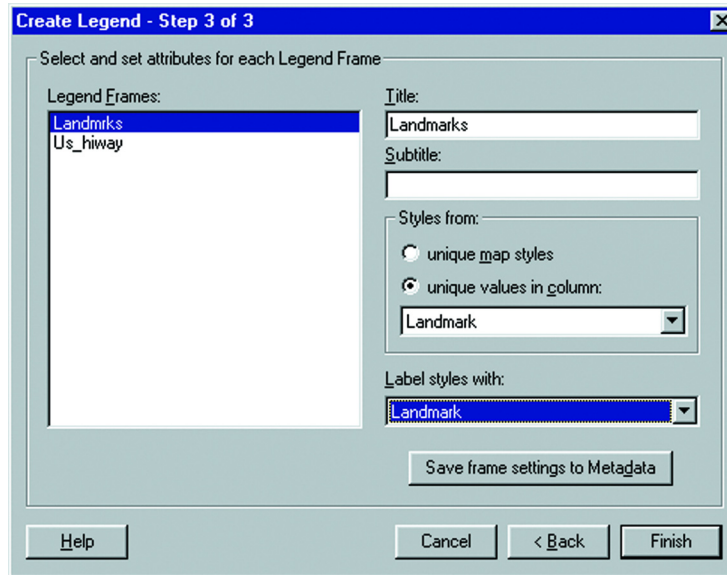
5. Use this dialog box to set default options across all frames in the legend. Change the legend properties and legend frame defaults as you wish. In our example, we'll change the Legend window title to New York Legend, and leave the other default options as is.



6. Click **NEXT**. The **CREATE LEGEND – STEP 3 OF 3** dialog box displays.

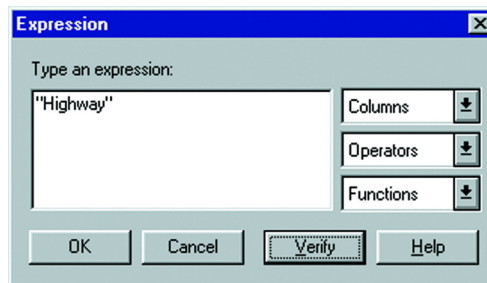


7. The **LEGEND FRAMES** group on the left displays all the frames selected in Step 1. Each frame corresponds to a map layer. Select a frame from the list (you can only select one frame at a time). Select the Landmarks layer first.
- The frame's default attribute settings display in the boxes on the 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.
8. 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.

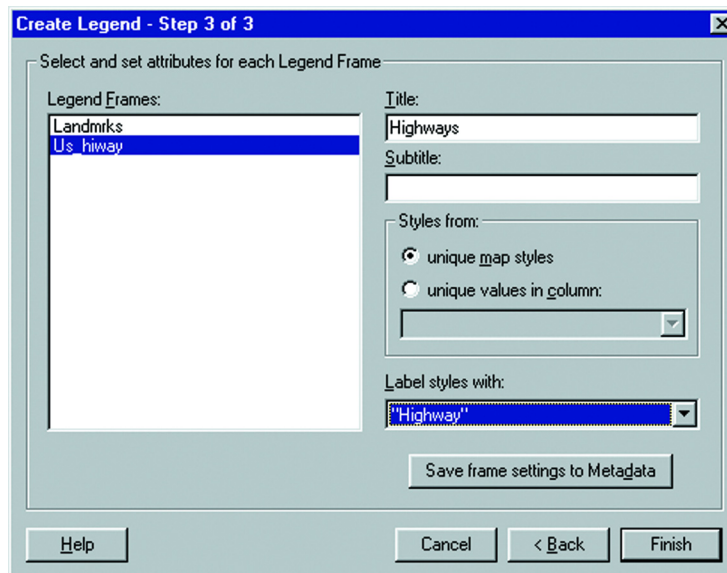


9. Continue in the same manner for the Us\_hiway legend frame.

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.



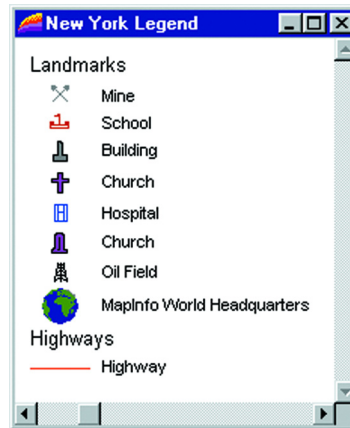
10. Type "Highway" in the text box, and click **OK**. It displays in the Label Style with box.



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.

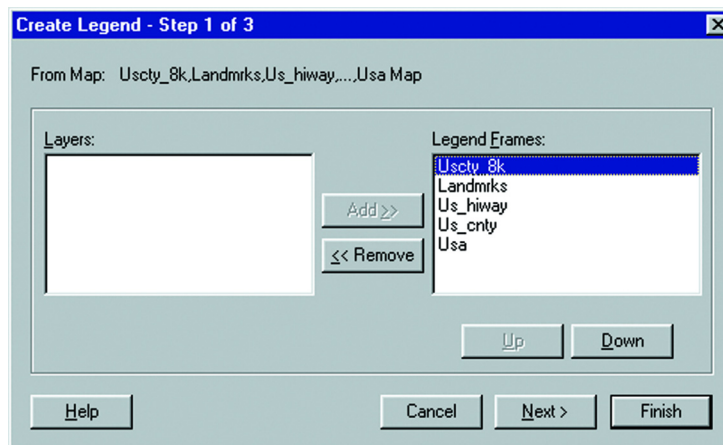


## Using the Legend Wizard

To use the Legend Wizard follow these steps:

### 1. *Selecting Layers*

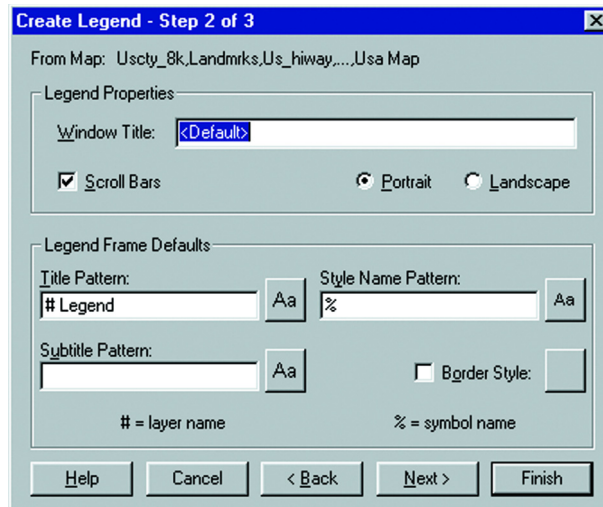
The layers listed in the Legend Frames group of the **CREATE LEGEND – STEP 1 OF 3** dialog box are all the layers that will be included in your legend. All the layers in your Map window are included by default.



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.

### 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** checkbox. 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

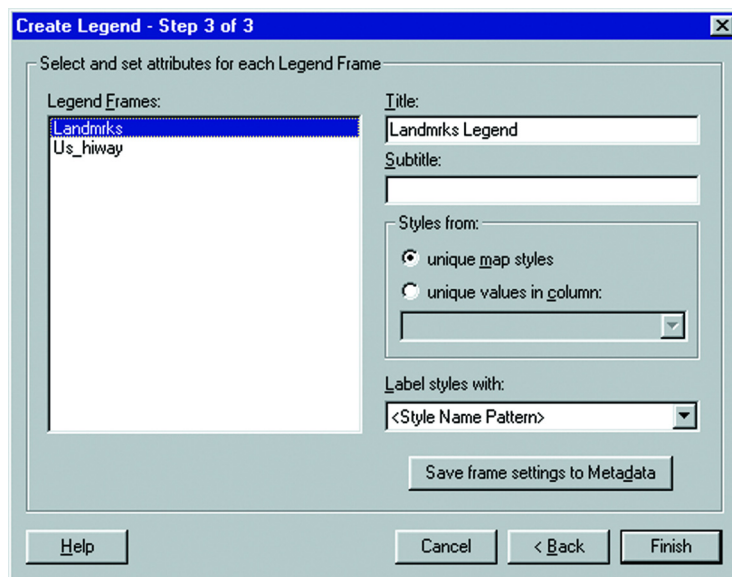
Select the **BORDER STYLE** checkbox to place a border around your legend frames. To change the border style, click the **STYLE** button next to the checkbox to display the **LINE STYLE** dialog box. Here you can specify the line type, color, and width for the frame border.

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**).

### 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.

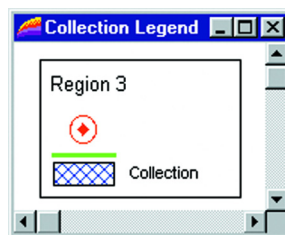


## Selecting Attributes

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, 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 polygons. There is also support for multipoint and collection objects in the cartographic legend feature. Multipoint objects display as a point symbol in the legend. A collection object displays a combination of symbols indicating the different object types it contains.



*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 (for example 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.

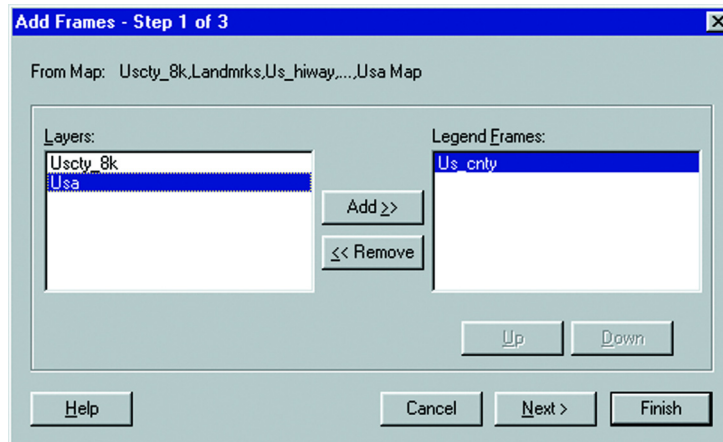
## Changing a Cartographic Legend

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.

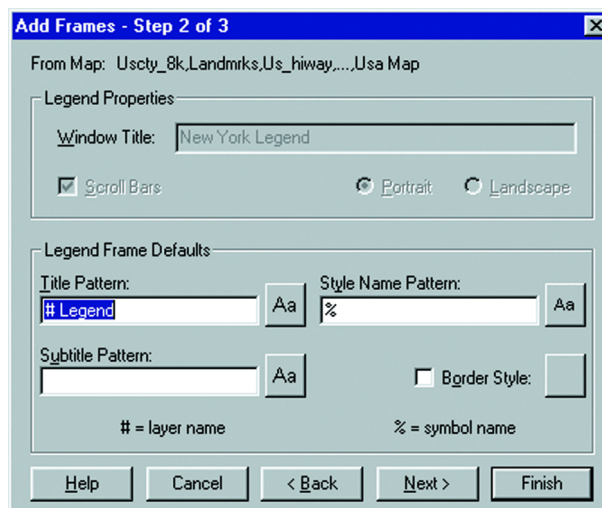
## Adding Frames to a Cartographic Legend

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.

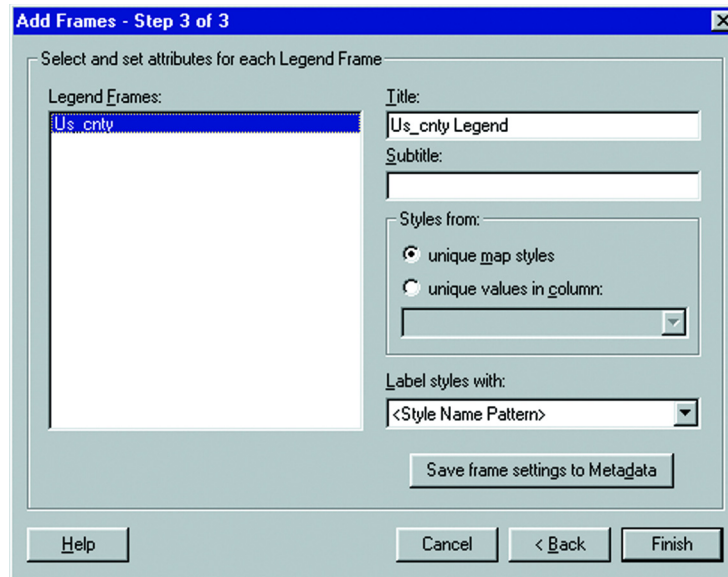


2. The Legend Frames list displays the map layers in your Map window that are not currently included in your legend. The US\_CNTY, USA, and US\_CTY 8K layers display in the box. To remove the USA and US\_CTY 8K layers, click the layer you want to remove and click the **REMOVE** button.
3. Click **NEXT**. 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.

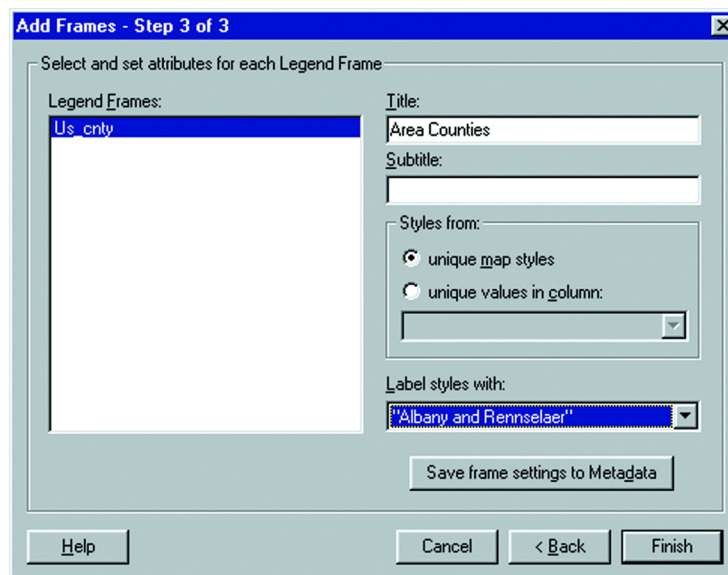
4. Click **NEXT**. The **ADD FRAMES – STEP 3 OF 3** dialog box displays.



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** drop-down list, choose **EXPRESSION**. In the **EXPRESSION** dialog box, type: "Albany and Rensselaer" and click **OK**.

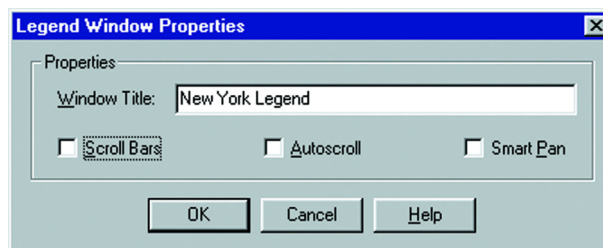


8. To save your frame settings to the table's metadata, click the **SAVE FRAME SETTINGS TO METADATA** button. These settings become the new legend frame defaults.
9. Click **FINISH**. Your legend redisplay with the added frame(s).



### 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.

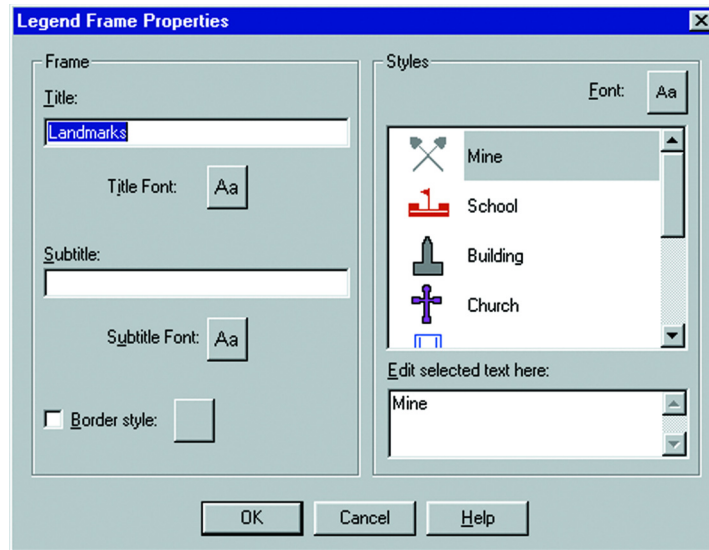


For the New York Legend, clear the **SCROLL BARS** checkbox to remove the scroll bars.

### Modifying a Legend Frame

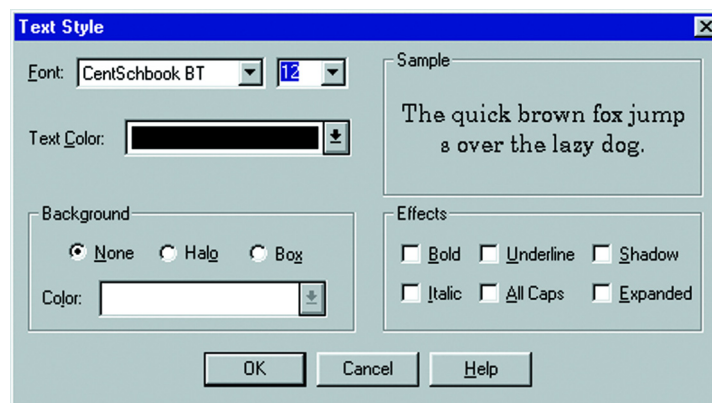
To modify a particular legend frame, right click the frame you want to change. The frame is selected and a shortcut menu displays. Click **PROPERTIES** to display the **LEGEND FRAME PROPERTIES** dialog box. You can also double-click the legend frame to display the Legend Frame Properties.

This example shows the frame properties for the Landmarks layer.



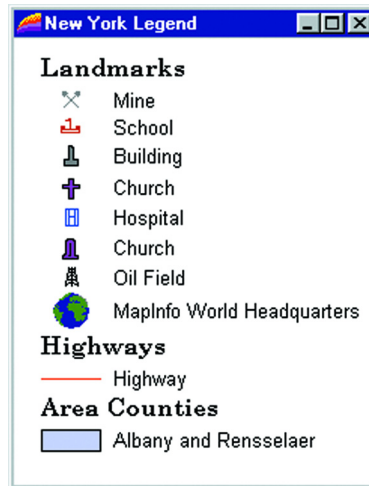
You can edit the title, subtitle, legend symbol text, as well as the title and subtitle text styles, the border style, and the styles of the legend symbol text. When you edit legend symbol text, you can add multi-line text in the Edit selected text box.

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.

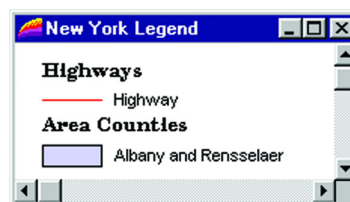
This is what the legend now looks like. The scrollbars have been removed and the frame title text has been modified.



**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 358](#) for details on thematic mapping and theme legends.

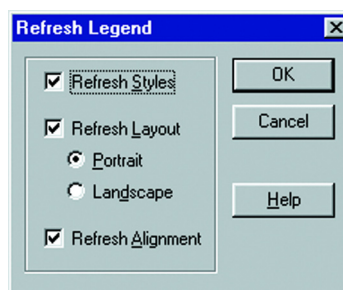
### Deleting Frames

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.



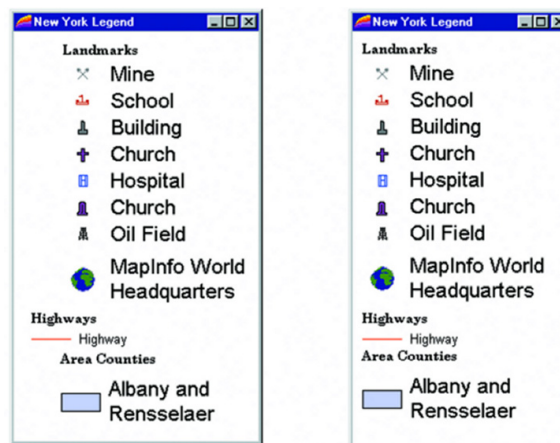
If the layout mode is changed from Portrait to Landscape, or vice versa, or from Custom to Portrait or Landscape, MapInfo Professional resizes the window to a default size that's based on the layout mode (similar to the initial window you get when you first create a Portrait or Landscape legend).

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.

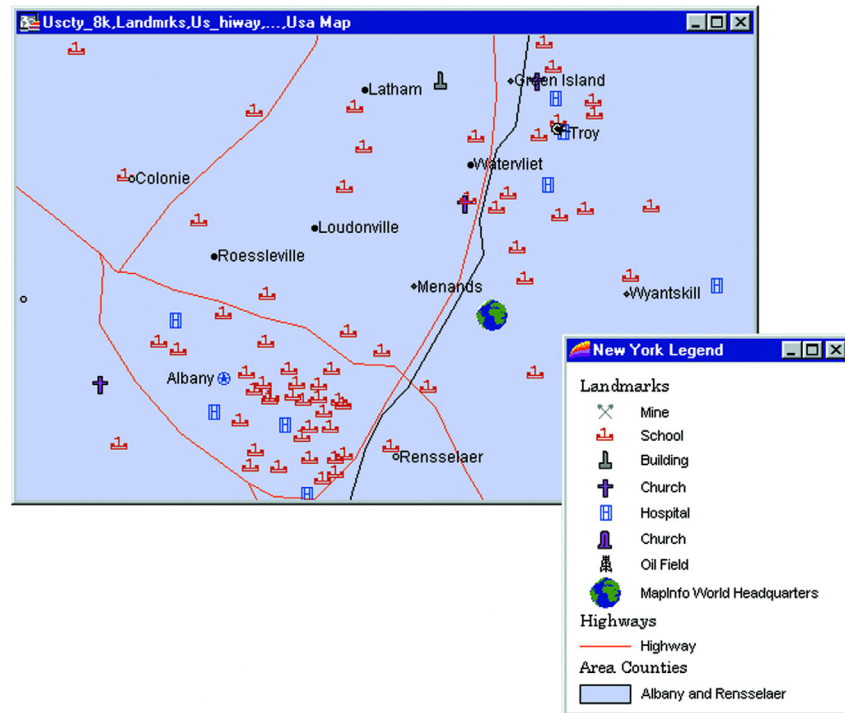
If editing or adding frames to an existing legend causes frame(s) to be formatted differently than other frames in the same window, users can use the **REFRESH** dialog box to re-align styles and text across all frames.

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.

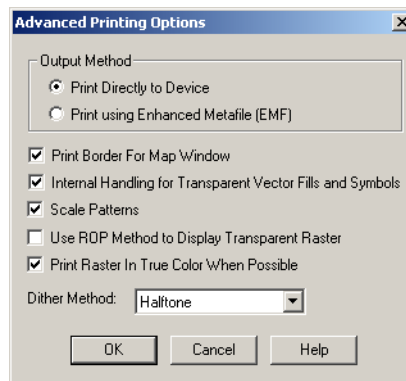
In addition, you can override your default printer setting and choose a different printer for this print job. Click the **PRINTER** button to display the **PAGE SETUP** dialog box for your printer. The printer that initially displays is the default printer that you set in the Printer preferences (on 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 from the Output Preferences.

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 Print Directly to Device (as used in previous versions of MapInfo Professional).
- b. 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 older 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. This method may produce large plot files.

- c. If you are using 24-bit, true color raster images, select the **PRINT RASTER IN TRUE COLOR WHEN POSSIBLE** checkbox, and select a dither method from the **DITHER METHOD** list.

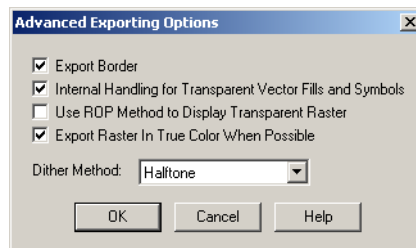
**Note:** The **PRINT BORDER FOR MAP WINDOW** checkbox is not available for Layout windows. You can control the border for each frame by selecting the frame and setting by selecting the **OPTIONS** menu, clicking **REGION STYLE**.

- d. Click **OK** to return to the **PRINT** dialog box.
5. Click **OK** to print.

More and more often, users want to export their maps electronically to files rather than print them.

## 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 advanced export options to produce better quality output. The same transparency and raster options are available when you print your Layout as 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 checkbox settings are available.



Changes you make to the Advanced Export settings override the default settings in the Output preferences. See [Setting your Output Setting Preferences in Chapter 2 on page 124](#) for more.

## 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.

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. Enable the option to specify EPS.
4. Once the postscript driver is installed on your system, use that printer to print the map or layout to a file from MapInfo Professional.
5. From the **FILE** menu, select **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**.



# 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:

- ♦ **Working with Raster Images** ..... 502
- ♦ **Opening a Raster Image** ..... 504
- ♦ **Printing/Exporting Translucent Images** ..... 512

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## Working with Raster Images

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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)

MapInfo Professional also supports AirPhotoUSA raster images taken 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. MapInfo Professional treats these images like any other raster file. The MAPINFOW.PRJ file has been updated to accommodate the AirPhotoUSA enhancements.

## 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

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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 (for example, GeoTIFF file).
- A partially registered image containing control points, but missing a projection (for example, 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 (for example, 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.

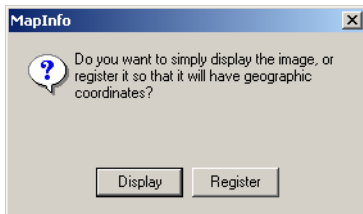
There are two ways to register a raster image in MapInfo Professional. Each involves specifying the map coordinates of control points on a reference map and matching them with equivalent points on the raster image. To determine map coordinates, you can:

- 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.

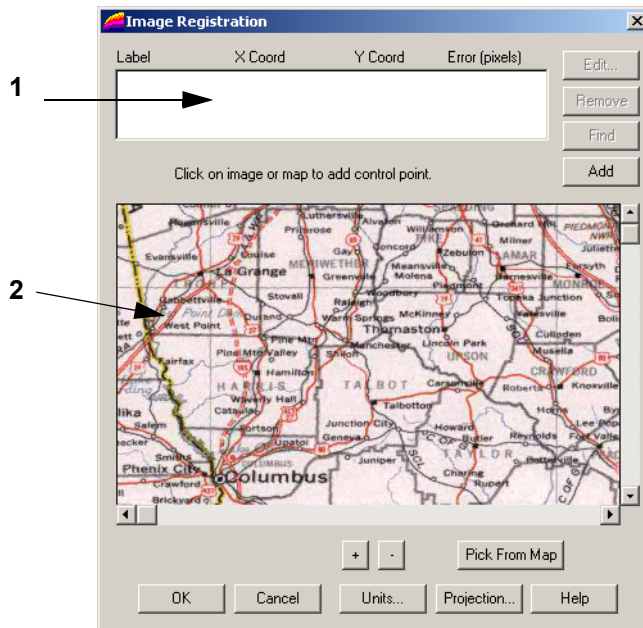
**Note:** If you scanned in the image from a paper map, the map most likely contains a graticule (latitude and longitude grid). You can choose those coordinates for prominent features and enter them in the **IMAGE REGISTRATION** dialog box.

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.



1 Control Points list box

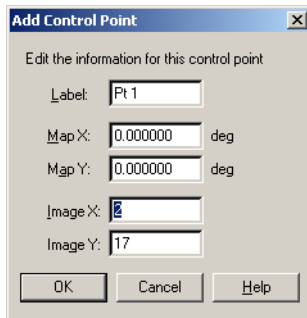
2 Preview of raster image

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.

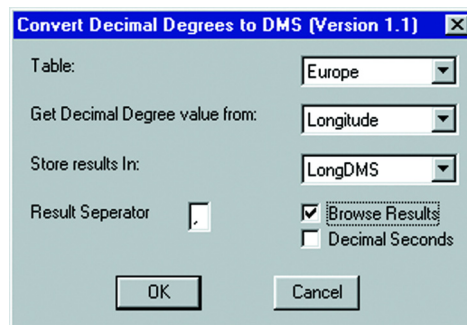
MapInfo Professional includes the Degree Converter program in its tool set, which easily converts coordinates from d/m/s to decimal degrees, and vice versa. You can also use the Degree Converter to convert a single Latitude/Longitude coordinate to either decimal degrees or d/m/s.

To run the Degree Converter and convert columns to decimal degrees:

1. On the **TOOLS** menu, click **TOOL MANAGER** and check the **LOADED** checkbox 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 (for example 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)

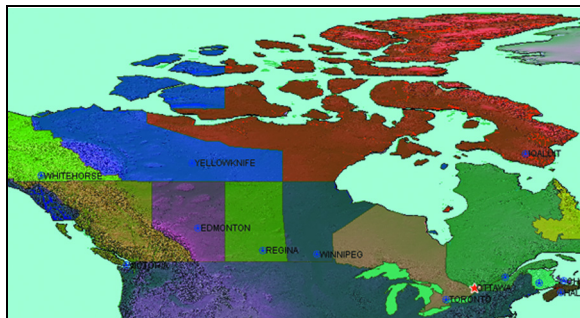
To change a color raster image to gray-scale, click the **GRAYSCALE** button in the Conversions group of the **ADJUST IMAGE STYLES** dialog box. To change it back, click the **ORIGINAL IMAGE** button.

### 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** checkbox 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

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When printing or exporting a translucent raster image, 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 checkbox 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 checkbox is cleared by default.

- **PRINT/EXPORT RASTER IN TRUE COLOR WHEN POSSIBLE** — Select this checkbox to print your 24-bit raster images in true color. Make sure your printer settings are greater than 256 colors. This checkbox 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 Coordinate Systems . . . . . 516**
- ◆ **Building Blocks of a Coordinate System . . . . . 521**
- ◆ **Adding Projections to the MAPINFOW.PRJ File . . . . . 538**
- ◆ **Understanding Affine Transformations . . . . . 541**
- ◆ **Frequently Asked Questions . . . . . 544**
- ◆ **Using Earth and Non-Earth Maps . . . . . 545**
- ◆ **Using the Ocean and Grid Tables . . . . . 547**

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## Working with Coordinate Systems

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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. You can think of a projection as 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 Table**
- **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

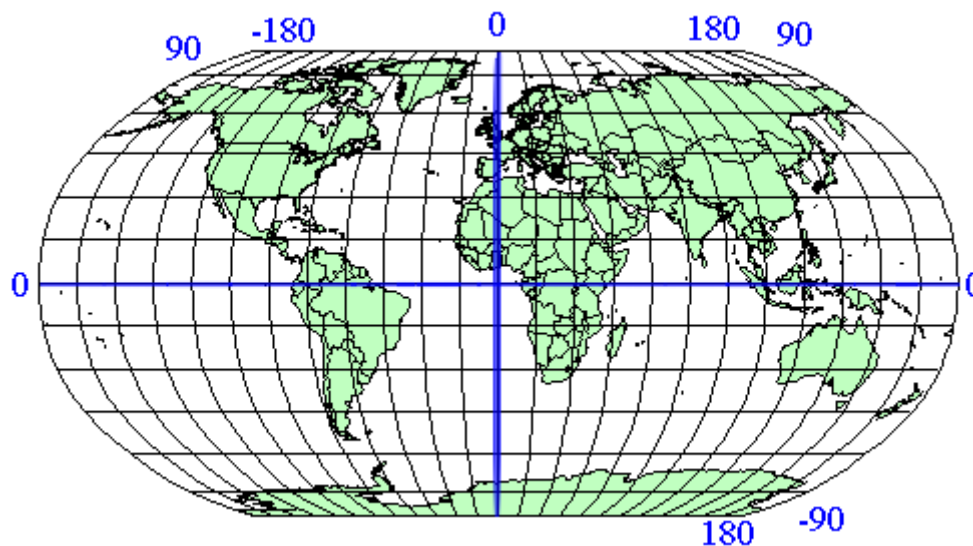
You can make a map out of any globe without distorting the points on the surface by placing the globe into an imaginary cylinder.

**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.

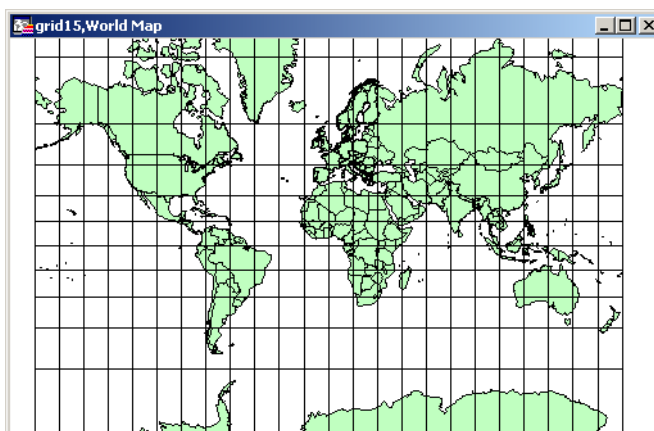
Because many people do not live near the Equator, other projections came into use to create more accurate local maps. Accuracy depends upon how you project the globe onto the cylinder. If you turn the cylinder so that it touches the Prime Meridian instead (or any line of longitude, 90 degrees away from 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**



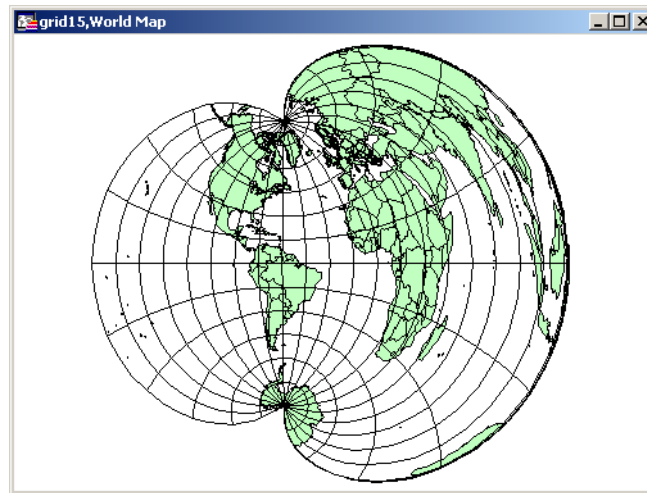
A third type of projection attempts to resolve the distortion problem in another way. Conic projections use a cone shape instead of a cylinder to create the “touch points” .

**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.

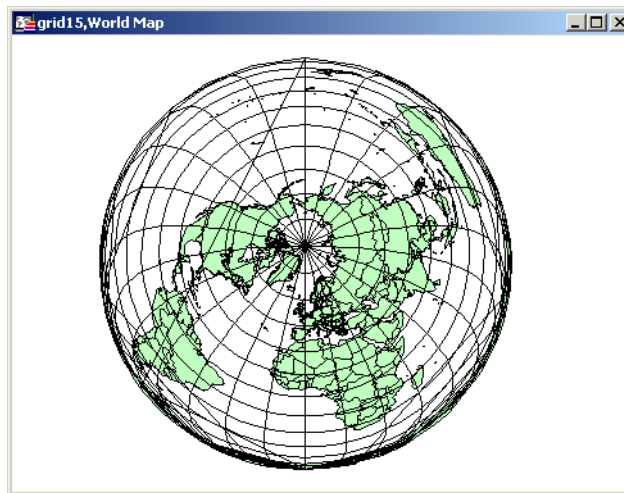
A fourth type of projection, the Azimuthal projection, does not use cones or cylinders but a simple circle that goes all the way around the globe over a particular point. This projection provides a “view from space” over a particular point.

**Figure: Globe with Azimuthal Projection**

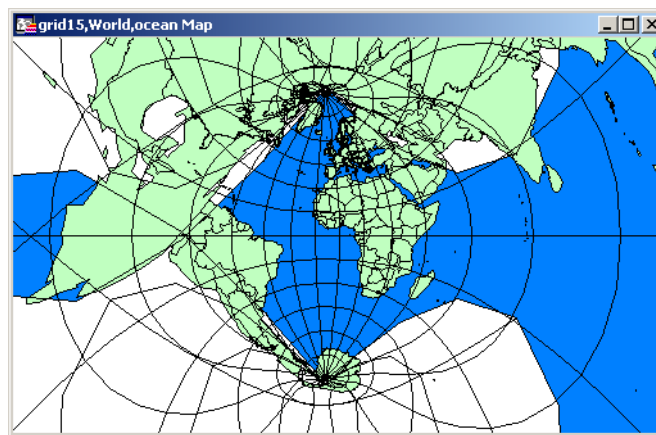


This type of projection is most useful when you need to work with a particular hemisphere. A hemisphere need not be North-South or East-West based. The next figure uses the North Pole as the center point for the Azimuthal Projection.



**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.

### 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 <italics>(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 <italics>(continued)**

<b>Number</b>	<b>Projection</b>
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 <a href="#">Description of an Affine Transformation on page 541</a> .)

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 <a href="#">Accounting for Affine Transformations and Explicit Bounds in Projection Types on page 524.</a> )

**Note:** For more about affine transformations, see [Understanding Affine Transformations on page 541.](#)

## Datums Table

A datum is established by tying a reference ellipsoid to a particular point on the earth. The following Datums 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 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
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

Number	Datum Name	Area of Coverage	Ellipsoid
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
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



Number	Datum Name	Area of Coverage	Ellipsoid
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
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

Number	Datum Name	Area of Coverage	Ellipsoid
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
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

<b>Number</b>	<b>Datum Name</b>	<b>Area of Coverage</b>	<b>Ellipsoid</b>
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
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

Number	Datum Name	Area of Coverage	Ellipsoid
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
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

Number	Datum Name	Area of Coverage	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
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

<b>Number</b>	<b>Datum Name</b>	<b>Area of Coverage</b>	<b>Ellipsoid</b>
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 about 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 517](#), 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 525](#).
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 521](#). 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	<a href="#">Common Coordinate Systems and their Parameters on page 521</a>
13,	Projection type used	<a href="#">MapInfo Professional Projection Types Table on page 522</a>
62,	Datum used	<a href="#">Datums Table on page 525</a>
7,	Units used	<a href="#">Units Table on page 534</a>
0	Origin Longitude used	<a href="#">Coordinate System Origin on page 534</a>

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	<a href="#">Common Coordinate Systems and their Parameters on page 521</a>
9,	Projection type used	<a href="#">MapInfo Professional Projection Types Table on page 522</a>
63,	Datum used	<a href="#">Datums Table on page 525</a>
7,	Units used	<a href="#">Units Table on page 534</a>
-154, 50	Origin Longitude and Origin Latitude used	<a href="#">Coordinate System Origin on page 534</a>
55, 65,	Standard Parallels used	<a href="#">Standard Parallels (Conic Projections) on page 535</a>
0, 0	False Easting, False Northing	<a href="#">False Easting and False Northing on page 535</a>

**Note:** If a projection is not in the list in [Common Coordinate Systems and their Parameters on page 521](#), 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	<a href="#">Common Coordinate Systems and their Parameters on page 521</a>
8,	Projection type used	<a href="#">MapInfo Professional Projection Types Table on page 522</a>
66,	Datum used	<a href="#">Datums Table on page 525</a>
7,	Units used	<a href="#">Units Table on page 534</a>
-129, 0	Origin Longitude and Origin Latitude used	<a href="#">Coordinate System Origin on page 534</a>
0.9996, 500000	False Easting, False Northing	<a href="#">False Easting and False Northing on page 535</a>
0	Scale Factor used	<a href="#">Scale Factor (Transverse Mercator) on page 535</a>

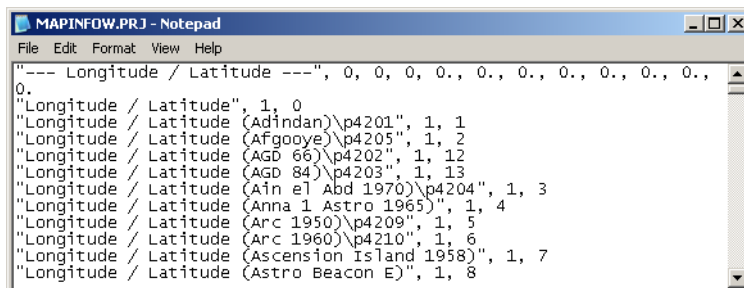
## Adding Projections to the MAPINFOW.PRJ File

Once you understand the structure of the entries in the MAPINFOW.PRJ file, you are ready to create a new projection entry for your coordinate system. You may want to make a copy of the MAPINFOW.PRJ file in case you want to revert back to it later.

To create a new projection entry for the coordinate system in the MAPINFOW.PRJ file:

1. Open MAPINFOW.PRJ in a text editor or word processor. In this file, you are going to add the new projection entries.

Figure: MAPINFOW.PRJ in Notepad



2. Scroll down in this list to find the type of projection you want to base your map on. See [Understanding Coordinate Systems on page 517](#) for descriptions of the different projection types.
3. Add a new line at the end of the projection list you are modifying.

For example, to add a new Universal Transverse Mercator projection (Australian Map Grid using AGD66 datum), scroll down to that entry in the list and enter the new projection at the end of that list.

Figure: Adding a Line in the MAPINFOW.PRJ File

```

MAPINFOW.PRJ - Notepad
File Edit Format View Help
"--- 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 521**.
  - 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 524**) 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

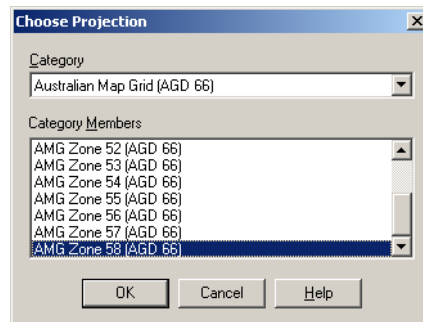
Once you have created this new projection, you can use it in a Map window to replace the coordinate system you are using.

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 redisplay.
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	10.33333,	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, 10.33333, 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

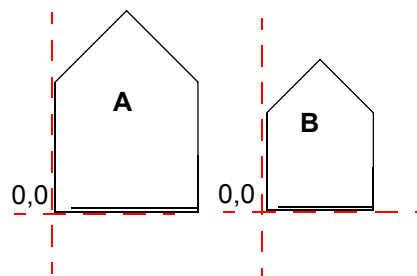
An affine transformation allows you to match the points on two vector maps that use different coordinate systems so they can be used together. The base map stays the same while the derived map is transformed mathematically to match up coordinates to the base map.

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 524](#).

### Description of an Affine Transformation

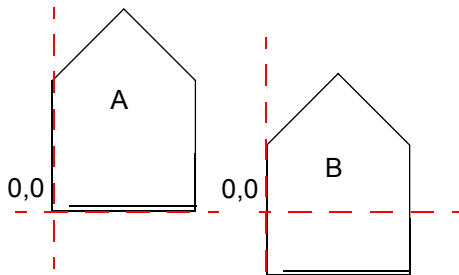
There are several basic types of transformation that can be applied to the base map using an affine transformation. These include scaling, translation, rotation, shearing, and reflection.

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.



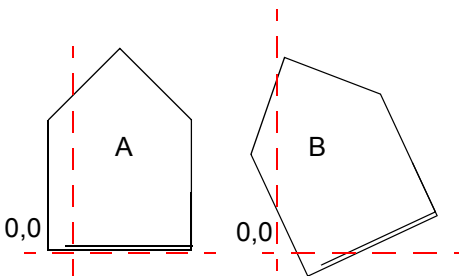
*The difference between these two images is the scale. To create an affine transformation that maps the base image (A) to the derived image (B), you need change only the scale.*

The *translation* factor of a transformation is when every point on an image follows a parallel path and no rotation takes place.



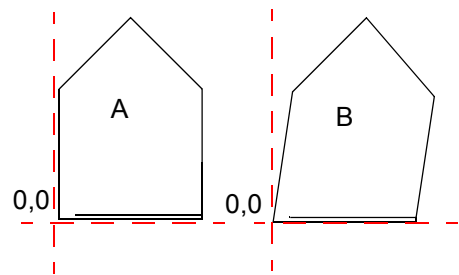
The difference between these two images is the translation.

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.



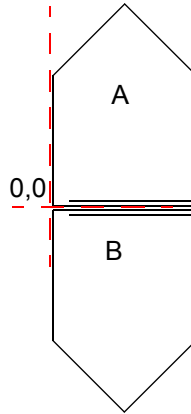
The difference between these two images is not the scale, because the size of each image is the same. The difference is the rotation of the derived image (B).

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:

$$\begin{array}{ccccccc} 1 & 0 & 0 & & 0.5 & -.0866 & 0 & & 1 & 0 & 5 \\ 5 & 1 & 0 & * & .0866 & 0.5 & 0 & * & 0 & 1 & 2 \\ 0 & 0 & 1 & & 0 & 0 & 1 & & 0 & 0 & 1 \end{array}$$

Multiplying these out gives the following matrix:

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?

for example: "— Australian Map Grid (AGD 66) —"

"AMG Zone 47 (AGD 66)", 8, 12, 7, 99, 0, 0.9996, 500000, 1000000

"AMG Zone 48 (AGD 66)\p20248", 8, 12, 7, 105, 0, 0.9996, 500000, 1000000

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
```

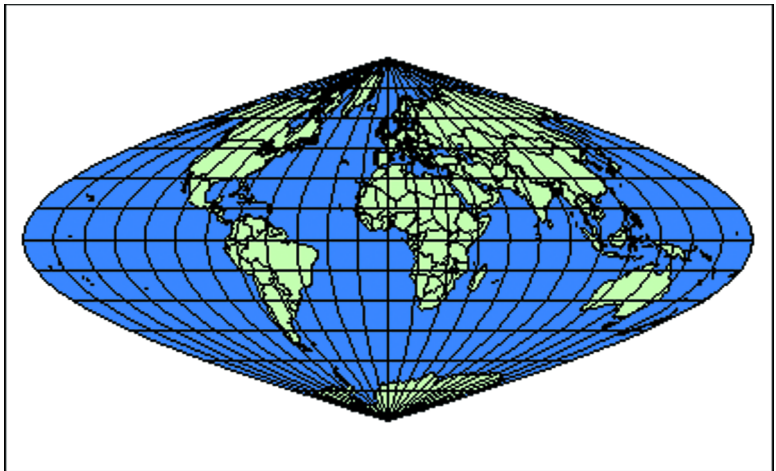
### I chose Longitude/Latitude (NAD 83) as my projection; however, whenever I look at the Choose Projection dialog, it keeps saying Longitude/Latitude (GRS 80). Why won't my projection change?

**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

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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.

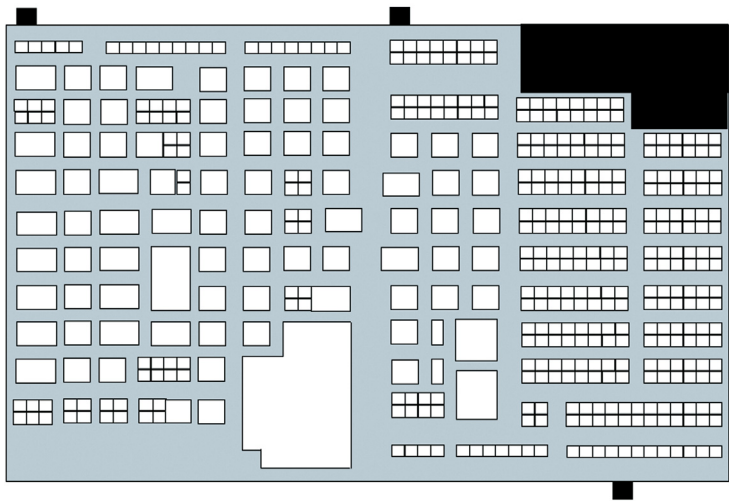


Sinusoidal (Equal-Area)

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. 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. 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. The next figure depicts a floor plan and is an example of a non-earth map.

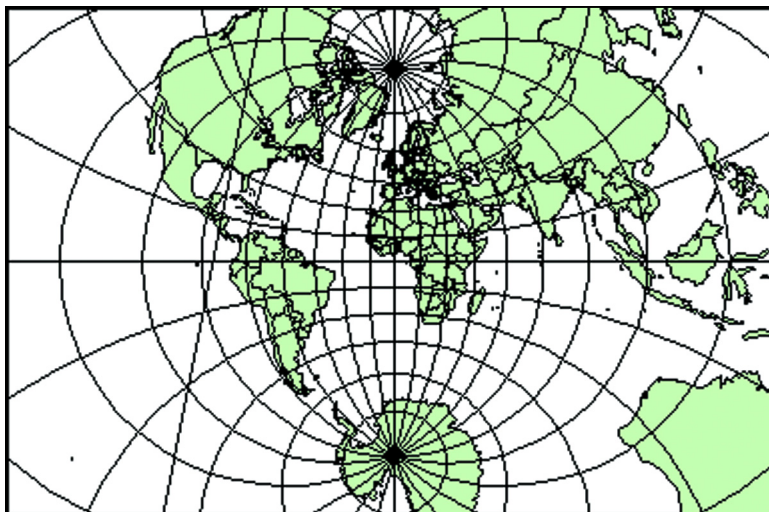


## Using the Ocean and Grid Tables

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MapInfo Professional supplies tables that you can use with projections. For example, you can use the Ocean table as a background for World projections. You can use the grid15 table as a coordinate grid for your map (often called a graticule). The number in the table's name specifies the spacing.

*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. . . . . 550**
- ♦ **Internet Connectivity and MapInfo Professional . . . . . 559**
- ♦ **Redistricting — Grouping Map Objects into Districts. . . . 566**
- ♦ **Creating Expressions. . . . . 573**
- ♦ **Web Map Service . . . . . 617**
- ♦ **Web Feature Service . . . . . 620**
- ♦ **Working with the MapBasic Window . . . . . 602**
- ♦ **Digitizing Maps with MapInfo Professional . . . . . 608**

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## Embedding MapInfo Professional Maps

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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 (for example, MapInfo Professional) into a container application (for example, 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.



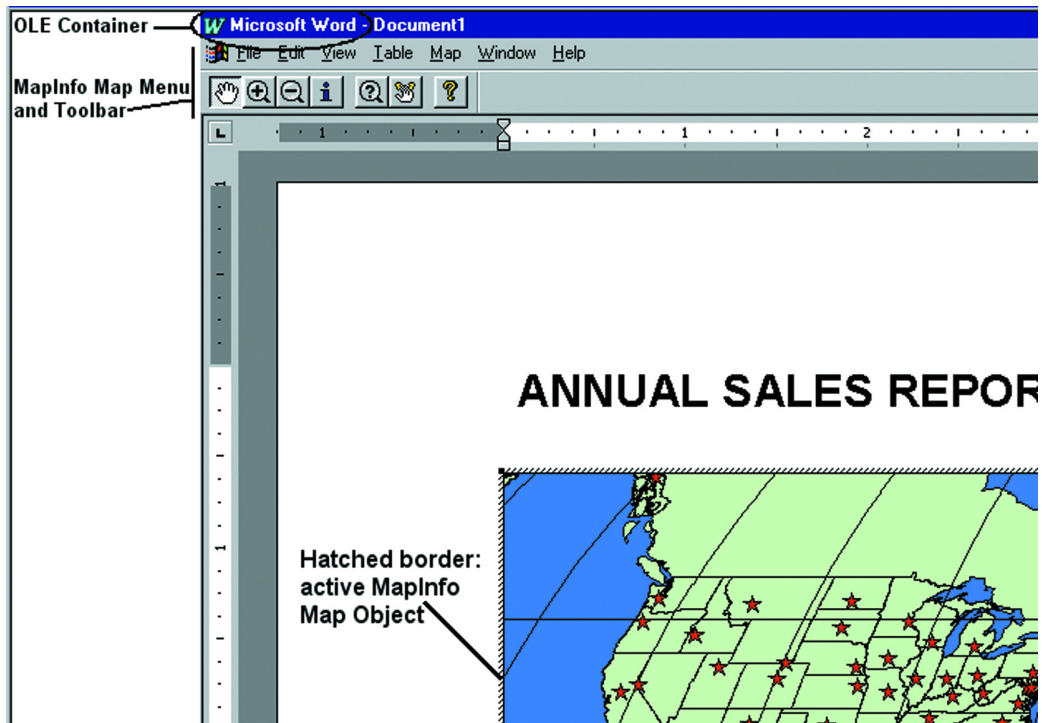
**Drag Map Window tool:** Use this to transfer a copy of your active Map window to MapInfo or to another OLE container. During the process, the cursor will change to indicate the three stages of drag and drop: "begin drag," "dragging," and "drop copy." For more on using Drag and Drop, see [Bringing a Map Window into Your Application on page 556](#).



**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 checkbox. 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.

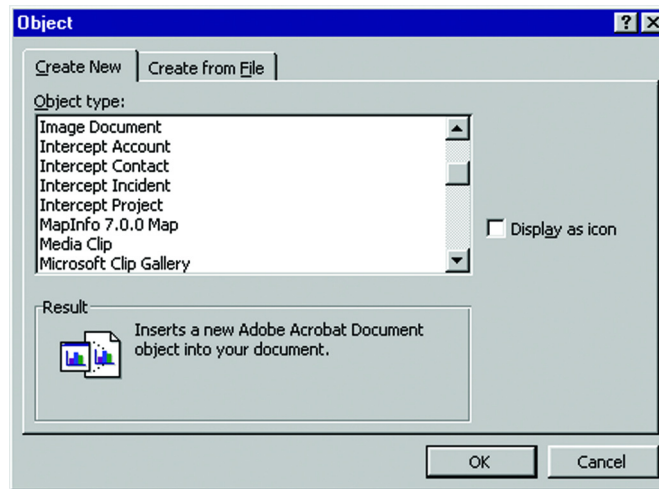
## Creating a New Map Window in Your Container

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 Professional's **OBJECT** 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 **CTRL-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.

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 **CTRL** 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 Professional

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.*



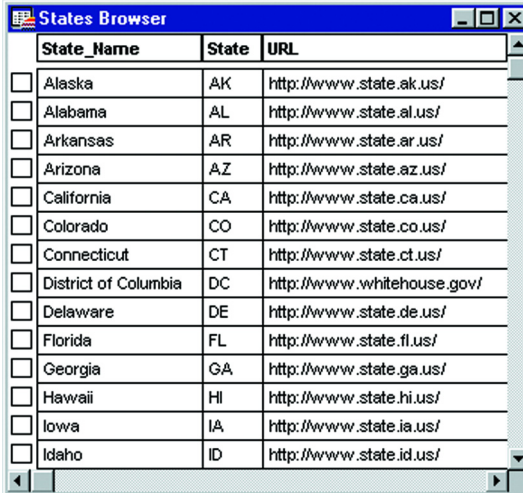
## Creating Active Objects

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:

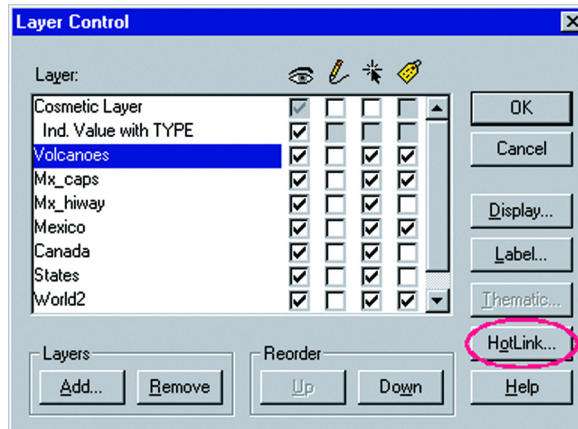
1. Click the **HOTLINK** button. Notice that the cursor displays as a pointing hand.
2. Move the cursor over the map. When you pass the cursor over an active object, the cursor changes to a hand holding a lightning bolt, as shown.   
The link associated with the object or label displays in the Status 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.

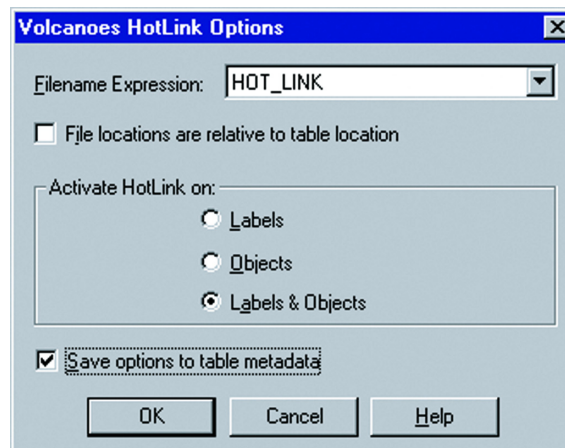
## Setting the HotLink Options

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.



3. Click the **HOTLINK** button. The HotLink Options for the table display.



4. Choose the Filename Expression from the drop-down list. This is the field name you added to hold the 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
```

5. To add the table path to the filename before launching it, check the file locations are relative to table location box.
6. In the Activate on group, choose how you want the active object to launch when you click the object with the HotLink tool. Choose:
  - **LABELS** – to launch the active object when you click the HotLink tool on an object's label.
  - **OBJECTS** – to launch the active object when you click the HotLink tool on an object.
  - **LABELS & OBJECTS** – to launch the active object when you click the HotLink tool on either an object or its label.
7. Check the **SAVE OPTIONS TO METADATA** box to save the HotLink options to the table's metadata.
8. 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 checkbox is not available if the table is read only or if metadata operations are not supported on the table type, for example, 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:

```
"\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 does 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 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 and the **REMOVE** and **REMOVE ALL** buttons to move layers back and forth to the Layers 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 table columns as the content.
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.

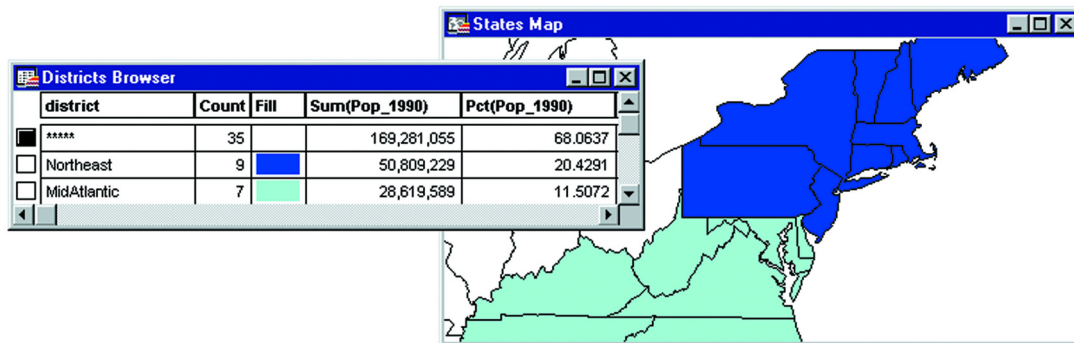
## Redistricting — Grouping Map Objects into Districts

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](http://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 REDISTRIBUTE 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:

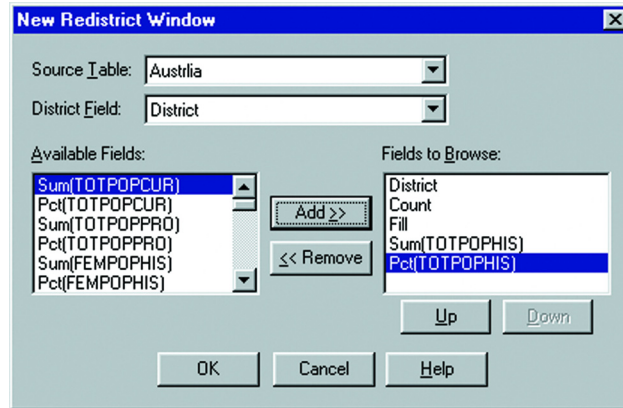
1. On the **WINDOW** menu, click **NEW REDISTRIBUTE WINDOW**. Specify your table and field choices in the **REDISTRIBUTE** dialog box. MapInfo Professional displays a color-coded map and Districts Browser.
2. Select the target district, if necessary.
3. Select the map object(s) that you want to go into 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**.

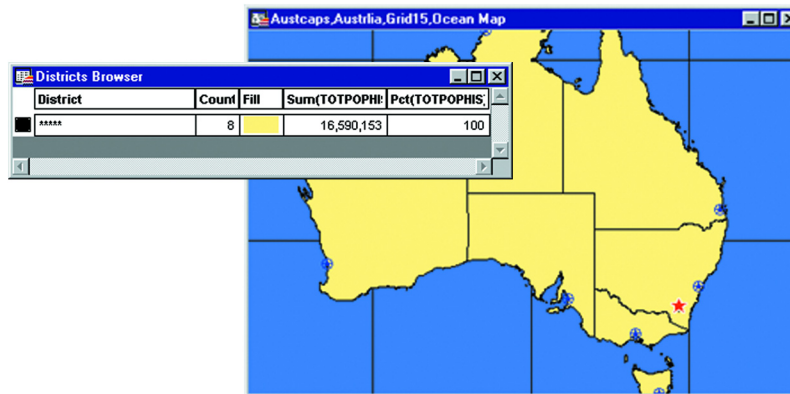
With that done, on the **WINDOW** menu, click **NEW REDISTRIBUTE WINDOW**. The **REDISTRIBUTE** dialog box displays. Choose your table from the drop-down list. Choose the district field from its drop-down list. The district field is the empty field you created in your table to hold the district names.



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 **REDISTRIBUTE** 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

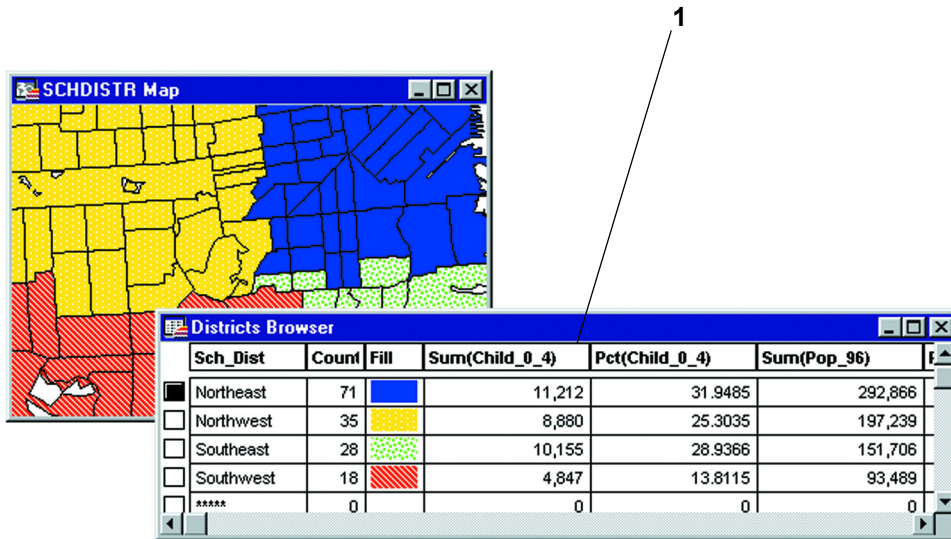
If you already have districts in your table, or have a column that contains values that are shared among the records, you can use those as the basis for your districts. When you activate the Redistricter, these values display as color-coded districts on a map.

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 **REDISTRIBUTE** 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.

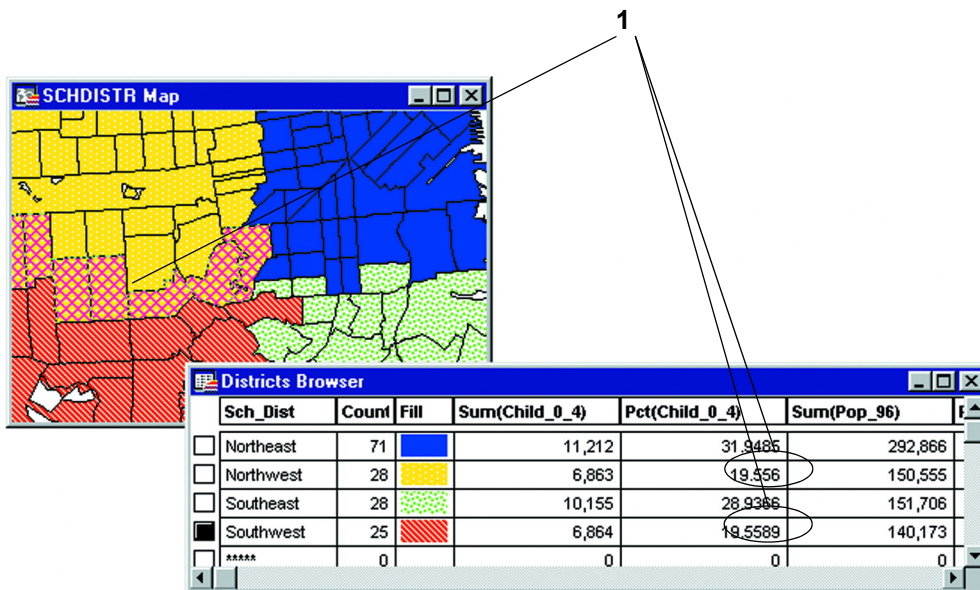
Now to begin the actual redistricting, or load-balancing, set the district that you want to add objects to as the target district. Select the map object(s) and watch the data change in the Districts Browser. You can select objects from more than one district and assign them to the same target district. Simply **SHIFT-CLICK** each additional map object after the first one.



1 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 **REDISTRIBUTE** 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 under 4.

## 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 416](#).

**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. The redistrict thematic layer is removed from the Map window. 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.

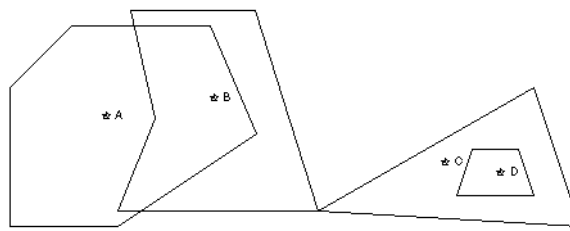
The geographic operators go between the objects being specified. Select the geographic operators from the Operators menu. Here are the geographic operators:

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.** Month(RECEIVED)=8 and Year(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 this:

**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 another expression. MapInfo Professional uses the keyword “obj” or “object” with the geographic functions: Area, CentroidX, CentroidY, ObjectLen, and Perimeter. This keyword tells MapInfo Professional that it has to get values based on graphical objects in the table rather than 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. Returns 0 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 with the current unit in double-quotes. In most cases the current unit is square miles. To specify another unit, type the unit 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
"l"	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 (for example 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".

Pattern Control Characters	Role in formatting results
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).
-	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”



Pattern	Value Parameter	Format\$( ) Returns:
"#.###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"
"#%"	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
-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 (for example 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 (for example, 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 (for example, "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), for example, 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:

<b>char_expr</b>	<b>Val(char_expr)</b>
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

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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:

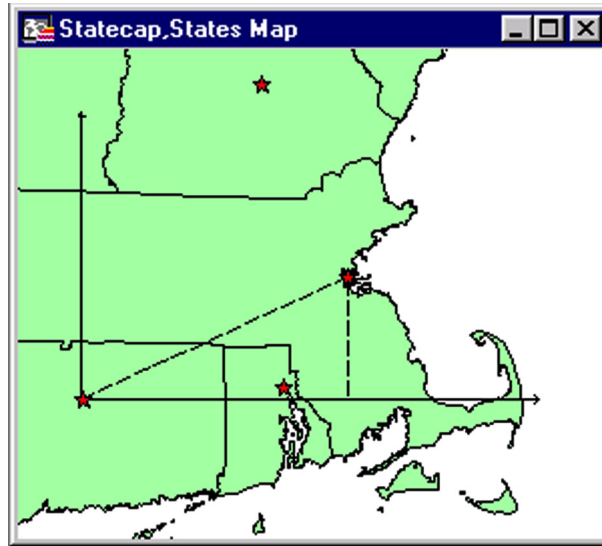
```
Str$(ObjectInfo(obj,2))="Pen (2, 2, 16711680)"
```

### 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.

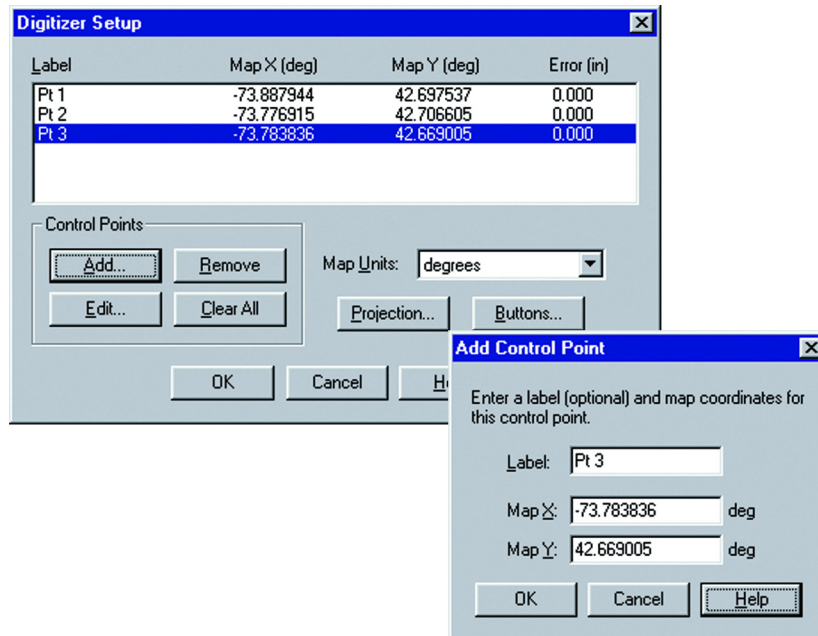
If you do not have coordinates for the map, you will need to digitize it as a non-earth map, which means points on the image will only be relative to each other, not to points on the earth. Create a non-earth map table first and display it in the active Map window.

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.

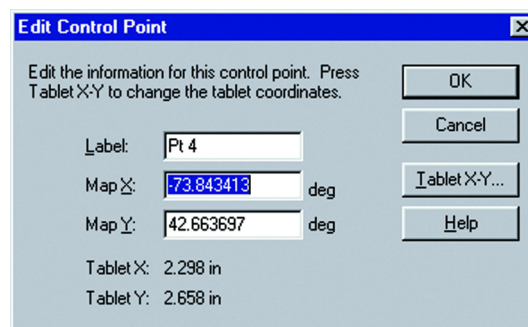


For instance, to add a control point, choose **ADD**. The **PICK TABLET POINT** dialog box displays telling you to choose a point on the tablet and click a digitizer button. Now the **ADD CONTROL POINT** dialog box displays prompting you for a label (optional) and the map coordinates for the point. When 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 235](#).

### 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:

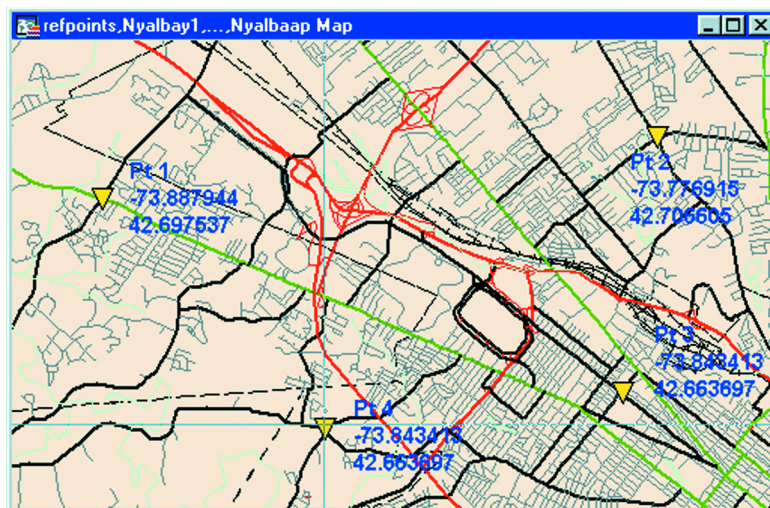
- If there are less than 3 control points entered in the workspace. You will need to enter at least 1 or 2 more control points in Digitizer Setup.
- If your control points run in a straight line. You must enter control points that are at different angles from each other.
- The digitizer size or resolution 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, for example, 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 (for example, 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.

## Web Map Service

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### Understanding GetFeatureInfo Support in 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.

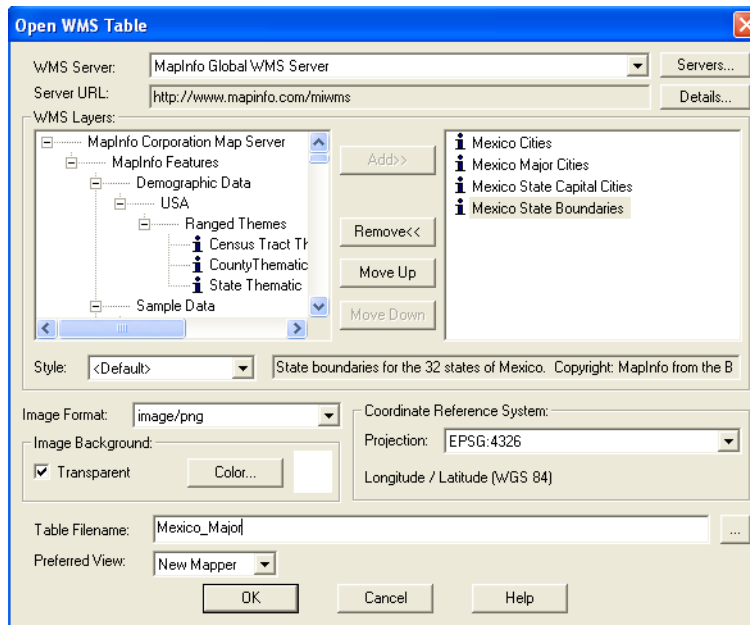
By default, when you open a WMS layer and add it to a map, it is selectable when it meets the following criteria:

- 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.

## Understanding 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>&lt;message from XML parser&gt;</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>&lt;message from server&gt;</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>&lt;message from server&gt;</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.
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>&lt;message from server&gt;</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>&lt;message from server&gt;</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.

### WMS-Related Error Messages

Error Message	Description and Explanation of Message
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 <formatA> rather than the requested format of <formatB>.	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.

## Web Feature Service

MapInfo Professional 8.0 provides a Web Feature Service (WFS) client to retrieve geospatial GML (Geography Markup Language)<sup>2</sup> 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.

**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 refetch your WFS data manually using the refresh process. See [Refreshing a WFS Layer on page 627](#) 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.

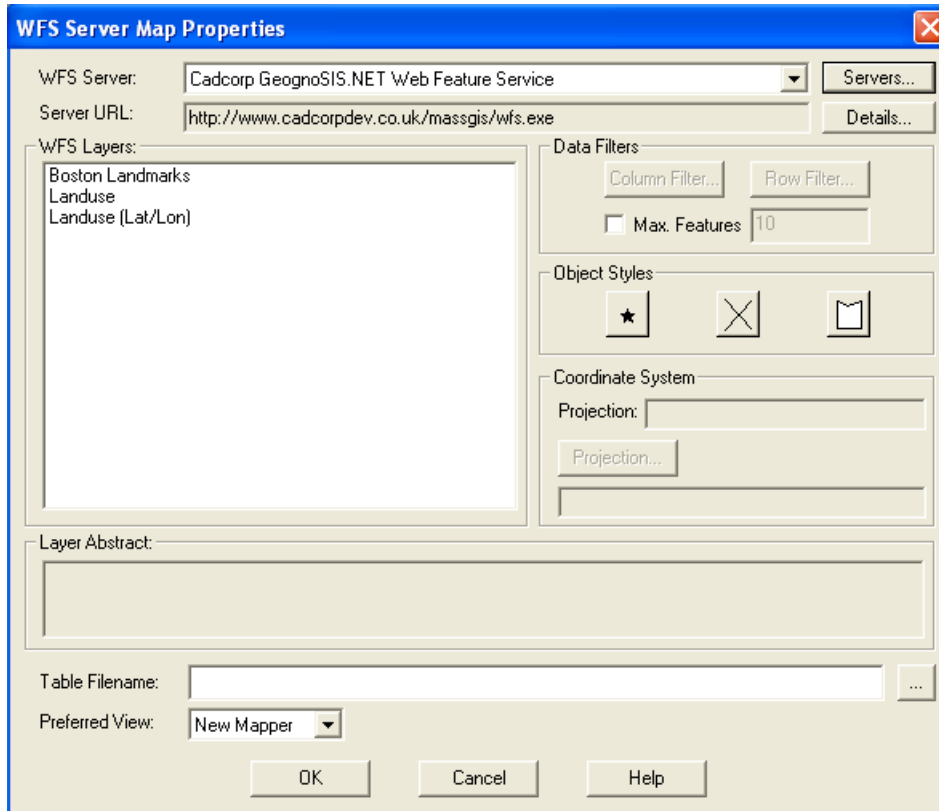
**Note:** You must have a working Internet connection whenever you retrieve WFS data.

## **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**



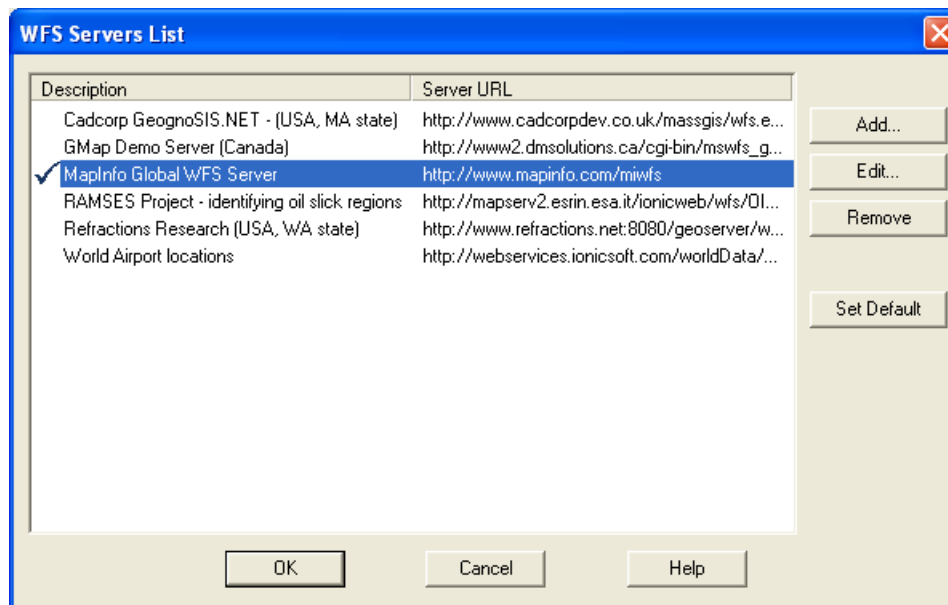
2. Select a server from the **WFS SERVER** drop-down list, then click **OK**.

**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**.

3. If you do not see the server you are looking for in the **WFS SERVER** list, select **SERVICES** 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 627](#).

**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.

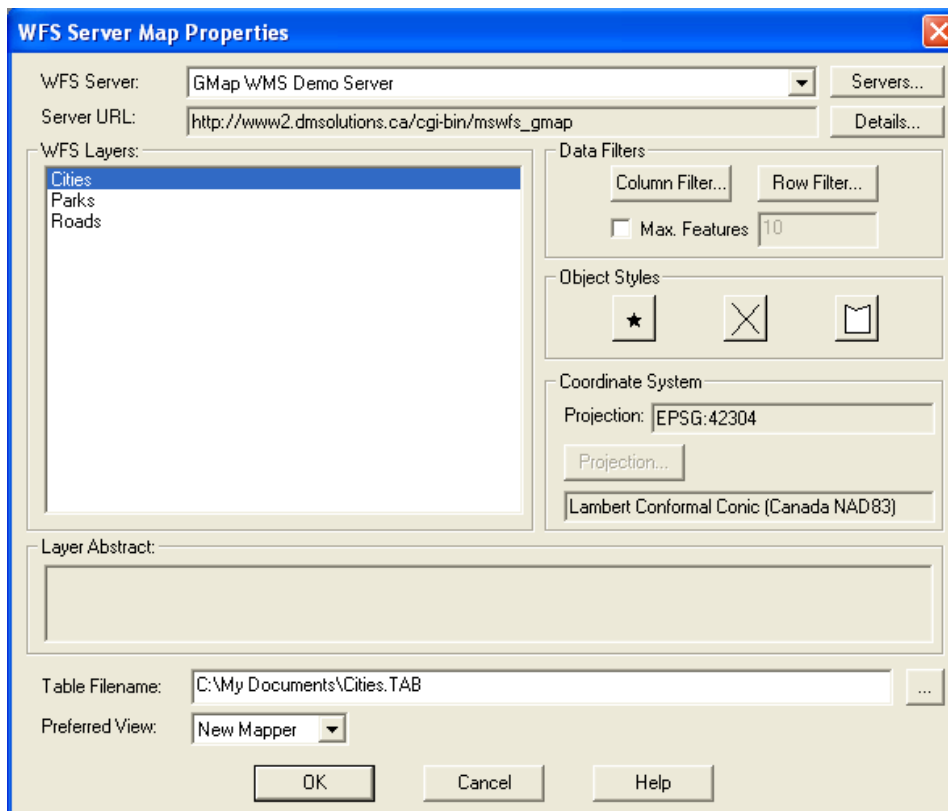
## Selecting a WFS Layer

To select a WFS Layer:

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

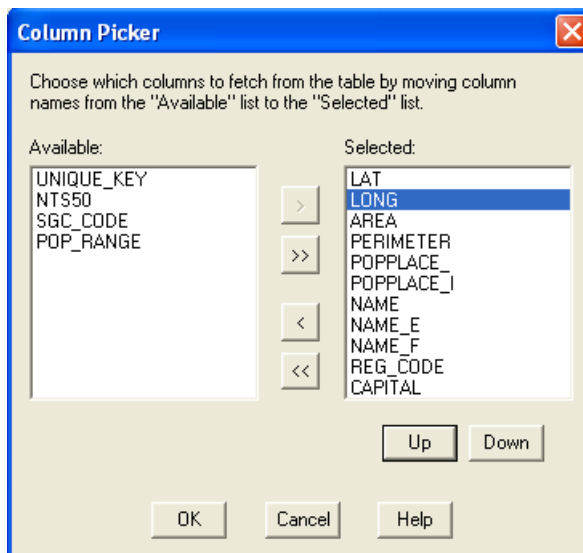


Figure: WFS Server Map Properties with Layer Highlighted



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**

The screenshot shows the 'Row Picker' dialog box with the following configuration:

Conjunction:	Column:	Operator:	Value:
	FEE_OWNER	=	MDC
and	AREA_ACRES	>=	20
	none		
	none		

Buttons: OK, Cancel, Help

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

6. 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 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**

The screenshot shows the 'Row Picker' dialog box with the following configuration:

Conjunction:	Column:	Operator:	Value:
	GEOM	ogc:BBOX	SELECTION
	none		
	none		
	none		

Buttons: OK, Cancel, Help

7. 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.

8. Select an appropriate file name from the **TABLE FILENAME** entry box. See **Handling Retrieved WFS Data on page 627** for detailed information on specifying file names and folders for saved tables.
9. 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.
10. 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.

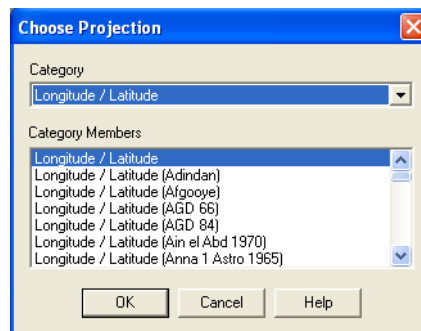
## Changing a WFS Coordinate System

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 table and click **SELECT** to refresh the WFS layer.
3. Click **OK** to exit the dialog box.

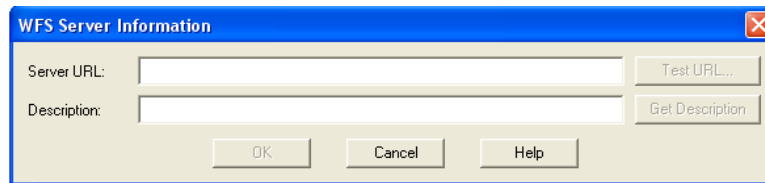
## Adding a WFS Server

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.

## 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>&lt;message from server&gt;</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>&lt;message from server&gt;</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>&lt;message from server&gt;</i>	<p>The raw data following the colon is transmitted by the WFS server. This may help you analyze the problem.</p> <p>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.</p>
The WFS Server returned data which was neither in the requested format nor a recognized WFS service exception: <i>&lt;message from server&gt;</i>	<p>The raw data following the colon is transmitted by the WFS server. This may help you analyze the problem.</p> <p>The exception message from the server could not be understood. For example, the exception message may not have been in XML format.</p>
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>&lt;message from server&gt;</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 <b>WFS SERVER MAP PROPERTIES</b> dialog box, you must also select a WFS layer. If you click <b>OK</b> before selecting a WFS layer, you will get this error message.

### WFS-Related Error Messages

Error Message	Description and Explanation of Message
Error: Unable to communicate with the WFS server while trying to determine the table structure.	This message can appear when pressing the <b>OK</b> button on the <b>WFS SEVER MAP PROPERTIES</b> dialog box. This means that the DescribeFeatureType failed.
Please select a supported projection.	This message appears if the selected WFS layer has Unsupported Projection, and the user did not select the <b>PROJECTION</b> button to specify a projection.
Error: Unable to create XML file for WFS table.	This message can appear when pressing the <b>OK</b> 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.
XML Parsing Error: <i>&lt;message from XML parser&gt;</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.

### WFS Server Requirements

To display GML2 data correctly in the MapInfo Professional Web Feature Service, the following requirements must be met:

- **The server you are requesting information from must support V1.0.0 of WFS.** The MapInfo Professional WFS client sends the initial GetCapabilities and specifies version 1.0.0. If the server you are requesting information from does not support the 1.0.0 version, MapInfo Professional cannot use that server and no further operations will be allowed.
- **The WFS server must respond to GetCapabilities request using Http GET in XML.**
- **The server must be able to respond to the GetFeature request by returning GML2 (OGC GML V2.1.1).** The server's GetCapabilities response should include this information. If the server does not claim to use GML2 as the Result Format for GetFeature, then MapInfo Professional cannot use the server and no further operations will be allowed.
- **The server GetCapabilities response must conform to the OGC GetCapabilities schema.** If the server GetCapabilities response does not conform to the schema, MapInfo Professional may not be able to read portions of it. This may mean that MapInfo Professional misses items that the server is trying to communicate, such as feature types (tables), or filters. In some cases, MapInfo Professional won't be able to deal with the server, since necessary information cannot be found. In other cases, MapInfo Professional may miss functionality that the server is trying to provide, such as filters.
- **The WFS server must support HTTP GET and/or HTTP Post for the DescribeFeatureType and GetFeature requests.** The MapInfo Professional client supports both HTTP GET and HTTP POST. The server should advertise what it accepts for each request in its GetCapabilities response. MapInfo Professional prefers HTTP POST for both operations, so if the server advertises that it supports both HTTP POST and HTTP GET methods for these operations, MapInfo Professional uses HTTP POST.
- **The server must supply the URL for both the DescribeFeatureType and GetFeature in their GetCapabilities response.** The URL provided must be valid for that request. If the

server provides an invalid URL, MapInfo Professional's WFS client cannot work and displays a suitable error message.

- **The DescribeFeatureType response should be an XML Schema that contains the information for the table specified only.** If the server returns a schema that contains descriptions for multiple tables, MapInfo Professional cannot parse it correctly, and the operation will fail.
- **If the DescribeFeatureType response is not a valid XML Schema, no further operations can be allowed for that feature type.** Without a valid schema, MapInfo Professional cannot create or populate the table. In this case you can either select another table, select another server, or cancel the **WFS** dialog box.
- **MapInfo Professional may not handle schemas that are “well formed” but contain invalid XML.** MapInfo Professional checks that the schema returned for DescribeFeatureType is well formed XML, but does not validate the XML. Our WFS client works correctly with many servers that return schema's which contain invalid items, and our developers thought that eliminating these servers because they didn't contain 100% valid XML was too limiting.

**Note:** MapInfo Professional cannot successfully handle schemas that contain invalid items, such as an invalid character in an element name - for example, "City Type" where the space in the element name isn't valid XML.

While MapInfo Professional may be able to process a schema that contains well-formed but invalid XML, this may cause problems elsewhere, such as during the GetFeature processing. This may cause some confusion. If the XML returned during GetFeature doesn't match the schema, MapInfo Professional may create an empty table without displaying an error.

- **MapInfo Professional doesn't process xsd:include.** All element types must be defined in the schema returned from the DescribeFeatureType request or derived from GML base types.
- **MapInfo Professional supports all row filters that the server advertises in the GetCapabilities response with the following constraints:**
  - The filters are OGC-defined filters as specified in the OGC WFS Specification or the OGC Filter Encoding Implementation specification.
  - The filter takes 0 or 1 arguments beyond the column name. This is a user interface constraint. MapInfo Professional's interface is currently not set up to address such filters. This includes the A Between filter, which requires 2 values.
- **While MapInfo Professional supports MaxFeatures, not all WFS servers seem to support this option.** While the OGC WFS Specification states that the server should implement this option, our experience has been that some servers ignore MaxFeatures.
- **MapInfo Professional's WFS implementation treats the Geometry column as mandatory.** While you can filter specific columns, MapInfo Professional always requests the Geometry column from the server. Many servers seem to treat the Geometry column as mandatory and return this column whether it is requested or not.
- **The GML returned during the GetFeature request should validate against the schema returned during the DescribeFeatureType request.** If this is not the case, then MapInfo Professional may not be able to create a table.





# 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.

## In this Appendix:

♦ Shortcuts for File Menu Items . . . . .	634
♦ Shortcuts for Edit Menu Items . . . . .	634
♦ Shortcut to Tools Menu Items . . . . .	634
♦ Shortcuts to Objects Menu Items . . . . .	635
♦ Shortcuts for Query Menu Items . . . . .	635
♦ Shortcuts for Options Menu Items . . . . .	635
♦ Shortcuts for Map Menu Items . . . . .	636
♦ Shortcut for Layout Menu Item . . . . .	636
♦ Shortcuts for Window Menu Items . . . . .	636
♦ Shortcuts by Keystroke . . . . .	637

## 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	<b>CTRL+T</b>
Objects > Clear Target	<b>CTRL+DELETE</b>

## Shortcuts for Query Menu Items

---

Menu Item	Keystrokes
Query > Unselect All	<b>CTRL+W</b>
Query > Find	<b>CTRL+F</b>
Query > Find Selection	<b>CTRL+G</b>

## Shortcuts for Options Menu Items

---

Menu Item	Keystrokes
Options > Line Style	<b>SHIFT+F8</b>
Options > Region Style	<b>CTRL+F8</b>
Options > Symbol Style	<b>ALT+F8</b>
Options > Text Style	<b>F8</b>

## Shortcuts for Map Menu Items

---

Menu Item	Keystrokes
Map > Layer Control	<b>CTRL+L</b>
Map > Create Prism Map	<b>F10</b>
Map > Create 3D Map	<b>F11</b>
Map > Create Thematic Map	<b>F9</b>
Map > Modify Thematic Map	<b>ALT+F9</b>
Map > Previous View	<b>ALT+LEFT ARROW</b>

## Shortcut for Layout Menu Item

---

Menu Item	Keystrokes
Layout > Previous View	<b>ALT+LEFT ARROW</b>

## Shortcuts for Window Menu Items

---

Menu Item	Keystrokes
Window > New Browser	<b>F2</b>
Window > New Mapper	<b>F3</b>
Window > New Grapher	<b>F4</b>
Window > New Layout	<b>F5</b>
Window > Redraw Window	<b>CTRL+D</b>
Window > Tile Windows	<b>SHIFT+F4</b>
Window > Cascade Windows	<b>SHIFT+F5</b>

## Shortcuts by Keystroke

---

Menu Items	Keystrokes
Map > Previous View and Layout > Previous View	<b>ALT+LEFT ARROW</b>
File > Copy	<b>CTRL+C</b>
Window > Redraw Window	<b>CTRL+D</b>
File > New Row	<b>CTRL+E</b>
Query > Find	<b>CTRL+F</b>
Query > Find Selection	<b>CTRL+G</b>
File > Save Workspace	<b>CTRL+K</b>
Map > Layer Control	<b>CTRL+L</b>
File > New Table	<b>CTRL+N</b>
File > Open	<b>CTRL+O</b>
File > Print	<b>CTRL+P</b>
File > Reshape	<b>CTRL+R</b>
File > Save Table	<b>CTRL+S</b>
Objects > Set Target	<b>CTRL+T</b>
Tools > Run MapBasic Program	<b>CTRL+U</b>
File > Paste	<b>CTRL+V</b>
Query > Unselect All	<b>CTRL+W</b>
File > Cut	<b>CTRL+X</b>
File > Undo	<b>CTRL+Z</b>
Objects > Clear Target	<b>CTRL+DELETE</b>
Window > New Browser	<b>F2</b>
Window > New Mapper	<b>F3</b>
Window > New Grapher	<b>F4</b>
Window > New Layout	<b>F5</b>
File > Get Info	<b>F7</b>
Options > Text Style	<b>F8</b>
Map > Create Thematic Map	<b>F9</b>

<b>Menu Items</b>	<b>Keystrokes</b>
Map > Create Prism Map	<b>F10</b>
Map > Create 3D Map	<b>F11</b>
File > Exit	<b>ALT+F4</b>
Options > Symbol Style	<b>ALT+F8</b>
Map > Modify Thematic Map	<b>ALT+F9</b>
Options > Region Style	<b>CTRL+F8</b>
Window > Tile Windows	<b>SHIFT+F4</b>
Window > Cascade Windows	<b>SHIFT+F5</b>
Options > Line Style	<b>SHIFT+F8</b>
Edit > Delete	<b>DEL</b>

## Elements of a Coordinate System

### In this Appendix:

- ◆ Projections and Their Parameters ..... 640
- ◆ Projection Datums ..... 643
- ◆ For More Information on Projections ..... 655



## 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
<b>Albers Equal-Area Conic</b>	X	X	X	X	X	X			X	X	
<b>Azimuthal Equidistant</b>	X	X	X	X*							X
<b>Cassini-Soldner</b>	X	X	X	X					X	X	
<b>Cylindrical Equal Area</b>	X	X	X		X						
<b>Double Stereographic</b>	X	X	X	X				X	X	X	
<b>Eckert IV</b>	X	X	X								
<b>Eckert VI</b>	X	X	X								
<b>Equidistant Conic</b>	X	X	X	X	X	X			X	X	
<b>Gall</b>	X	X	X								
<b>Hotine Oblique Mercator</b>	X	X	X	X			X	X	X	X	
<b>Lambert Azimuthal Equal-Area</b>	X	X	X	X†							X
<b>Lambert Conformal Conic</b>	X	X	X	X	X	X			X	X	
<b>Longitude-Latitude</b>	X										
<b>Mercator</b>	X	X	X								
<b>Miller</b>	X	X	X								
<b>Mollweide</b>	X	X	X								
<b>New Zealand Map Grid</b>	X	X	X	X					X	X	
<b>Polyconic</b>	X	X	X	X					X	X	
<b>Regional Mercator</b>	X	X	X		X						
<b>Robinson</b>	X	X	X								
<b>Sinusoidal</b>	X	X	X								
<b>Stereographic</b>	X	X	X	X				X	X	X	

<b>Swiss Oblique Mercator</b>	X	X	X	X					X	X	
<b>Transverse Mercator</b>	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:

<b>Number</b>	<b>Projection</b>
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
5	Arc 1950	Botswana, Lesotho, Malawi, Swaziland, Zaire, Zambia, Zimbabwe	Clarke 1880
6	Arc 1960	Kenya, Tanzania	Clarke 1880

Number	Datum	Area Maps	Ellipsoid
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
23	Chua Astro	Paraguay	International
122	Co-Ordinate System 1937 of Estonia	Estonia	Bessel 1841
24	Corrego Alegre	Brazil	International

Number	Datum	Area Maps	Ellipsoid
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 Sys- tem 1967 (GRS 67)	Worldwide	GRS 67
33	Geodetic Reference Sys- tem 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

Number	Datum	Area Maps	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
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
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

Number	Datum	Area Maps	Ellipsoid
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
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



Number	Datum	Area Maps	Ellipsoid
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
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

Number	Datum	Area Maps	Ellipsoid
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
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

Number	Datum	Area Maps	Ellipsoid
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
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

Number	Datum	Area Maps	Ellipsoid
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)***
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.

## Datum Enhancements

---

This section describes the datum enhancements by product version. The MAPINFOW.PRJ file has been updated to support these changes.

### MapInfo Professional 7.8

#### 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

### **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.

## MapInfo Professional 7.5

### Enhanced KKJ Projection Algorithm

For this release, we have significantly improved the KKJ projection algorithm using conversion formulas from the National Land Survey of Finland.

### Japanese Geodetic Datum Conversion

In the late 90's, Japan started using new parameters for its Tokyo datum, which are somewhat different from those in the previous version of the product. In MapInfo Professional 7.5, we have added a new datum, which uses the JGD2000 conversion to convert the old Tokyo datum (the NIMA Tokyo datum (1991)) and the "new" Tokyo datum to the JGD2000 datum. If the JGD2000 conversion fails (for example, when a point is outside the JGD2000 grid), we use the standard Molodensky transformation method.

## 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>

## Registering SPOT Images

### In this Appendix:

- ◆ Registering SPOT Image Files ..... 658

## 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 506](#) 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

```

## Geopot™ 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 506** 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.

## In this Appendix:

♦ MIF File Header . . . . .	664
♦ MIF Data Section . . . . .	671
♦ Pen Styles . . . . .	674
♦ Brush Styles . . . . .	675
♦ Symbol Styles . . . . .	676
♦ Font Styles for Symbols . . . . .	678
♦ Colors for Symbols . . . . .	678



## MIF File Header

---

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.

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 <b>SAVE QUERIES IN WORKSPACES</b> checkbox in the <b>STARTUP PREFERENCES</b> 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 Hill-shading
	X	X		Table uses a Datum or ellipsoid released in a specific version. * See release notes for new datums and new ellipsoids

Version Number	TAB	MIF - MID	WOR	Action
600	X	X		Azimuthal Equidistant projection, Oblique aspect - #(28)
	X	X		Everest (Pakistan) ellipsoid - #(50)
	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 ledit_version 650 and lversion 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
750				
	X			TAB files can include Web Map Service data.
			X	Workspaces can include Advanced Printer settings (scale patterns).
			X	Workspaces can include cartographic legends with custom layouts.
780				
	X			TAB files can include Web Feature Service data.
			X	Workspaces can include cartographic legends. The workspace will always include a clause for swatch size that cannot be parsed by earlier versions of MapInfo Professional.
			X	Workspaces can include mappers with dot-density thematics. The workspace will always include a clause for dot size that cannot be parsed by earlier versions of MapInfo Professional.

## 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 (for example, -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 (for example, -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, decimal points, and optional sign) and 4 digits after the decimal.

## MIF Data Section

---

The MIF file data section 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 and 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 676](#) 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 (for example, "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.

```
ROUNDRECT  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 (for example, "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 (for example, "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 and has this syntax:

```
FONT ("fontname", style, size, forecolor [, bgcolor] )
```

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:  $(red * 65536) + (green * 256) + blue$

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 pattern ID numbers and their corresponding patterns.

### Sections in this Appendix:







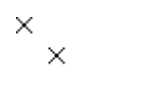


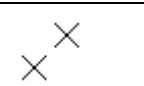


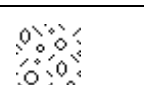


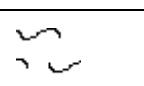





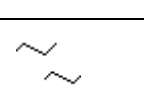


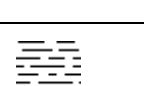


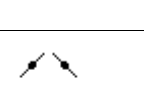


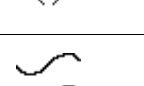


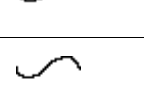

- ♦ **MapInfo Professional Fill Pattern Table** ..... 682

## MapInfo Professional Fill Pattern Table

MB ID	Image	MB ID	Image	MB ID	Image	MB ID	Image
1	None	15		26		37	
2		16		27		38	
3		17		28		39	
4		18		29		40	
5		19		30		41	
6		20		31		42	
7		21		32		43	
8		22		33		44	
12		23		34		45	
13		24		35		46	
14		25		36		40	

MB ID	Image	MB ID	Image	MB ID	Image	MB ID	Image
41		54		67		80	
42		55		68		81	
43		56		69		82	
44		57		70		83	
45		58		71		84	
46		59		72		85	
47		60		73		86	
48		61		74		87	
49		62		75		88	
50		63		76		89	
51		64		77		90	
52		65		78		91	
53		66		79		92	

MB ID	Image	MB ID	Image	MB ID	Image	MB ID	Image
93		105		117		129	
94		106		118		130	
95		107		119		131	
96		108		120		132	
97		109		121		133	
98		110		122		134	
99		111		123		135	
100		112		124		136	
101		113		125		137	
102		114		126		138	
103		115		127		139	
104		116		128		140	

MB ID	Image	MB ID	Image	MB ID	Image	MB ID	Image
141		153		165			
142		154		166			
143		155		167			
144		156		168			
145		157		169			
146		158		170			
147		159		171			
148		160		172			
149		161		173			
150		162		174			
151		163		175			
152		164					



# 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** ..... 688
- ◆ **Datum Conversion** ..... 693



## 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  $0^\circ$ . 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,  $dX$ ,  $dY$ ,  $dZ$ ,  $E_X$ ,  $E_Y$ ,  $E_Z$ ,  $m$ , 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 <sup>-6</sup>

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 .....	696
♦ Asia .....	696
♦ Europe .....	697
♦ North America .....	698
♦ World .....	700



## 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.

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. Source: 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

## New statements

♦ CartesianConnectObjects() function . . . . .	702
♦ CartesianObjectDistance() function . . . . .	702
♦ ConnectObjects() function. . . . .	703
♦ Farthest statement . . . . .	703
♦ Nearest statement. . . . .	705
♦ ObjectDistance() function . . . . .	708
♦ ObjectNodeM() function. . . . .	709
♦ ObjectNodeZ() function . . . . .	710
♦ Server Create Workspace statement . . . . .	711
♦ Server Remove Workspace statement . . . . .	712
♦ Server Versioning statement. . . . .	713
♦ Server Workspace Merge statement. . . . .	714
♦ Server Workspace Refresh statement . . . . .	716
♦ SphericalConnectObjects() function . . . . .	717
♦ SphericalObjectDistance() function . . . . .	718

## Enhanced statements

♦ Add Cartographic Frame statement . . . . .	719
♦ Alter Object statement . . . . .	721
♦ Create Cartographic Legend statement . . . . .	721
♦ Create Collection statement . . . . .	722
♦ Create Pline statement. . . . .	722
♦ Create Region statement . . . . .	722
♦ Commit Table statement . . . . .	723
♦ ExtractNodes() function. . . . .	723
♦ Import statement. . . . .	723
♦ ObjectGeography() function . . . . .	724
♦ ObjectInfo() function . . . . .	724
♦ ObjectNodeX() function . . . . .	725
♦ ObjectNodeY() function . . . . .	725
♦ Set Cartographic Legend statement. . . . .	725
♦ Set Legend statement . . . . .	726
♦ TableInfo() function . . . . .	729

## CartesianConnectObjects() function

### Purpose

Returns an object representing the shortest or longest distance between two objects.

### Syntax

```
CartesianConnectObjects(object1, object2, min)
```

*object1* and *object2* are object expressions.

*min* is a logical expression where TRUE calculates the minimum distance between the objects, and FALSE calculates the maximum distance between objects.

### Returns

This statement returns a single section, two-point Polyline object representing either the closest distance (`min == TRUE`) or farthest distance (`min == FALSE`) between *object1* and *object2*.

### Description

One point of the resulting Polyline object is on *object1* and the other point is on *object2*. Note that the distance between the two input objects can be calculated using the `ObjectLen()` function. If there are multiple instances where the minimum or maximum distance exists (e.g., the two points returned are not uniquely the shortest distance and there are other points representing "ties") then these functions return one of the instances. There is no way to determine if the object returned is uniquely the shortest distance.

`CartesianClosestPoints()` returns a Polyline object connecting *object1* and *object2* in the shortest (`min == TRUE`) or longest (`min == FALSE`) way using a cartesian calculation method. If the calculation cannot be done using a cartesian distance method (e.g., if the MapBasic Coordinate System is Lat Long), then this function will produce an error.

---

## CartesianObjectDistance() function

### Purpose

Returns the distance between two objects.

### Syntax

```
CartesianObjectDistance(object1, object2, unit_name)
```

*object1* and *object2* are object expressions.

*unit\_name* is a string representing the name of a distance unit.

### Returns

Float

### Description

`CartesianObjectDistance()` returns the minimum distance between *object1* and *object2* using a cartesian calculation method with the return value in *unit\_name*. If the calculation cannot be done using a cartesian distance method (e.g., if the MapBasic Coordinate System is Lat Long), then this function will produce an error.

## ConnectObjects() function

### Purpose

Returns an object representing the shortest or longest distance between two objects.

### Syntax

```
ConnectObjects(object1, object2, min)
```

*object1* and *object2* are object expressions.

*min* is a logical expression where TRUE calculates the minimum distance between the objects, and FALSE calculates the maximum distance between objects.

### Returns

This statement returns a single section, two-point Polyline object representing either the closest distance (`min == TRUE`) or farthest distance (`min == FALSE`) between *object1* and *object2*.

### Description

One point of the resulting Polyline object is on *object1* and the other point is on *object2*. Note that the distance between the two input objects can be calculated using the `ObjectLen()` function. If there are multiple instances where the minimum or maximum distance exists (e.g., the two points returned are not uniquely the shortest distance and there are other points representing "ties") then these functions return one of the instances. There is no way to determine if the object returned is uniquely the shortest distance.

`ConnectObjects()` returns a Polyline object connecting *object1* and *object2* in the shortest (`min == TRUE`) or longest (`min == FALSE`) way using a spherical calculation method. If the calculation cannot be done using a spherical distance method (e.g., if the MapBasic Coordinate System is NonEarth), then a cartesian method will be used.

## Farthest statement

### Purpose

Find the object in a table that is farthest from a particular object. The result is a two-point Polyline object representing the farthest distance.

### Syntax

```
Farthest [N | ALL] From { Table fromtable | Variable fromvar }
To totable Into intotable
[Type { Spherical | Cartesian }]
[Ignore [Contains] [Min min_value] [Max max_value] Units unitname]
[Data clause]
```

*N* optional parameter representing the number of "farthest" objects to find. The default is 1. If ALL is used, then a distance object is created for every combination.

*fromtable* represents a table of objects that you want to find farthest distances from.

*fromvar* represents a MapBasic variable representing an object that you want to find the farthest distances from.

*totable* represents a table of objects that you want to find farthest distances to.



*intotable* represents a table to place the results into.

*Type* is the method used to calculate the distances between objects. It can either be Spherical or Cartesian. The type of distance calculation must be correct for the coordinate system of the *intotable* or an error will occur. If the *Coordsys* of the *intotable* is NonEarth and the distance method is Spherical, then an error will occur. If the *Coordsys* of the *intotable* is Latitude/Longitude, and the distance method is Cartesian, then an error will occur.

The *Ignore* clause limits the distances returned. Any distances found which are less than or equal to *min\_value* or greater than *max\_value* are ignored. *min\_value* and *max\_value* are in the distance unit signified by *unitname*. If *unitname* is not a valid distance unit, an error will occur. The entire *Ignore* clause is optional, as are the *Min* and *Max* subclauses within it (e.g., only a *Min* or only a *Max*, or both may occur).

Normally, if one object is contained within another object, the distance between the objects is zero. For example, if the *From* table is *WorldCaps* and the *To* table is *World*, then the distance between London and the United Kingdom would be zero. If the *Contains* flag is set within the *Ignore* clause, then the distance will not be automatically be zero. Instead, the distance from London to the boundary of the United Kingdom will be returned. In effect, this will treat all closed objects, such as regions, as polylines for the purpose of this operation.

The *Data* clause can be used to mark which *fromtable* object and which *totable* object the result came from.

#### Description

Every object in the *fromtable* is considered. For each object in the *fromtable*, the farthest object in the *totable* is found. If *N* is present, then the *N* farthest objects in *totable* are found. A two-point Polyline object representing the farthest points between the *fromtable* object and the chosen *totable* object is placed in the *intotable*. If *All* is present, then an object is placed in the *intotable* representing the distance between the *fromtable* object and each *totable* object.

If there are multiple objects in the *totable* that are the same distance from a given *fromtable* object, then only one of them may be returned. If multiple objects are requested (i.e., if *N* is greater than 1), then objects of the same distance will fill subsequent slots. If the tie exists at the second farthest object, and 3 objects are requested, then the object will become the third farthest object.

The types of the objects in the *fromtable* and *totable* can be anything except Text objects. For example, if both tables contain Region objects, then the minimum distance between Region objects is found, and the two-point Polyline object produced represents the points on each object used to calculate that distance. If the Region objects intersect, then the minimum distance is zero, and the two-point Polyline returned will be degenerate, where both points are identical and represent a point of intersection.

The distances calculated do not take into account any road route distance. It is strictly a "as the bird flies" distance.

The *Ignore* clause can be used to limit the distances to be searched, and can effect how many *<totable>* objects are found for each *<fromtable>* object. One use of the *Min* distance could be to eliminate distances of zero. This may be useful in the case of two point tables to eliminate comparisons of the same point. For example, if there are two point tables representing Cities, and we want to find the closest cities, we may want to exclude cases of the same city.

The Max distance can be used to limit the objects to consider in the *totable*. This may be most useful in conjunction with *N* or All. For example, we may want to search for the five airports that are closest to a set of cities (where the *fromtable* is the set of cities and the *totable* is a set of airports), but we don't care about airports that are farther away than 100 miles. This may result in less than five airports being returned for a given city. This could also be used in conjunction with the All parameter, where we would find all airports within 100 miles of a city.

Supplying a Max parameter can improve the performance of the Farthest statement, since it effectively limits the number of <totable> objects that are searched.

The effective distances found are strictly greater than the *min\_value* and less than or equal to the *max\_value*:

```
min_value < distance <= max_value
```

This can allow ranges or distances to be returned in multiple passes using the Farthest statement. For example, the first pass may return all objects between 0 and 100 miles, and the second pass may return all objects between 100 and 200 miles, and the results should not contain duplicates (i.e., a distance of 100 should only occur in the first pass and never in the second pass).

#### Data Clause

```
Data IntoColumn1=column1, IntoColumn2=column2
```

The IntoColumn on the left hand side of the equals must be a valid column in *intotable*. The column name on the right hand side of the equals must be a valid column name from either *totable* or *fromtable*. If the same column name exists in both *totable* and *fromtable*, then the column in *totable* will be used (e.g., *totable* is searched first for column names on the right hand side of the equals). To avoid any conflicts such as this, the column names can be qualified using the table alias:

```
Data name1=states.state_name, name2=county.state_name
```

It is currently not possible to fill in a column in the *intotable* with the distance. However, this can be easily accomplished after the Nearest operation is completed by using the **TABLE > UPDATE COLUMN...** functionality from the menu or by using the Update MapBasic statement.

#### See Also

**Nearest statement, ObjectDistance() function, ConnectObjects() function**

---

## Nearest statement

### Purpose

Find the object in a table that is closest to a particular object. The result is a 2 point Polyline object representing the closest distance.

### Syntax

```
Nearest [N | ALL] From { Table fromtable | Variable fromvar }
To totable Into intotable
[Type { Spherical | Cartesian }]
[Ignore [Contains] [Min min_value] [Max max_value] Units unitname]
[Data clause]
```

*N* optional parameter representing the number of "nearest" objects to find. The default is 1. If `ALL` is used, then a distance object is created for every combination.

*fromtable* represents a table of objects that you want to find closest distances from.

*fromvar* represents a MapBasic variable representing an object that you want to find the closest distances from.

*totable* represents a table of objects that you want to find closest distances to.

*intotable* represents a table to place the results into.

*Type* is the method used to calculate the distances between objects. It can either be Spherical or Cartesian. The type of distance calculation must be correct for the coordinate system of the *intotable* or an error will occur. If the *Coordsys* of the *intotable* is NonEarth and the distance method is Spherical, then an error will occur. If the *Coordsys* of the *intotable* is Latitude/Longitude, and the distance method is Cartesian, then an error will occur.

The `Ignore` clause limits the distances returned. Any distances found which are less than or equal to *min\_value* or greater than *max\_value* are ignored. *min\_value* and *max\_value* are in the distance unit signified by *unitname*. If *unitname* is not a valid distance unit, an error will occur. The entire `Ignore` clause is optional, as are the `Min` and `Max` subclauses within it (e.g., only a `Min` or only a `Max`, or both may occur).

Normally, if one object is contained within another object, the distance between the objects is zero. For example, if the *From* table is `WorldCaps` and the *To* table is `World`, then the distance between London and the United Kingdom would be zero. If the `Contains` flag is set within the `Ignore` clause, then the distance will not be automatically be zero. Instead, the distance from London to the boundary of the United Kingdom will be returned. In effect, this will treat all closed objects, such as regions, as polylines for the purpose of this operation.

The `Data` clause can be used to mark which *fromtable* object and which *totable* object the result came from.

### Description

Every object in the *fromtable* is considered. For each object in the *fromtable*, the nearest object in the *totable* is found. If *N* is present, then the *N* nearest objects in *totable* are found. A two-point Polyline object representing the closest points between the *fromtable* object and the chosen *totable* object is placed in the *intotable*. If `ALL` is present, then an object is placed in the `<intotable>` representing the distance between the *fromtable* object and each *totable* object.

If there are multiple objects in the *totable* that are the same distance from a given *fromtable* object, then only one of them may be returned. If multiple objects are requested (i.e., if *N* is greater than 1), then objects of the same distance will fill subsequent slots. If the tie exists at the second closest object, and three objects are requested, then the object will become the third closest object.

The types of the objects in the *fromtable* and *totable* can be anything except Text objects. For example, if both tables contain Region objects, then the minimum distance between Region objects is found, and the two-point Polyline object produced represents the points on each object used to calculate that distance. If the Region objects intersect, then the minimum distance is zero, and the two-point Polyline returned will be degenerate, where both points are identical and represent a point of intersection.

The distances calculated do not take into account any road route distance. It is strictly a "as the bird flies" distance.

The Ignore clause can be used to limit the distances to be searched, and can effect how many *totable* objects are found for each *fromtable* object. One use of the Min distance could be to eliminate distances of zero. This may be useful in the case of two point tables to eliminate comparisons of the same point. For example, if there are two point tables representing Cities, and we want to find the closest cities, we may want to exclude cases of the same city.

The Max distance can be used to limit the objects to consider in the <totable>. This may be most useful in conjunction with *N* or *All*. For example, we may want to search for the five airports that are closest to a set of cities (where the *fromtable* is the set of cities and the *totable* is a set of airports), but we don't care about airports that are farther away than 100 miles. This may result in less than five airports being returned for a given city. This could also be used in conjunction with the *All* parameter, where we would find all airports within 100 miles of a city.

Supplying a Max parameter can improve the performance of the Nearest statement, since it effectively limits the number of <totable> objects that are searched.

The effective distances found are strictly greater than the *min\_value* and less than or equal to the *max\_value*:

```
min_value < distance <= max_value
```

This can allow ranges or distances to be returned in multiple passes using the Nearest statement. For example, the first pass may return all objects between 0 and 100 miles, and the second pass may return all objects between 100 and 200 miles, and the results should not contain duplicates (i.e., a distance of 100 should only occur in the first pass and never in the second pass).

#### Data Clause

```
Data IntoColumn1=column1, IntoColumn2=column2
```

The IntoColumn on the left hand side of the equals must be a valid column in *intotable*. The column name on the right hand side of the equals must be a valid column name from either *totable* or *fromtable*. If the same column name exists in both *totable* and *fromtable*, then the column in *totable* will be used (e.g., *totable* is searched first for column names on the right hand side of the equals). To avoid any conflicts such as this, the column names can be qualified using the table alias:

```
Data name1=states.state_name, name2=county.state_name
```

It is currently not possible to fill in a column in the *intotable* with the distance. However, this can be easily accomplished after the Nearest operation is completed by using the **TABLE > UPDATE COLUMN...** functionality from the menu or by using the `Update MapBasic` statement.

#### Examples

Assume that we have a point table representing locations of ATM machines and that there are at least two columns in this table: *business* which represents the name of the business which contains the ATM and *Address* which represents the street address of that business. Assume that the current selection represents our current location. Then the following will find the closest ATM to where we currently are:

```
Nearest From selection To atm Into result Data where=buisness,address=address
```

If we wanted to find the closest five ATM machines to our current location:

```
Nearest 5 From selection To atm Into result Data where=business,address=address
```

If we want to find all ATM machines within a 5 mile radius:

```
Nearest All From selection To atm Into result Ignore Max 5 Units "mi" Data
where=buisness,address=address
```

Assume we have a table of house locations (the *fromtable*) and a table representing the coastline (the *totable*). To find the distance from a given house to the coastline:

```
Nearest From customer To coastline Into result Data
who=customer.name,where=customer.address,coast_loc=coastline.county,type=coastli
ne.designation
```

If we don't care about customer locations which are greater than 30 miles from any coastline:

```
Nearest From customer To coastline Into result Ignore Max 30 Units "mi" Data
who=customer.name,where=customer.address,coast_loc=coastline.county,type=coastli
ne.designation
```

Assume we have a table of cities (the *fromtable*) and another table of state capitals (the *totable*), and we want to find the closest state capital to each city, but we want to ignore the case where the city in the *fromtable* is also a state capital:

```
Nearest From uscty_1k To usa_caps Into result Ignore Min 0 Units "mi" Data
city=uscty_1k.name,capital=usa_caps.capital
```

#### See Also

**Farthest statement, ObjectDistance() function, ConnectObjects() function**

---

## ObjectDistance() function

### Purpose

Returns the distance between two objects.

### Syntax

```
ObjectDistance(object1, object2, unit_name)
```

*object1* and *object2* are object expressions.

*unit\_name* is a string representing the name of a distance unit.

### Returns

Float

### Description

`ObjectDistance()` returns the minimum distance between *object1* and *object2* using a spherical calculation method with the return value in *unit\_name*. If the calculation cannot be done using a spherical distance method (e.g., if the MapBasic Coordinate System is NonEarth), then a cartesian distance method will be used.

---

## ObjectNodeM() function

### Purpose

Returns the m-value of a specific node in a region, polyline or multipoint object.

### Syntax

```
ObjectNodeM( object, polygon_num, node_num )
```

object is an Object expression

polygon\_num is a positive Integer value indicating which polygon or section to query. It is ignored for Multipoint objects (it used for regions and polylines).

node\_num is a positive Integer value indicating which node to read

### Return Value

Float

### Description

The ObjectNodeM() function returns the m-value of a specific node from a region, polyline or multipoint object.

The polygon\_num parameter must have a value of one or more. This specifies which polygon (if querying a region) or which section (if querying a polyline) should be queried. Call the ObjectInfo() function to determine the number of polygons or sections in an object. The ObjectNodeM() function supports Multipoint objects and returns the m-value of a specific node in a Multipoint object.

The node\_num parameter must have a value of one or more; this tells MapBasic which of the object's nodes should be queried. You can use the ObjectInfo() function to determine the number of nodes in an object.

If object does not support m values or m-value for this node is not defined, then, error is set.

### Example

The following example queries the first graphic object in the table Routes. If the first object is a polyline, the program queries z-coordinates and m-values of the first node in the polyline.

```
Dim i_obj_type As SmallInt,  
    z, m As Float  
Open Table "routes"  
Fetch First From routes  
    ' at this point, the expression:  
    ' routes.obj  
    ' represents the graphical object that's attached  
    ' to the first record of the routes table.  
i_obj_type = ObjectInfo(routes.obj, OBJ_INFO_TYPE)  
If i_obj_type = OBJ_PLINE Then  
    ' ... then the object is a polyline...  
    z = ObjectNodeZ(routes.obj, 1, 1) ' read z-coordinate  
    m = ObjectNodeM(routes.obj, 1, 1) ' read m-value  
End If
```

### See Also

Querying map objects

---

## ObjectNodeZ() function

### Purpose

Returns the z-coordinate of a specific node in a region, polyline, or multipoint object.

### Syntax

```
ObjectNodeZ( object, polygon_num, node_num )
```

object is an Object expression

polygon\_num is a positive Integer value indicating which polygon or section to query. It is ignored for Multipoint objects (it used for regions and polylines).

node\_num is a positive Integer value indicating which node to read

### Return Value

Float

### Description

The ObjectNodeZ() function returns the z-value of a specific node from a region, polyline or multipoint object.

The polygon\_num parameter must have a value of one or more. This specifies which polygon (if querying a region) or which section (if querying a polyline) should be queried. Call the ObjectInfo() function to determine the number of polygons or sections in an object. The ObjectNodeZ() function supports Multipoint objects and returns the z-coordinate of a specific node in a Multipoint object.

The node\_num parameter must have a value of one or more; this tells MapBasic which of the object's nodes should be queried. You can use the ObjectInfo() function to determine the number of nodes in an object.

If object does not support Z values or Z-value for this node is not defined then an error is thrown.

### Example

The following example queries the first graphic object in the table Routes. If the first object is a polyline, the program queries z-coordinates and m-values of the first node in the polyline.

```
Dim i_obj_type As SmallInt,  
    z, m As Float  
Open Table "routes"  
Fetch First From routes  
    ' at this point, the expression:  
    ' routes.obj  
    ' represents the graphical object that's attached  
    ' to the first record of the routes table.  
i_obj_type = ObjectInfo(routes.obj, OBJ_INFO_TYPE)  
If i_obj_type = OBJ_PLINE Then  
    ' ... then the object is a polyline...  
    z = ObjectNodeZ(routes.obj, 1, 1) ' read z-coordinate  
    m = ObjectNodeM(routes.obj, 1, 1) ' read m-value  
End If
```

### See Also

Querying map objects

## Register Table statement

### Syntax

```
Register Table source_file
.
.
.
Type "ODBC" [ Cache { On | OFF } ]
  Connection { Handle ConnectionNumber | ConnectionString }
  Toolkit toolkitname
  Table SQLQuery
  [Versioned {Off | On}]
  [Workspace WorkspaceName]
  [ParentWorkspace ParentWorkspaceName]
  ...
```

*Versioned* indicates if the table to be opened is an version-enabled (ON) table or not (OFF).

*WorkspaceName* is the name of the current workspace in which the table will be operated. The name is case sensitive.

*ParentWorkspaceName* is the name of parent workspace of the current workspace.

**Note:** In order to use have this statement be effective, the table has to be version-enabled, for example, *Versioned* is set ON.

### Examples

The following example create a tab file and then open the tab file.

```
Register Table "Gwmusa" TYPE ODBC
TABLE "Select * From "MIUSER"."GWMUSA""
CONNECTION "SRVR=troyny;UID=miuser;PWD=miuser"
toolkit "ORAINET"
Versioned On
Workspace "MIUSER"
ParentWorkspace "LIVE"
Into "C:\projects\data\testscripts\english\remote\Gwmusa.tab"

Open Table "C:\Projects\Data\TestScripts\English\remote\Gwmusa.TAB" Interactive
Map From Gwmusa
```

**Note:** *Interactive* is not a valid parameter to use when registering SHP files.

### See Also

[Server Create Workspace statement](#)

## Server Create Workspace statement

### Purpose

Creates a new workspace in the database (Oracle 9i or later).

### Syntax

```
Server ConnectionNumber Create
Workspace WorkspaceName
[Description Description ]
[Parent ParentWorkspaceName]
```



*ConnectionNumber* is an integer value that identifies the specific connection.

*WorkspaceName* is the name of the workspace. The name is case sensitive, and it must be unique. The length of a workspace name must not exceed 30 characters.

*Description* is a string to describe the workspace.

*ParentWorkspaceName* is the name of the workspace which will be the parent of the new workspace *WorkspaceName*. By default, when a workspace is created, it is created from the topmost, or LIVE, database workspace.

### Description

This statement only applies to Oracle9i or later. The new workspace *WorkspaceName* is a child of the parent workspace *ParentWorkspaceName* or LIVE if the Parent is not specified.

Refer to the *Oracle9i Application Developer's Guide - Workspace Manager* for more information.

### Examples

The following example creates a workspace named GARYG in the database.

```
Dim hdbc As Integer
hdbc = Server_Connect("ORAINET", "SRVR=TROYNY;UID=MIUSER;PWD=MIUSER")
Server hdbc Create
Workspace "MIUSER"
Description "MIUser private workspace"
```

The following example creates a child workspace under MIUSER in the database.

```
Dim hdbc As Integer
hdbc = Server_Connect("ORAINET", "SRVR=TROYNY;UID=MIUSER;PWD=MIUSER")
Server hdbc Create Workspace "MBPROG" Description "MapBasic project" Parent
"MIUSER"
```

### See also

[Server Remove Workspace statement](#), [Server Versioning statement](#)

---

## Server Remove Workspace statement

### Purpose

Discards all row versions associated with a workspace and deletes the workspace in the database (Oracle 9i or later).

### Syntax

```
Server ConnectionNumber Remove
Workspace WorkspaceName
```

*ConnectionNumber* is an integer value that identifies the specific connection.

*WorkspaceName* is the name of the workspace. The name is case sensitive.

### Description

This statement only applies to Oracle9i or later. This operation can only be performed on leaf workspaces (the bottom-most workspaces in a branch in the hierarchy). There must be no other users in the workspace being removed.

## Examples

The following example removes the MIUSER workspace in the database.

```
Dim hdbc As Integer
hdbc = Server_Connect ("ORAINET", "SRVR=TROYNY;UID=MIUSER;PWD=MIUSER")
Server hdbc Remove Workspace "MIUSER"
```

## See also

[Server Create Workspace statement](#)

## Server Versioning statement

### Purpose

Version-enable or disable a table on Oracle 9i or later, which creates or deletes all the necessary structures to support multiple versions of rows to take advantage of Oracle Workspace Manager.

### Syntax

```
Server ConnectionNumber Versioning
{
  ON
  [History {SRV_WM_HIST_NONE|SRV_WM_HIST_OVERWRITE|SRV_WM_HIST_NO_OVERWRITE}]
  | OFF
  [Force {OFF | ON }]
}
Table ServerTableName
```

**ON** | **OFF** indicates to enable (when it is **ON**) a table versioning or disable (when it is **OFF**) a table versioning.

*ConnectionNumber* is an integer value that identifies the specific connection.

*ServerTableName* is the name of the table on Oracle server to be version-enabled/disabled. The length of a table name must not exceed 25 characters. The name is not case sensitive.

When version-enabling a table (**ON**), *History* is an optional parameter.

*History* clause specifies how to track modifications to *ServerTableName*, i.e., lets you timestamp changes made to all rows in a version-enabled table and to save a copy of either all changes or only the most recent changes to each row. Must be one of the following constant values:

- **SRV\_WM\_HIST\_NONE (0)**: No modifications to the table are tracked. (This is the default.)
- **SRV\_WM\_HIST\_OVERWRITE (1)**: The with overwrite (**W\_OVERWRITE**) option. A view named *ServerTableName\_HIST* is created to contain history information, but it will show only the most recent modifications to the same version of the table. A history of modifications to the version is not maintained; that is, subsequent changes to a row in the same version overwrite earlier changes. (The **CREATETIME** column of the *TableName\_HIST* view contains only the time of the most recent update.)
- **SRV\_WM\_HIST\_NO\_OVERWRITE (2)**: The without overwrite (**WO\_OVERWRITE**) option. A view named *ServerTableName\_HIST* is created to contain history information, and it will show all modifications to the same version of the table. A history of modifications to the version is maintained; that is, subsequent changes to a row in the same version do not overwrite earlier changes.

However, there are many restrictions on tables to use this option. Please refer the *Oracle9i Application Developer's Guide - Workspace Manager* for more information.

When disabling a version-enabled table (OFF), `Force` is an optional parameter.

If `Force` is set ON, all data in workspaces other than LIVE to be discarded before versioning is disabled. OFF (the default) prevents versioning from being disabled if `ServerTableName` was modified in any workspace other than LIVE and if the workspace that modified `ServerTableName` still exists.

### Description

This statement only applies to Oracle9i or later. The table, `ServerTableName`, that is being version-enabled must have a primary key defined. Only the owner of a table or a user with the WM\_ADMIN role can enable or disable versioning on the table. Tables that are version-enabled and users that own version-enabled tables cannot be deleted. You must first disable versioning on the relevant table or tables. Tables owned by SYS cannot be version-enabled. Refer to the *Oracle9i Application Developer's Guide - Workspace Manager* for more information.

### Examples

The following example enables versioning on the MIUUSA3 table.

```
Dim hdbc As Integer
hdbc = Server_Connect("ORAINET", "SRVR=TROYNY;UID=MIUSER;PWD=MIUSER")
Server hdbc Versioning ON Table "MIUUSA3"
```

or

```
Server hdbc Versioning ON History 1 Table "MIUUSA3"
```

The following example disables versioning on the MIUUSA3 table.

```
Dim hdbc As Integer
hdbc = Server_Connect("ORAINET", "SRVR=TROYNY;UID=MIUSER;PWD=MIUSER")
Server hdbc Versioning OFF Force ON Table "MIUUSA3"
```

### See also

[Server Create Workspace statement](#)

---

## Server Workspace Merge statement

### Purpose

Applies changes to a table (all rows or as specified in the Where clause) in a workspace to its parent workspace in the database (Oracle 9i or later).

### Syntax

```
Server Workspace Merge
  Table TableName
  [Where WhereClause]
  [RemoveData {OFF | ON}]
  [{Interactive | Automatic merge_keyword}]
```

*TableName* is the name (alias) of an open MapInfo table from an Oracle9i or later server. The table contains rows to be merged into its parent workspace.

*WhereClause* identifies the rows to be merged into the parent workspace. The clause itself should omit the WHERE keyword.

**Example:**

'MI\_PRINX = 20'. Only primary key columns can be specified in the *WhereClause*. The *WhereClause* cannot contain a subquery. If *WhereClause* is not specified, all rows in *TableName* are merged.

If *RemoveData* is set ON, the data in the table (as specified by *WhereClause*) in the child workspace will be removed. This option is permitted only if workspace has no child workspaces (that is, it is a leaf workspace). OFF (the default) does not remove the data in the table in the child workspace.

If there are conflicts between the workspace being merged and its parent workspace, the user must resolve conflicts first in order for merging to succeed. MapInfo Professional allows the user to resolve the conflicts first and then to perform the merging within the process. The following clauses let you control what happens when there is a conflict. These clauses have no effect if there is no conflict between the workspace being merged and its parent workspace.

**Interactive**

In the event of a conflict, MapInfo displays the Conflict Resolution dialog box. The conflicts will be resolved one by one or all together based on user choices. After all the conflicts are resolved, the table is merged into its parent based on the user's choices.

**Note:** Due to an Oracle system limitation, this option is not available if the server is Oracle9i.

**Automatic StopOnConflict**

In the event of a conflict, MapInfo will stop here. (This is also the default behavior if the statement does not include an *Interactive* clause or an *Automatic* clause.)

**Automatic RevertToBase**

In the event of a conflict, MapInfo reverts to the original (base) values. (it causes the base rows to be copied to the child workspace but not to the parent workspace. However, the conflict is considered resolved; and when the child workspace is merged, the base rows are copied to the parent workspace too.) Note that BASE is ignored for insert-insert conflicts where a base row does not exist; in this case the *Automatic* parameter must be followed by *UseParent* or *UseCurrent*.)

**Automatic UseCurrent**

In the event of a conflict, MapInfo uses the child workspace values.

**Automatic UseParent**

In the event of a conflict, MapInfo uses the parent workspace values.

**Description**

This statement only applies to Oracle9i or later. All data that satisfies the *WhereClause* in *TableName* is applied to the parent workspace. Any locks that are held by rows being merged are released. If there are conflicts between the workspace being merged and its parent workspace, this operation provides user options on how to solve the conflict. The merge operation was executed only after all the conflicts were resolved. A table cannot be merged in the LIVE workspace (because that workspace has no parent workspace). A table cannot be merged or refreshed if there is an open database transaction affecting the table.

Refer to *Oracle9i Application Developer's Guide - Workspace Manager* for more information.

## Examples

The following example merge changes to USA where MI\_PRINX=5 in MIUSER to its parent workspace.

```
Server Workspace Merge
Table "GWMUSA2"
Where "MI_PRINX = 60"
Automatic UseCurrent
```

## See Also

[Server Workspace Refresh statement](#)

---

## Server Workspace Refresh statement

### Purpose

Applies all changes made to a table (all rows or as specified in the Where clause) in its parent workspace to a workspace in the database (Oracle 9i or later).

### Syntax

```
Server Workspace Refresh
Table TableName
[Where WhereClause]
[{{Interactive | Automatic merge_keyword}}
```

*TableName* is the name (alias) of an open MapInfo table from an Oracle9i or later server. The table contains rows to be refreshed using values from its parent workspace.

*WhereClause* identifies the rows to be refreshed from the parent workspace. The clause itself should omit the WHERE keyword.

Example:

'MI\_PRINX = 20'. Only primary key columns can be specified in the Where clause. The Where clause cannot contain a subquery. If *WhereClause* is not specified, all rows in *TableName* are refreshed.

If there are conflicts between the workspace being refreshed and its parent workspace, the user must resolve conflicts first in order for refreshing to succeed. MapInfo Professional allows the user to resolve the conflicts first and then to perform the refreshing within the process. The following clauses let you control what happens when there is a conflict. These clauses has no effect if there is no conflict between the workspace being refreshed and its parent workspace.

### Interactive

In the event of a conflict, MapInfo displays the Conflict Resolution dialog box. The conflicts will be resolved one by one based on user choices. After all the conflicts are resolved, the table is refreshed from its parent based on the user's choices.

**Note:** Due to an Oracle system limitation, this option is not available if the server is Oracle9i.

### Automatic StopOnConflict

In the event of a conflict, MapInfo will stop here. (This is also the default behavior if the statement does not include an Interactive clause or an Automatic clause.)

### Automatic RevertToBase

In the event of a conflict, MapInfo reverts to the original (base) values. (it causes the base rows to be copied to the child workspace but not to the parent workspace. However, the conflict is considered resolved; and when the child workspace is merged to its parent, the base rows will be copied to the parent workspace.) Note that BASE is ignored for insert-insert conflicts where a base row does not exist; in this case the Automatic parameter must be followed by UseParent or UseCurrent.)

### Automatic UseCurrent

In the event of a conflict, MapInfo uses the child workspace values.

### Automatic UseParent

In the event of a conflict, MapInfo uses the parent workspace values.

#### Description

This statement only applies to Oracle9i or later. It applies to workspace all changes in rows that satisfy the *WhereClause* in the table in the parent workspace from the time the workspace was created or last refreshed. If there are conflicts between the workspace being refreshed and its parent workspace, this operation provides user options on how to solve the conflict. The refresh operation is executed only after all the conflicts are resolved. A table cannot be refreshed in the LIVE workspace (because that workspace has no parent workspace). A table cannot be merged or refreshed if there is an open database transaction affecting the table.

Refer to the *Oracle9i Application Developer's Guide - Workspace Manager* for more information.

#### Examples

The following example refreshes MIUSER by applying changes made to USA where MI\_PRINX=5 in its parent workspace.

```
Server Workspace Refresh
Table "GWMUSA2"
Where "MI_PRINX = 60"
Automatic UseParent
```

#### See also

[Server Workspace Merge statement](#)

---

## SphericalConnectObjects() function

#### Purpose

Returns an object representing the shortest or longest distance between two objects.

#### Syntax

```
SphericalConnectObjects(object1, object2, min)
```

*object1* and *object2* are object expressions.

*min* is a logical expression where TRUE calculates the minimum distance between the objects, and FALSE calculates the maximum distance between objects.

#### Returns

This statement returns a single section, two-point Polyline object representing either the closest distance (*min* == TRUE) or farthest distance (*min* == FALSE) between *object1* and *object2*.

**Description**

One point of the resulting Polyline object is on *object1* and the other point is on *object2*. Note that the distance between the two input objects can be calculated using the `ObjectLen()` function. If there are multiple instances where the minimum or maximum distance exists (e.g., the two points returned are not uniquely the shortest distance and there are other points representing "ties") then these functions return one of the instances. There is no way to determine if the object returned is uniquely the shortest distance.

`SphericalConnectObjects()` returns a Polyline object connecting *object1* and *object2* in the shortest (`min == TRUE`) or longest (`min == FALSE`) way using a spherical calculation method. If the calculation cannot be done using a spherical distance method (e.g., if the MapBasic Coordinate System is NonEarth), then this function will produce an error.

---

**SphericalObjectDistance() function****Purpose**

Returns the distance between two objects.

**Syntax**

```
SphericalObjectDistance(object1, object2, unit_name)
```

*object1* and *object2* are object expressions.

*unit\_name* is a string representing the name of a distance unit.

**Returns**

Float

**Description**

`SphericalObjectDistance()` returns the minimum distance between *object1* and *object2* using a spherical calculation method with the return value in *unit\_name*. If the calculation cannot be done using a spherical distance method (e.g., if the MapBasic Coordinate System is NonEarth), then this function will produce an error.

## Enhanced MapBasic Functions and Statements

---

**Add Cartographic Frame statement**

**Alter Object statement**

**Create Cartographic Legend statement**

**Create Collection statement**

**Create Pline statement**

**Create Region statement**

**Commit Table statement**

**ExtractNodes() function**

**Import statement**

**ObjectGeography() function**

**ObjectInfo() function**

**ObjectNodeX() function**

**ObjectNodeY() function**

**Set Cartographic Legend statement**

**Set Legend statement**

**TableInfo() function**

---

### Add Cartographic Frame statement

```
[ Window legend_window_id ]
[ Custom ]
[ Default Frame Title { def_frame_title } [ Font... ] ]
[ Default Frame Subtitle { def_frame_subtitle } [ Font... ] ]
[ Default Frame Style { def_frame_style } [ Font... ] ]
[ Default Frame Border Pen... pen_expr ]
Frame From Layer { map_layer_id | map_layer_name
[ Using
  [ Column { column | object [ FromMapCatalog { On | Off }] } ]
...

```

The syntax indicates that if you specify `Using Column object`, there is a new `FromMapCatalog` clause you can use that is only applicable to live access tables.

`FromMapCatalog ON` retrieves styles from the `MapCatalog` for a live access table. If the table is not a live access table, MapBasic reverts to the default behavior for a non-live access table instead of throwing an error. The default behavior for a non-access table is `FromMapCatalog Off` (i.e., map styles).



`FromMapCatalog OFF` retrieves the unique map styles for the live table from the server. This table must be a live access table that supports per record styles for this to occur. If the live table does not support per record styles than the behavior is to revert to the default behavior for live tables, which is to get the default styles from the MapCatalog (`FromMapCatalog ON`).

## Examples

Creating on live access table that supports per record styles with map styles:

```
Create Cartographic Legend From Window 168811024
Scrollbars On
Portrait Style Size Large
Default Frame
Title "# Legend"
Font ("Arial",0,10,0)
Default Frame Style "%"
Font ("Arial",0,8,0)
Frame From Layer 1
Title "nyalbap Legend"
Using column object FromMapCatalog OFF label default
```

Creating on live access table with MapCatalog:

```
Create Cartographic Legend From Window 168811024
Scrollbars On
Portrait Style Size Large
Default Frame
Title "# Legend"
Font ("Arial",0,10,0)
Default Frame Style "%"
Font ("Arial",0,8,0)
Frame From Layer 1
Title "tony_nyalbap Legend"
Using column object FromMapCatalog ON label default
```

Creating on live access table with MapCatalog:

```
Create Cartographic Legend From Window 168811024
Scrollbars On
Portrait Style Size Large
Default Frame Title "# Legend"
Font ("Arial",0,10,0)
Default Frame Style "%"
Font ("Arial",0,8,0)
Frame From Layer 1 Title "nyalbap Legend"
Using column class label default
```

## Workspace Behavior

When you save to a workspace, the new `FromMapCatalog OFF` clause is written to the workspace when specified. This requires the workspace to be bumped up to 800. If the `FromMapCatalog ON` clause is specified we do not write it to the workspace since it is default behavior. This lets us avoid bumping up the workspace version in this case.

## Alter Object statement

### Syntax

```
Alter Object obj
{ Info object_info_code, new_info_value |
  Geography object_geo_code, new_geo_value |
  Node { Add [ Position polygon_num, node_num ] ( x, y ) |
        Set Position polygon_num, node_num ( x, y ) |
        Remove Position polygon_num, node _num
  }
}
```

*polygon\_num* is an Integer value (one or larger), identifying one polygon from a region object or one section from a polyline object.

## Create Cartographic Legend statement

### Syntax

```
Create Cartographic Legend
[ From Window map_window_id ]
[ Behind ]
[ Position ( x , y ) [ Units paper_units ] ]
[ Width win_width [ Units paper_units ] ]
[ Height win_height [ Units paper_units ] ]
[ Window Title { legend_window_title } ]
[ ScrollBars { On | Off } ]
[ Portrait | Landscape | Custom ]
[ Style Size {Small | Large} ]
[ Default Frame Title { def_frame_title } [ Font... ] } ]
[ Default Frame Subtitle { def_frame_subtitle } [ Font... ] } ]
[ Default Frame Style { def_frame_style } [ Font... ] } ]
[ Default Frame Border Pen [ [ pen_expr ] ] ]
Frame From Layer { map_layer_id | map_layer_name
[ Using
  [ Column { column | object [ FromMapCatalog { On | Off }]] ] ]
...

```

The syntax indicates that if you specify Using Column object, there is a new FromMapCatalog clause you can use that is only applicable to live access tables.

FromMapCatalog ON retrieves styles from the MapCatalog for a live access table. If the table is not a live access table, MapBasic reverts to the default behavior for a non-live access table instead of throwing an error. The default behavior for a non-access table is FromMapCatalog Off (i.e., map styles).

FromMapCatalog OFF retrieves the unique map styles for the live table from the server. This table must be a live access table that supports per record styles for this to occur. If the live table does not support per record styles than the behavior is to revert to the default behavior for live tables, which is to get the default styles from the MapCatalog (FromMapCatalog ON).

---

## Create Collection statement

### Syntax

```

Create Collection [ num_parts ]
  [ Into { Window window_id | Variable var_name } ]
  Multipoint
    [ num_points ]
    ( x1, y1 ) ( x2, y2 ) [ ... ]
    [ Symbol . . . ]
  Region
    num_polygons
    [ num_points1 (x1, y1) (x2, y2) [ ... ] ]
    [ num_points2 (x1, y1) (x2, y2) [ ... ] ... ]
    [ Pen ... ]
    [ Brush ... ]
    [ Center ( center_x, center_y ) ]
  Pline
    [ Multiple num_sections ]
    num_points
    ( x1, y1 ) ( x2, y2 ) [ ... ]
    [ Pen ... ]
    [ Smooth ... ]

```

*num\_polygons* is the number of polygons inside the Collection object.

*num\_sections* specifies how many sections the multi-section polyline will contain.

---

## Create Pline statement

### Syntax

```

Create Pline
  [ Into { Window window_id | Variable var_name } ]
    [ Multiple num_sections ]
    num_points
  ( x1, y1 ) ( x2, y2 ) [...]
  [ Pen ... ]
  [ Smooth ]

```

*num\_sections* specifies how many sections the multi-section polyline will contain.

---

## Create Region statement

### Syntax

```

Create Region
  [ Into { Window window_id | Variable var_name } ]
    num_polygons
    [ num_points1 ( x1, y1 ) ( x2 , y2 ) [ ... ] ]
    [ num_points2 ( x1, y1 ) ( x2 , y2 ) [ ... ] ... ]
  [ Pen ... ]
  [ Brush ... ]
  [ Center ( center_x, center_y ) ]

```

*num\_polygons* specifies the number of polygons that will make up the region (zero or more).

---

## Commit Table statement

Here is the syntax with the new `ConvertObjects` keyword in **bold**:

```
Commit Table table
  [ As filespec
    [ Type { NATIVE |
      DBF [ Charset char_set ] |
      Access Database database_filespec
      Version version Table tablename
      [ Password pwd ] [ Charset char_set ] |
      QUERY
      ODBC Connection ConnectionNumber Table tablename
    } ]
    [ CoordSys... ]
    [ Version version ] ]
  [ { Interactive | Automatic commit_keyword } ]
  [ConvertObjects {ON | OFF | INTERACTIVE }]
```

---

## ExtractNodes() function

```
ExtractNodes( object, polygon_index, begin_node, end_node, b_region )
```

`polygon_index` is an Integer value, 1 or larger: for region objects. This indicates which polygon (for regions) or section (for polylines) to query.

---

## Import statement

### Syntax

```
Import file_name
  [ Type "GML21" ]
  [ Layer layer_name ]
  [ Into table_name ]
  [ Overwrite ]
  [ Coordsys clause ]
```

`file_name` is the name of the GML 2.1 file to import.

Type is "GML21" for GML 2.1 files.

`layer_name` is the name of the GML layer.

`table_name` is the MapInfo table name.

`Overwrite` causes the TAB file to be automatically overwritten. If `Overwrite` is not specified, an error will result if the TAB file already exists.

The `Coordsys` clause is optional. If the GML file contains a supported projection and the `Coordsys` clause is not specified, the projection from the GML file will be used. If the GML file contains a supported projection and the `Coordsys` clause is specified, the projection from the `Coordsys` clause will be used. If the GML file does not contain a supported projection, the `Coordsys` clause must be specified.

**Note:** If the Coordsys clause does not match the projection of the GML file, your data may not import correctly. The coordsys must match the coordsys of the data in the GML file. It will not transform the data from one projection to another.

**Example**

```
Import "D:\midata\GML\GML2.1\mi_usa.xml" Type "GML21" layer "USA" Into
"D:\midata\GML\GML2.1\mi_usa_USA.TAB" Overwrite CoordSys Earth Projection 1, 104
```

The following functions have been updated for this release.

## ObjectGeography() function

attribute setting	Return value (Float)
OBJ_GEO_POINTZ	z-value of a Point object.
OBJ_GEO_POINTM	m-value of a Point object.

If object does not support z/m values or z/m-value for this node is not defined, then an error is thrown.

## ObjectInfo() function

**Syntax**

```
ObjectInfo( object, attribute )
```

*object* is an Object expression

*attribute* is an integer code specifying which type of information should be returned.

**Return value**

OBJ\_INFO\_NPOLYGONS (21) is an Integer that indicates the number of polygons (in the case of a region) or sections (in the case of a polyline) which make up an object.

OBJ\_INFO\_NPOLYGONS+N (21) is an Integer that indicates the number of nodes in the *N*th polygon of a region or the *N*th section of a polyline.

**Note:** With region objects, MapInfo Professional counts the starting node twice (once as the start node and once as the end node). For example, ObjectInfo returns a value of 4 for a triangle-shaped region.

attribute setting	Return value
OBJ_INFO_Z_UNIT_SET(12)	Logical, indicating whether Z units are defined.
OBJ_INFO_Z_UNIT(13)	String result: indicates distance units used for Z-values. Return empty string if units are not specified.
OBJ_INFO_HAS_Z(14)	Logical, indicating whether object has Z values.
OBJ_INFO_HAS_M(15)	Logical, indicating whether object has M values.

## ObjectNodeX() function

### Syntax

```
ObjectNodeX( object, polygon_num, node_num )
```

*object* is an Object expression.

*polygon\_num* is a positive Integer value indicating which polygon or section to query. It is ignored for Multipoint objects (it used for regions and polylines).

---

## ObjectNodeY() function

### Syntax

```
ObjectNodeY( object, polygon_num, node_num )
```

*object* is an Object expression.

*polygon\_num* is a positive Integer value indicating which polygon or section to query. It is ignored for Multipoint objects (it used for regions and polylines).

---

## Set Cartographic Legend statement

### Syntax

```
Set Cartographic Legend  
  [ Window window_id ]  
  [Refresh]  
  [Portrait | Landscape]  
  [Columns number_of_columns | Lines number_of_lines]
```

...

*number\_of\_columns* specifies the width of the legend.

*number\_of\_lines* specifies the height of the legend.

---

## Set Legend statement

### Purpose

The Set Legend command is used to provide custom ordering of legend categories or items. The new syntax is in **bold**.

### Syntax

```
Set Legend
  [ Window window_id ]
  [ Layer { layer_id | layer_name | Prev }
    [ Display { On | Off } ]
    [ Shades { On | Off } ]
    [ Symbols { On | Off } ]
    [ Lines { On | Off } ]
    [ Count { On | Off } ]
    [ Title { Auto | layer_title [ Font . . . ] } ]
    [ SubTitle { Auto | layer_subtitle [ Font . . . ] } ]
    [ Style Size { Large | Small | Fontsize } ]
    [ Columns number_of_columns ]
    [ Ascending { On | Off } | Order { Ascending | Descending | Custom } ]
    [ Ranges { [Font . . . ]
      [ Range { range_identifier | default } ]
      range_title [ Display { On | Off } ] ]
      [ , . . . ]
    ]
  ]
  [ , . . . ]
```

There are four new clauses: Order, Range, Style Size, and Columns. When you want custom order, include `Order Custom` in the MapBasic statement as well as a range identifier for each category in the theme. The order of ranges dictates the order of categories in the legend. The range identifier is the same const string or value used by the Values clause in the Shade statement that creates the Individual Value theme.

The Order and Range clauses will increase the workspace version to 8.0. Old workspaces will still parse correctly as there is still support for the original Ascending clause. If the order is not custom, MapInfo Professional will write out the original Ascending clause and NOT increase the workspace version.

The Order clause is a new way to specify legend label order of ascending or descending as well as new custom order. However, the original Ascending { On | Off } clause is still available for backwards compatibility. You can use either the new Order clause, or the old Ascending clause, but not both (both clauses cannot be included in the same MapBasic statement or you will get a syntax error).

The Custom option for the Order clause is allowed only for Individual Value themes. An error will occur if you try to custom order other theme types. The error is "Custom legend label order is only allowed for Individual Value themes."

When the Order is Custom, each range in the Ranges clause must include a range identifier, otherwise a syntax error will occur. The range identifier must come before the range title and Display clause. The range identifier is the same const string or value used by the Values clause in the Shade statement that creates the Individual Value theme. The range identifier for the "all others" category is 'default'.

Every category in the theme must be included, including the default or "all others" category, otherwise an error will occur. The error is "Incorrect number of ranges specified for custom order."

The default or "all others" category may also be reordered, although the best place to place this argument is at the end or beginning of the Ranges clause.

If the range identifier does not refer to a valid category an error will occur. The error is "Invalid range value for custom order."

The Style Size clause facilitates thematic swatches to appear in different sizes and increases the workspace to version 8.0.

The Columns clause allows you to specify the width of the legend. *number\_of\_columns* indicates the column width and increases the workspace to version 8.0.

### Examples

The example workspace below needs the following shade statement:

```
shade 1 with Province_Name values
  "Alberta" Brush (2,16711680,16777215) Pen (1,2,0) ,
  "British Columbia" Brush (2,65280,16777215) Pen (1,2,0) ,
  "Manitoba" Brush (2,255,16777215) Pen (1,2,0) ,
  "New Brunswick" Brush (2,16711935,16777215) Pen (1,2,0) ,
  "Newfoundland" Brush (2,16776960,16777215) Pen (1,2,0) ,
  "Northwest Territories" Brush (2,65535,16777215) Pen (1,2,0) ,
  "Nova Scotia" Brush (2,8388608,16777215) Pen (1,2,0) ,
  "Nunavut" Brush (2,32768,16777215) Pen (1,2,0) ,
  "Ontario" Brush (2,128,16777215) Pen (1,2,0) ,
  "Prince Edward Island" Brush (2,8388736,16777215) Pen (1,2,0) ,
  "Quebec" Brush (2,8421376,16777215) Pen (1,2,0) ,
  "Saskatchewan" Brush (2,32896,16777215) Pen (1,2,0) ,
  "Yukon Territory" Brush (2,16744576,16777215) Pen (1,2,0)
default Brush (1,0,16777215) Pen (1,2,0) # color 1 #
```

The Set Legend statement includes the Order Custom tokens and a Range identifier for each category. The Range identifier is the same string found in the shade statement and the order of ranges is what is displayed in the Legend. (New information is in bold.)



```

set legend
  layer 1
    display on
    shades on
    symbols off
    lines off
    count on
    title auto Font ("Arial",0,9,0)
    subtitle auto Font ("Arial",0,8,0)
    order custom
    ranges Font ("Arial",0,8,0)
      range "Prince Edward Island" auto display on ,
      range "Northwest Territories" auto display on ,
      range "British Columbia" auto display on ,
      range "Yukon Territory" auto display on ,
      range "New Brunswick" auto display on ,
      range "Newfoundland" auto display on ,
      range "Saskatchewan" auto display on ,
      range "Nova Scotia" auto display on ,
      range "Manitoba" auto display on ,
      range "Nunavut" auto display on ,
      range "Ontario" auto display on ,
      range "Quebec" auto display on ,
      range "Alberta" auto display on ,
      range default auto display off

```

## Enabling Transparent Patterns on Same Layer

In order to facilitate a multi-thematic analysis on a particular layer, transparent patterns are necessary. To facilitate this, the Shade statement and the Set Shade statement now have the addition of a `Style Replace` clause for use with for Range and Individual Value themes. The syntax for the new clause is as follows:

```
{Style Replace { On | Off } }
```

`Style Replace On` (default) specifies the layers under the theme are not drawn.

`Style Replace Off` specifies the layers under the theme are drawn, allowing for multi-variate transparent themes.

`Style Replace On` is the default and provides backwards compatibility with the existing behavior so that the underlying layers are not drawn.

## Export Windows to Additional Formats

The Save Window statement now supports three additional formats for image export. The new values for `type` include: "TIFFG4", "TIFFLZW", and "GIF".

### Examples

```

save window frontwindow() as "untitled.gif" type "gif"
save window frontwindow() as "untitled.tif" type "tiffg4"
save window frontwindow() as "untitled.tif" type "tiffLZW"

```

---

## TableInfo() function

attribute code	TableInfo( ) returns
TAB_INFO_SUPPORT_MZ	Logical result: TRUE if table supports M and Z values.
TAB_INFO_Z_UNIT_SET	Logical result: TRUE is unit is set for Z-values.
TAB_INFO_Z_UNIT	String result: indicates distance units used for Z-values. Return empty string if units are not specified.

---



# Data and Settings Management

## In this Appendix:

- ◆ Data and Settings Management – Application Data Files . 732
- ◆ List of Changes by Version ..... 734

## Data and Settings Management – Application Data Files

Application data (appdata) files are the non-executable data files that MapInfo Professional uses during execution. The following files/directories are considered appdata:

Filename	Description
MAPINFOW.PRF	Preference file
MAPINFOW.WOR	Default workspace
STARTUP.WOR	Startup workspace
MAPINFOW.CLR	Color file
MAPINFOW.PEN	Pen file
MAPINFOW.FNT	Symbol file
CUSTSYMB	Custom symbol directory
THMTMPLT	Theme template directory
GRAPHSUPPORT	Graph support directory

Prior to version 6.5 these files were kept in the Windows directory or the Program directory, and MapInfo Professional searched those directories for the appdata files. Since the introduction of version 6.5, the strategy is to install application data files in a per-user location, and also search for them in other areas to allow support for sharing application data files between MapInfo versions/products.

Now the application searches for appdata files in the following directories, in this order:

- appdata\_dir
- local\_appdata\_dir
- pref\_dir
- common\_appdata (new in version 7.0)
- program\_dir

**Note:** Refer to the Glossary for definitions of each of these directory types.

The following table gives the default (installed) location for each appdata file in version 7.5:

Filename	Default installed location
MAPINFOW.CLR	appdata_dir
MAPINFOW.PEN	appdata_dir
MAPINFOW.FNT	appdata_dir
MAPINFOW.ABB	program_dir
MAPINFOW.PRJ	program_dir

Filename	Default installed location
MAPINFOW.MNU	program_dir
CUSTSYMB	appdata_dir
THMTMPLT	appdata_dir
GRAPHSUPPORT	common_appdata_dir
MAPINFO.PRF	pref_dir*
*This file is not created during installation. It is created the first time you exit MapInfo Professional.	

After installation, you can manually move appdata files between the predefined locations. For example, by manually relocating MAPINFOW.PRJ a user can share one customized projection file between different versions of MapInfo Professional. The default installed location of one or more of the appdata files/directories can be modified by defining a `mode.ini` file prior to the installation. See **Installing MapInfo Professional in Chapter 2 on page 100** for particulars on the `mode.ini` file.

## Registry Changes

MapInfo Professional's use of the registry must be organized to allow each user to work with their own data. The following changes were made to support this organization:

- The Tool Manager entries are now installed under HKEY\_CURRENT\_USER.
- The graph engine now stores custom colors and number formats under HKEY\_CURRENT\_USER.

## A Glossary for Upgrading Applications

You will find the following definitions useful:

### <user profile root>

The root of the user directory structure. Each user has write access to the subdirectories of this area. The location varies depending on the Windows version:

- Windows 2000/XP: `c:\Documents and Settings\`
- Windows 98: `<Windows dir>`
- Windows NT 4.0: `<Windows dir>\profiles\`

### appdata\_dir

This is a per-user directory. Many of the appdata files will be installed in this location.

- 6.0: n/a
- 6.5 (and following): `<user profile root>\Application Data\MapInfo\MapInfo\Professional\6501`.

**Note:** If this directory does not exist at startup, MapInfo Professional does not create it. Programmers must not assume this represents a valid path.

1. Version number: 6.5=650, 7.0=700, etc.

**common appdata\_dir**

This directory is shared by all users on a machine (new in version 7.0)

- 6.0: n/a
- 6.5: n/a
- 7.0: <userprofile root>\All Users\Application Data\MapInfo\MapInfo\Professional\700

**local\_appdata\_dir**

This is also a per-user directory, similar to appdata\_dir, except files here do not roam.

- 6.0: n/a
- 6.5 (and following): <user profile root>Local Settings\Application Data\MapInfo\MapInfo\Professional\650\*

**Note:** If this directory does not exist at startup MapInfo Professional does not create it. Programmers must not assume this represents a valid path.

**pref\_dir**

MapInfo Professional writes out mapinfow.prf and mapinfow.wor by default.

- 6.0: Windows directory
- 6.5 (and following): <user profile root>\Application Data\MapInfo\MapInfo. If this directory does not exist at startup, then MapInfo Professional creates it.

**program\_dir**

In 6.0 MapInfo Professional expects to find many of the appdata files in this location.

- 6.0: location of MAPINFOW.EXE
- 6.5 (and following): location of MAPINFOW.EXE

## List of Changes by Version

---

Following is a list of changes (and their implications) to versions in tab, workspace, and other files used by MapInfo Professional:

- TAB files are always saved as 300 unless noted in the table
- WOR files are always saved as 400 unless noted in the table
- 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 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 is 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.

Version #	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 <b>SAVE QUERIES IN WORKSPACES</b> checkbox in the <b>STARTUP PREFERENCES</b> dialog box) are implemented as straight Select statements
410	X	X		Table uses MS Access DB's
450	X	X		Region and polyline objects, that have more than 32K nodes ledit_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 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



Version #	TAB	MIF/ MID	WOR	Action
	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)
	X	X		ATS 77 ellipsoid - #(51)
				<p>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).</p> <p>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.</p> <p>Since MapInfo Professional does not write datum number into TAB file, version will be incremented only if ellipsoid is new.</p>
			X	Workspace includes Advanced Printer settings
600			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

Version #	TAB	MIF/ MID	WOR	Action
			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
	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



# New Thematic Templates

These are the new thematic templates for the MapInfo Professional 8.0 product.

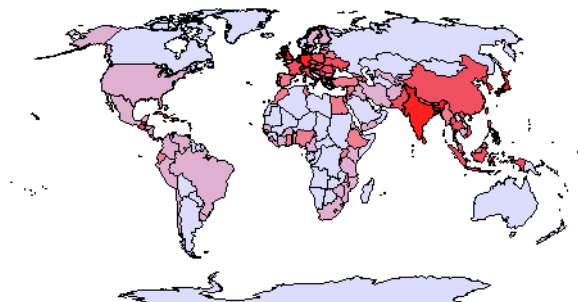
## Sections in this Appendix:

- ◆ **Region Ranges Theme Templates** ..... 740
- ◆ **Region Individual Values Theme Templates** ..... 744
- ◆ **Point Ranges Theme Templates** ..... 745
- ◆ **Grid Elevation** ..... 747

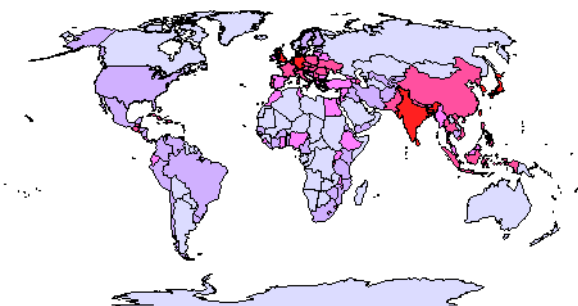
## Region Ranges Theme Templates

---

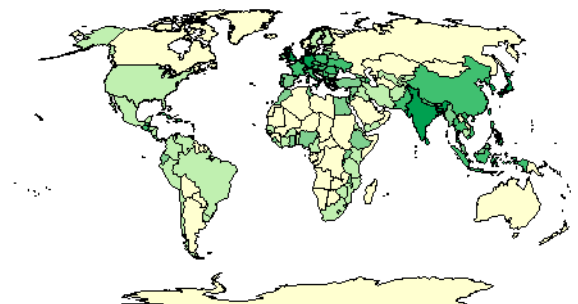
### Sequential Red-Light Purple RGB



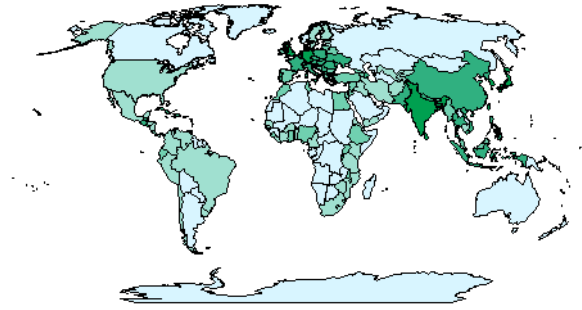
### Sequential Red-Light Purple HSV



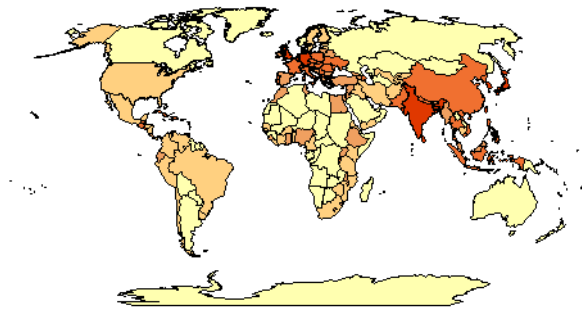
### Sequential Green-Light Yellow



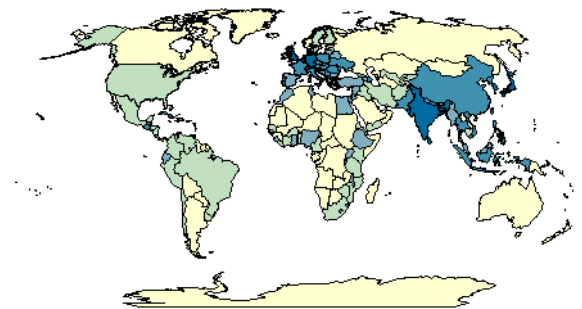
### Sequential Green-Light Blue



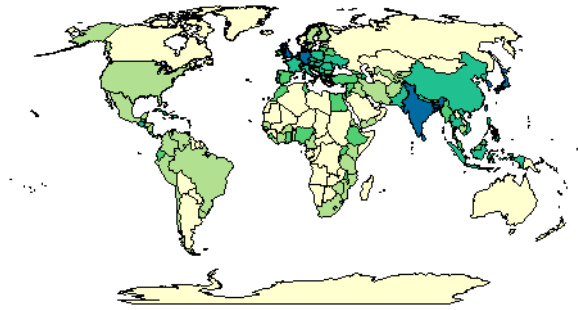
### Sequential Brown-Light Yellow



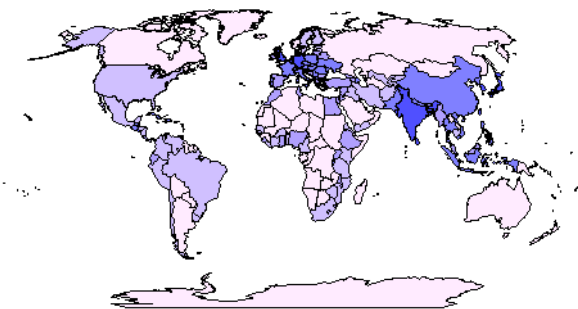
### Sequential Blue-Light Yellow RGB



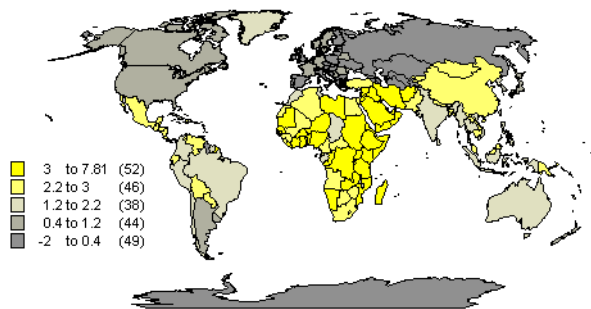
### Sequential Blue-Light Yellow HSV



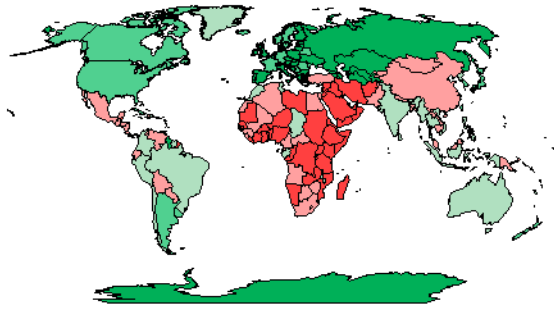
### Sequential Blue-Light Purple



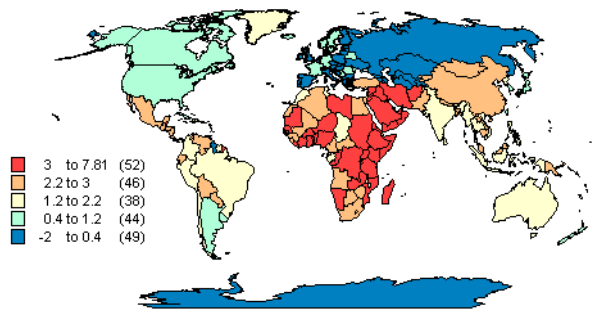
### Five Diverging Yellow-Gray



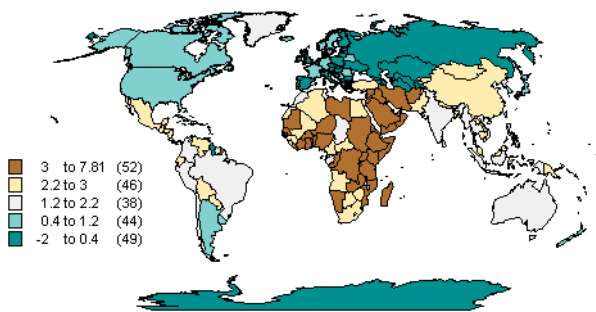
### Five Diverging Red-Green



### Five Diverging Red-Blue

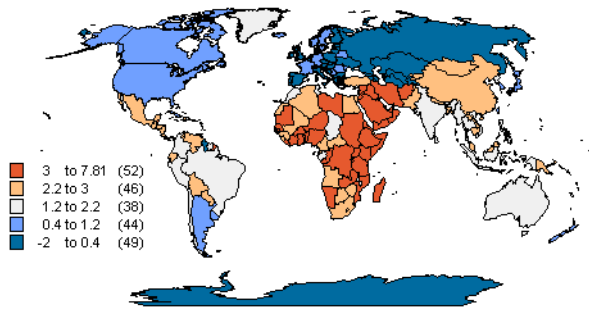


### Five Diverging Brown-Green





## Five Diverging Brown-Blue



## Region Individual Values Theme Templates

### Region IndValue Qualitative Pastel

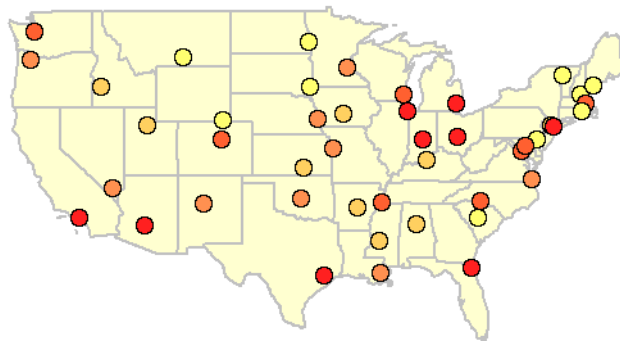


### Region IndValue Qualitative Light and Dark

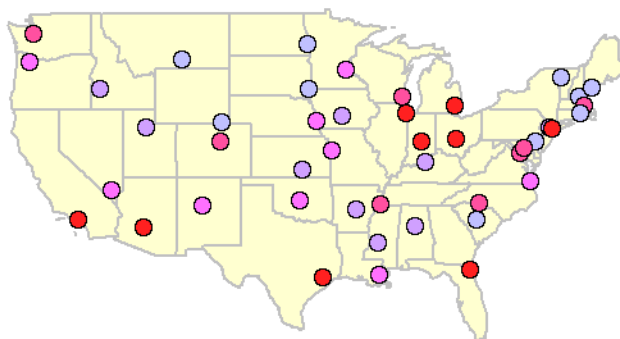


### Point Ranges Theme Templates

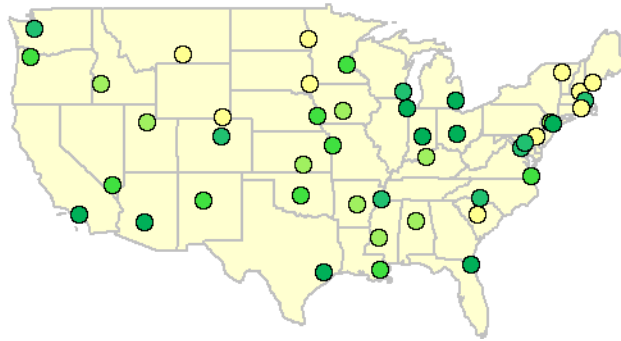
#### Sequential Red RGB



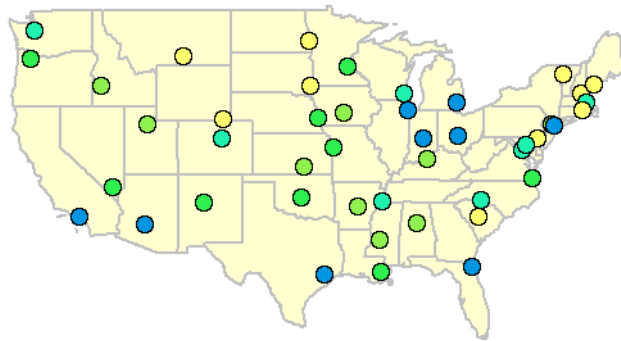
#### Sequential Red HSV



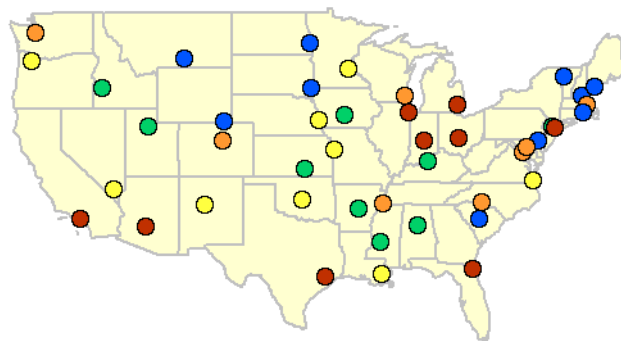
### Sequential Green HSV



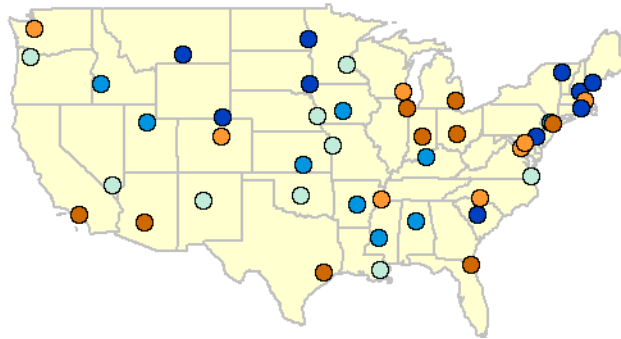
### Sequential Blue HSV



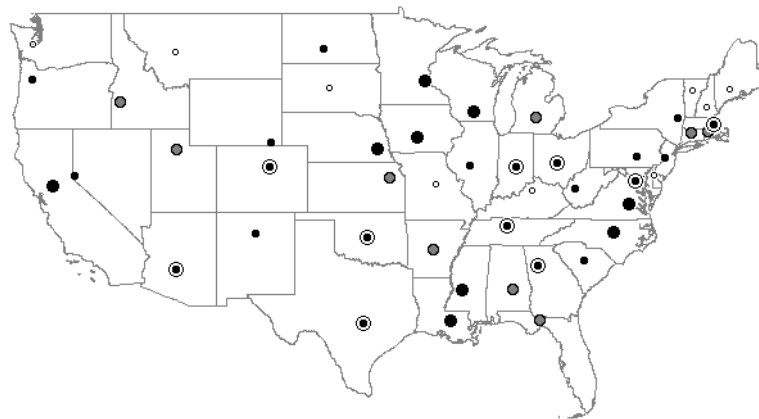
### Five Sequential Spectral



### Five Diverging

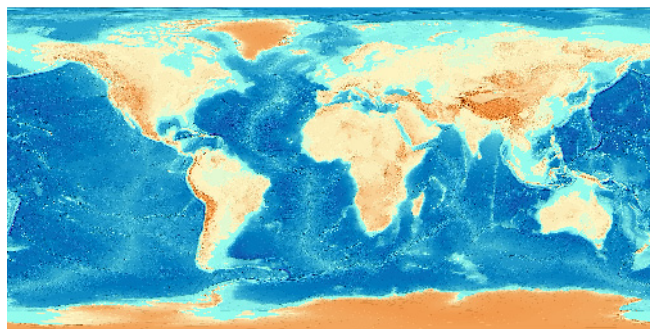


### Five Cities



### Grid Elevation

#### Grid Elevation in Meters and Feet





## Equivalent MapBasic/ MI SQL Functions, Operators

Here are the MapBasic functions and operators and their MapInfo SQL equivalents.

### Sections in this Appendix:

- ◆ Equivalent MapBasic and MapInfo SQL Functions . . . . . 750
- ◆ Equivalent MapBasic and MapInfo SQL Operators . . . . . 754

## Equivalent MapBasic and MapInfo SQL Functions

The functions in this list are the only functions that are supported in both MapBasic and in MapInfo SQL. If you do not see a function translation in this list, it is not translatable.

MapBasic Function/ ParameterTypes	MapBasic Notes	MapInfo SQL Function/ Parameter Types	MapInfo SQL Translation Notes
Abs num		Abs double	
Acos num		Acos double	
Area obj, unit	Spherical, but Cartesian for NonEarth	MI_Area geometry, unit, calculationType	For the obj argument only “obj” or the MapBasic CreatePoint() function can be translated. The 3rd argument is assumed to be Spherical unless basetable is Non-Earth.
Asc string		Ascii string	
Asin num		Asin double	
Atn num		Atan or Atn double	
Buffer object, res, width, unit		MI_Buffer geometry, dist, unit, calculationType, res	For the obj argument only “obj” or the MapBasic CreatePoint() function can be translated. The calcula- tionType arg is assumed to be Spherical unless basetable is Non-Earth.
CartesianArea obj, unit		MI_Area geometry, unit, calculationType (Cartesian)	For the obj argument only “obj” or the MapBasic CreatePoint() function can be translated.
CartesianObjectLen obj, unit		MI_Length geometry, unit, calculationType (Cartesian)	For the obj argument only “obj” or the MapBasic CreatePoint() function can be translated.
CartesianPerimeter obj, unit		MI_Perimeter geometry, unit, calculationType (Cartesian)	For the obj argument only “obj” or the MapBasic CreatePoint() function can be translated.

MapBasic Function/ ParameterTypes	MapBasic Notes	MapInfo SQL Function/ Parameter Types	MapInfo SQL Translation Notes
Centroid obj		MI_Centroid geometry	For the obj argument only "obj" or the MapBasic CreatePoint() function can be translated.
CentroidX obj		MI_CentroidX geometry	For the obj argument only "obj" or the MapBasic CreatePoint() function can be translated.
CentroidY obj		MI_CentroidY geometry	For the obj argument only "obj" or the MapBasic CreatePoint() function can be translated.
Chr\$ num		Char num	
Combine obj, obj		MI_Union geometry, geometry	For the obj argument only "obj" or the MapBasic CreatePoint() function can be translated.
Cos num		Cos double	
CreatePoint		MI_Point double, double, csys string	Current MB CSYS is used.
CurDate		Current_Date	
Day date expression		Day date expression	
Exp num		Exp double	
Fix num		Trunc double, 0	
FormatDate\$ num	YYYYMMDD format	DateToString date, MI SQL date for- mat	OS short date format is used as a format arg.
InStr position, string, sub- string	substring = str to look for	InStr str1, str2[, start_at[, occurrence]]	
Int number		Floor double	Floor (instead of Trunc) because gives same result as Int when arg is neg.
LCase\$ string		Lower string	



MapBasic Function/ ParameterTypes	MapBasic Notes	MapInfo SQL Function/ Parameter Types	MapInfo SQL Translation Notes
Left\$ string, num		Left string, num	
Len expr		Char_Length str	
Log num		Log double	
LTrim\$ string		Ltrim string	
MBR obj		MI_Envelope geometry	For the obj argument only "obj" or the MapBasic CreatePoint() function can be translated.
Mid\$ string, position, length		Substring str1, start[, length]	
Month date		Month date	
NumberToDate num = YYYYMMDD		NumberToDate num = YYYYMMDD	
ObjectLen obj expr, unit	Spherical operation unless coord sys is Non- Earth, then Cartesian	MI_Length geometry, unit, calculationType (Spherical)	For the obj argument only "obj" or the MapBasic CreatePoint() function can be translated. The 3rd arg is assumed to be Spherical unless basetable is Non- Earth.
Overlap object1, object2		MI_Intersection	For the obj argument only "obj" or the MapBasic CreatePoint() function can be translated.
Perimeter obj, unit	Spherical, but Cartesian for NonEarth	MI_Perimeter geometry, unit, calculationType (Spherical or Cartesian)	For the obj argument only "obj" or the MapBasic CreatePoint() function can be translated. The 3rd arg is assumed to be Spherical unless basetable is Non- Earth.
Right\$ string, num		Right string, num	
Round num, num		Round double, double	
RTrim\$ string		Rtrim string	

MapBasic Function/ ParameterTypes	MapBasic Notes	MapInfo SQL Function/ Parameter Types	MapInfo SQL Translation Notes
Sgn num		Sign double	
Sin num		Sin double	
Space\$ num		Space int	
SphericalArea obj, unit		MI_Area geometry, unit, calculationType (Spherical)	For the obj argument only "obj" or the MapBasic CreatePoint() function can be translated.
SphericalObjLen obj, unit		MI_Length geometry, unit, calculationType (Spherical)	For the obj argument only "obj" or the MapBasic CreatePoint() function can be translated.
SphericalPerimeter obj, unit		MI_Perimeter geometry, unit, calculationType (Spherical)	For the obj argument only "obj" or the MapBasic CreatePoint() function can be translated.
Sqr num		Sqrt double	
StringToDate string	Interprets the date string according to current date- formatting options; including Set Format Date command	StringToDate string, fmt string	fmt string will be built from current system settings and will ignore whether MB date format is "US" (since this can only be set in MB and is not the default).
Tan num		Tan double	
UCase\$ string		Upper string	
Weekday date		Weekday date	
Year date		Year date	

## Equivalent MapBasic and MapInfo SQL Operators

The operators in this list are the only operators that are supported in both MapBasic and in MapInfo SQL. If you do not see an operator translation in this list, it is not translatable.

**Note:** Operator types are indicated when they are significant.

MapBasic Operator/	MapBasic Notes	MI SQL Operator/ Parameter Types	MI SQL Translation Notes
mod	Treated like an operator; for example, 10 Mod 8	Mod double, double	Treated like a function; For example, Mod(10, 8)
And		And	
Or		Or	
Not		Not	
Like item1 LIKE item2 [ESCAPE item3]		Like item1 LIKE item2 [ESCAPE item3]	
Between item1 BETWEEN item2 AND		Between item1 BETWEEN item2 AND item3	
Contains		ContainsCentroid	
Contains Entire		Contains	
Within		CentroidWithin	
Entirely Within		Within	
Intersects, Partly Within, and Partly Contains		Intersects	
""	dbl quote string constant delimiter	''	Single quotes instead.
&H	Specify a number in hexadecimal format.	&H	Gets evaluated to number.
&	string concatenation	&	
+	Addition operator; also concatenation operator.	+	

MapBasic Operator/	MapBasic Notes	MI SQL Operator/ Parameter Types	MI SQL Translation Notes
-	Subtraction operator; also unary negation	-	
*	Multiplication operator.	*	
/	Division operator.	/	
^	Exponentiation operator.	^	
=	Equality operator (NOT case sensitive for strings).	=	Equality operator (IS case sensitive for strings unless the platform forces us to be case insensitive, like in the SQL Server default case).
<>	Inequality operator.	<>	
<	Less-than operator.	<	
>	Greater-than operator.	>	
<=	Less-than or equal-to operator.	<=	
>=	Greater-than or equal-to operator.	>=	
(	Expression delimiter.	(	
)	Expression delimiter.	)	
%	Wildcard symbol, matches 0 or more characters, used in string pattern matching.	%	
_ (underscore)	Wildcard symbol, matches 1 character, used in string pattern matching.	_ (underscore)	
,	List item and function argument separator.	,	



# Glossary of Terms

# GL

Term	Definition
<b>Alias</b>	The name assigned to an expression or a column when you are working in the <b>SELECT COLUMNS</b> field in the <b>SQL SELECT</b> dialog box. This name appears as the column title for that expression or column in a Browser.
<b>Application</b>	A computer program used for a particular kind of work, such as word processing. Application is often interchangeable with the word program.
<b>ASCII</b>	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.
<b>Axis</b>	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.
<b>Bar Chart Map</b>	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.
<b>Base Map</b>	Usually the dominant or underlying layer in a given map. <i>(These are typically the data layers that MapInfo® offers as ready products.)</i> 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.
<b>Base Table</b>	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 <a href="#">Query Table on page 764</a> .
<b>Bitmap</b>	A screen image displayed as an array of dots or bits. Software usually generates either bit-mapped (raster) or object-oriented (vectored) files. MapInfo Professional can work with both.
<b>Boundary Region</b>	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.
<b>Browser</b>	A window for viewing a table (or database, spreadsheet or text file) in tabular form.
<b>Buffer</b>	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.
<b>Cadastral</b>	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.
<b>Cartesian</b>	A coordinate system using an x,y scale not tied to any "real-world" system. Most CAD drawing uses this method of registering objects (for example, 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.

Term	Definition
<b>Cartesian Coordinates</b>	The conventional representation of geometric objects by x and y values on a plane.
<b>Cartographic Legend</b>	A MapInfo Professional legend window that enables you to display cartographic information for any map layer in the Map window.
<b>Cartography</b>	The art and science of making maps. In GIS it is also the graphic presentation and visual interpretation of data.
<b>Centroid</b>	<p>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.</p> <p>In MapInfo Professional, 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.</p>
<b>Check Box</b>	A small square box that appears in a dialog box. You can click in the checkbox or on the text in order to select the option. Check boxes are generally present when multiple options can be selected at one time.
<b>Command</b>	A word or phrase, usually found in a menu, that displays a dialog box and/or carries out an action.
<b>Conflict Resolution</b>	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 Professional linked table. The conflict resolution process is invoked whenever an attempt to save the linked table detects a conflict in an update.
<b>Control Points</b>	The points on a raster image whose coordinates serve as a reference for associating earth coordinates with any location on the image. See <a href="#">Registration on page 765</a> .
<b>Coordinate</b>	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.
<b>Coordinate System</b>	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 <a href="#">Cartesian Coordinates on page 759</a> , <a href="#">Projection on page 764</a> , and <a href="#">Spherical Coordinates on page 765</a> .
<b>Cosmetic Layer</b>	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.
<b>Data Aggregation</b>	A process that occurs when combining separate map objects into a single object. MapInfo Professional calculates what the column values for the new object should be, based on sums or averages of the values of the original objects.



Term	Definition
<b>Data Disaggregation</b>	A process that occurs when splitting a map object(s) into smaller parts where MapInfo Professional splits the data associated with the map object(s) into smaller parts to match the new map objects.
<b>Data Sources</b>	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.
<b>Database</b>	Any organized collection of data. The term is often used to refer to a single file or table of information in MapInfo Professional.
<b>Decimal Degree</b>	The decimal representation of fractions of degrees. Many paper maps express coordinates in degrees, minutes, seconds (for example, 40_30/10), where minutes and seconds are fractions of degrees. 30 minutes equal half a degree, and 30 seconds equal half a minute. MapInfo Professional, however, expresses coordinates in decimal degrees (for example, 72.558 degrees), where fractions of degrees are expressed as decimals. Thus, the longitude: 40 degrees, 30 minutes, would be expressed in MapInfo Professional as 40.5 degrees.
<b>Default</b>	The value or option used in the absence of explicit specification. Often the original setting or value for a variable.
<b>Degrees Longitude, Degrees Latitude, Decimal Degrees</b>	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.
<b>Derived Column</b>	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.
<b>Derived Field</b>	The same as a derived column.
<b>Deselect</b>	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.
<b>Digitizer, Digitizing Tablet</b>	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.
<b>Districts Browser</b>	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.
<b>Dot Density Map</b>	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.
<b>Drawing Toolbar</b>	A MapInfo Professional window containing twelve buttons that access tools for drawing and modifying objects on your map or layout.

Term	Definition
<b>Edit Handle</b>	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.
<b>Export</b>	The process whereby a program saves information in a file to be used by another program.
<b>Expression</b>	A statement containing two parts: 1) column names and constants (i.e., specific data values), and 2) functions (for example, area) and operators (for example, +, -, >), in order to extract or derive information from a database. Expressions are used in <i>Select</i> , <i>SQL Select</i> , <i>Update Column</i> , <i>Create Thematic Map</i> , and <i>Label with Column</i> .
<b>Field</b>	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.
<b>File</b>	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.
<b>Fill Pattern</b>	The design and color used to fill a closed object.
<b>Font</b>	A character set based on a particular style used for text characters.
<b>Generalization</b>	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.
<b>Geocode</b>	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.
<b>Geographic Information System (GIS)</b>	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.
<b>Graduated Symbols Map</b>	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.
<b>Graph window</b>	A window that displays numerical data in the form of a graph.
<b>Graticule</b>	A grid of horizontal (latitude) and vertical (longitude) lines displayed on an earth map, spaced at a regular distance (for example, every five degrees, every fifteen degrees). Used to establish a frame of reference.
<b>Grid Surface Map</b>	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.
<b>Heads-Up Digitizing</b>	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.
<b>Help Button Bar</b>	A bar located at the top of the Help Window that contains buttons you use to move to Help topics.

Term	Definition
<b>Hot Views</b>	MapInfo Professional 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.
<b>Import</b>	The process whereby a program loads a file that is the output of another program.
<b>Individual Values Map</b>	A type of thematic map that shades records according to individual values.
<b>Join</b>	The process of creating a relational link between two tables (databases).
<b>Latitude</b>	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.
<b>Layer</b>	A layer is a basic building block of MapInfo Professional 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 (for example, 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 (for example, text objects). Cosmetic Layers contain map objects that represent temporary map annotations (for example, labels). See <a href="#">Cosmetic Layer on page 759</a> and <a href="#">Table on page 766</a> .
<b>LayoutWindow</b>	A window where you arrange and annotate the contents of one or several windows for printing.
<b>Line, Line Object</b>	A map object defined by a set of sequential coordinates that may represent the generalized shape of a geographic feature (for example, street centerlines, railroads, cables). A MapInfo street map is a collection of thousands of line objects.
<b>Linked Table</b>	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.
<b>Longitude</b>	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.
<b>Longitude/Latitude</b>	MapInfo Professional's default coordinate system for representing geographic objects in a map.
<b>Main Toolbar</b>	A window containing buttons for choosing tools, accessing dialog boxes, and showing or hiding windows.
<b>Map Catalog</b>	The MapInfo map catalog stores information about the location of spatial columns on the DBMS. There must be one catalog per database. The EasyLoader application can create this catalog for each database: Oracle 8, 9, Informix, SQL Server, and MS Access. Additionally, you can create a map catalog manually with instructions in the MapInfo Professional <i>User Guide</i> . This is a one-time only task per database and is required before any tables on that database can be mapped in MapInfo Professional.

Term	Definition
<b>Map Scale</b>	<p>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 (for example, one inch) represents 10,000 of the same units of distance on the earth.</p> <p>The term <i>scale</i> must be used carefully. Technically, a map of a single city block is <i>large-scale</i> (for example, 1:12,000), while a map of an entire country is <i>small-scale</i> (for example, 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.</p>
<b>Map Segment</b>	<p>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.</p>
<b>MapBasic</b>	<p>The programming language used to customize and/or automate MapInfo Professional. 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.</p>
<b>Map window</b>	<p>A window that allows you to view a table as a map.</p>
<b>Meridian</b>	<p>A line or a portion of a line running from the North to the South pole. A longitudinal line.</p>
<b>Minimum Bounding Rectangle (MBR)</b>	<p>For any given map object, the smallest rectangle that completely encompasses the object.</p>
<b>Native Projection</b>	<p>The projection in which a map's coordinate points are stored. MapInfo Professional allows you to display maps in other projections, but not as fast as displaying maps in their native projection.</p>
<b>Node</b>	<p>An end-point of a line object, or an end-point of a line segment which is part of a polyline or region object.</p>
<b>Non-Earth Map</b>	<p>A map in which objects are not explicitly referenced to locations on the earth's surface. Floor plans are typical examples.</p>
<b>ODBC Drivers</b>	<p>An ODBC driver is a dynamic-link library (.DLL) file that MapInfo Professional uses to connect to an SQL database. Each type of SQL database requires a different ODBC driver.</p>
<b>ODBC Table</b>	<p>An ODBC table is a table residing in a remote SQL database.</p>
<b>Outer Join</b>	<p>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 Professional does not perform outer joins.</p>
<b>Pack</b>	<p>The process of compressing MapInfo tables so that they use less disk space.</p>
<b>Pie Chart Map</b>	<p>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.</p>
<b>Pin Map, Push-Pin Map</b>	<p>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.</p>
<b>Pixel</b>	<p>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.</p>

Term	Definition
<b>Point, Point Object</b>	A map object defined by a single X,Y coordinate pair. Each point object is represented by a symbol style (for example, circle, square, triangle, etc.).
<b>Point Size</b>	A unit of measurement equal to 1/72 of an inch. Used to measure character size.
<b>Pointer</b>	An arrow-shaped cursor on the screen that can be manipulated by a mouse.
<b>Polygon, Polygon Object</b>	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.
<b>Polygon Overlay</b>	A spatial operation that merges overlapping polygons from two layers to analyze those intersected areas or to create a third layer of new polygons.
<b>Polyline, Polyline Object</b>	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).
<b>Projection</b>	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 (for example, Mercator) produce maps well suited for navigation. Other projections (for example, equal-area projections, such as Lambert) produce maps well suited for visual analysis.
<b>Query Table</b>	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 <a href="#">Selection on page 765</a> and <a href="#">Base Table on page 758</a> .
<b>Ranged Map</b>	A type of thematic map that displays data according to ranges set by the user. The ranges are shaded using colors or patterns.
<b>Raster Image</b>	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 <a href="#">Scanning on page 765</a> and <a href="#">Vector Image on page 767</a> .
<b>Record</b>	All the information about one object in a database or table. A record in a table corresponds to a row in a Browser.
<b>Redistricting</b>	The process of assigning map objects to groups. As you assign map objects, MapInfo Professional automatically calculates totals for each group and displays the totals in a special Districts Browser. This process is sometimes known as load-balancing.
<b>Region, Region Object</b>	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.

Term	Definition
<b>Registration</b>	Usually the first stage of the digitizing process or when opening a raster image for the first time in MapInfo Professional. 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 (for example, longitude, latitude). After you have registered the map, MapInfo Professional can associate a longitude, latitude position with any point on the map surface; this allows MapInfo Professional 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 <b>Control Points on page 759</b> .
<b>Scale Bar</b>	A map element that graphically depicts the map scale (for example, 0 — 5 — 10 km).
<b>Scanning</b>	The process of inputting data into a raster format using an optical device called a scanner.
<b>Scroll Bar</b>	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.
<b>Selection</b>	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 Professional's <b>QUERY</b> 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.
<b>Snap To Nodes</b>	A feature that helps in drawing, moving and positioning map objects. In Snap mode ( <b>S</b> key) the cursor snaps to a node of a map object when it comes within a certain distance.
<b>Spatial Analysis</b>	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.
<b>Spherical Coordinates</b>	Latitude and longitude values that represent objects on the surface of the globe.
<b>SQL Query</b>	The selection of information from a database according to the textual attributes and object relationships of the items. In MapInfo Professional, queries are created with the <i>SQL Select</i> and <i>Select</i> commands or with MapBasic commands in the MapBasic window.
<b>Standard Deviation</b>	A measurement of the variation of a set of data values around the mean.
<b>Standard Toolbar</b>	A window containing buttons for quick access to the most commonly used menu commands such as Cut, Copy, and Paste.
<b>Statistics Window</b>	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.
<b>StatusBar</b>	A bar at the bottom of the screen that displays messages that help in using MapInfo Professional. 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.
<b>Structured Query Language (SQL)</b>	A standard language used for analyzing information stored in relational databases. MapInfo Professional's database engine is based on the SQL standard.

Term	Definition
<b>Subselect</b>	A select statement that is placed inside the Where Condition field of the <b>SQL SELECT</b> dialog box. MapInfo Professional first evaluates the subselect and then uses the results of the subselect to evaluate the main SQL Select statement.
<b>Symbol, Symbol Object</b>	A small, relatively simple shape (for example, square, circle, star, push-pin) used to graphically represent a point object (for example, a customer location).
<b>Table</b>	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 <b>Base Table on page 758</b> and <b>Query Table on page 764</b> . See also <b>Layer on page 762</b> .
<b>Table Row</b>	In a table, a row contains all the information for a single item. It corresponds to a record in a table.
<b>Target District</b>	The district that is selected in a Districts Browser to be affected by subsequent redistricting operations.
<b>Text Cursor</b>	A blinking vertical bar that shows the position where text can be edited, inserted, or deleted.
<b>Thematic Layer</b>	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.
<b>Thematic Map</b>	A type of map that uses a variety of graphic styles (for example, 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).
<b>Thematic Shading</b>	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).
<b>Thematic Variable</b>	The data values displayed on a thematic map. A thematic variable can be a field or expression.
<b>Theme Legend</b>	MapInfo Professional's original style legend that allows you to display legends for thematic maps and graphs. MapInfo Professional automatically creates a theme legend window for a thematic map. Customize its display through the <b>MODIFY THEMATIC MAP</b> dialog box. See <b>Cartographic Legend on page 759</b> .
<b>Toolbars</b>	MapInfo Professional 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 (for example, Zoom-in, Select, Info, etc.) and the Drawing Toolbar contains all drawing tools. The Tools Toolbar contains the <b>RUN MAPBASIC PROGRAM</b> and the <b>SHOW/HIDE MAPBASIC WINDOW</b> buttons. Toolbars may be reshaped and hidden.
<b>Transformation</b>	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.
<b>Ungeocode</b>	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, such as an ungeocoded table.

Term	Definition
<b>Vector Image</b>	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 <a href="#">Raster Image on page 764</a> .
<b>Weighted Average</b>	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.
<b>Window</b>	In MapInfo Professional, 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.
<b>Workspace</b>	A saved configuration of open MapInfo tables and windows.
<b>Zoom Layering</b>	A setting that determines the range (for example, 0–3 miles, 2–5 miles, etc.) at which a layer is visible in a Map window.



# Index

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## Numerics

### 3D Graphs

- customizing cube walls [448](#)
- moving at an angle [448](#)
- panning [447](#)
- rotating [447](#)
- templates [436](#)
- using the 3D viewing angle [446–447](#)

### 3DMaps

- creating [391](#)
- manipulating the view [394](#)
- print options [243](#)
- prism maps [390–391](#)
- setting the hardware acceleration defaults [119](#)

### 3DWindow Menu

- commands [392, 394](#)

## A

**Abbreviations File** [221–222, 224–227](#)

**Abs Function** [585](#)

### Access Tables

- creating .tab files from [192](#)
- creating in MapInfo Professional [194](#)
- limitations with MapInfo Professional [196](#)
- opening [145](#)
- saving as another Access table [196](#)

### Active Objects

- creating [561](#)
- definition [560](#)
- using hotlink tool [561–562](#)

**Add Nodes Tool Button** [295](#)

### Adding

- cartographic legend frames [491–492](#)
- layers to map windows [154](#)
- lines to the abbreviation file [227](#)
- new streets in StreetPro maps [316](#)
- nodes [295](#)
- ODBC drivers [103](#)
- open windows to layouts [473](#)
- records in browser windows [263](#)
- rows to tables [257](#)
- segments to StreetPro maps [315](#)
- temporary columns to tables [250](#)
- tools in tool manager [177](#)

### Address Matching

- preferences [122](#)

**Address Matching Preferences Definition** [113](#)

### Address Ranges

- matching to street number [212, 228](#)

### Addresses

- errors in [220](#)
- geocoding precision [208](#)
- matching town names [229](#)

### ADRG Format (\*.Gen) Files

- raster format [503](#)

### Advanced Options and Settings

- printing [243–244](#)
- registry [107](#)

### Affine Transformation

- coordinate systems [541–544](#)
- description [541](#)

### Affine Transformations

- digitizing [612](#)

### Aggregate Functions

- with update column command [260](#)

### Aggregating Data

- computing total population and area by continent [343–345](#)
- SQL select command [340–341](#)
- with set target model [410](#)

**AirPhotoUSA Conterminous Coordinate System Added** [654](#)

### Aliases

- for columns [337–338](#)

**Aliases, defined** [758](#)

**Aligning Objects In A Layout Window** [476](#)

**Aligning Objects in a Layout Window** [477](#)

### Alternate Street Names

- with geocoding [228](#)

### Application Data Files

- managing [732–734](#)
- per-user install [100](#)
- specifying installation location [108](#)

**Application Data Files, Mode.Ini** [109](#)

### Arc Objects

- drawing tool button [294](#)
- moving endpoints of [310](#)

### Area

- area function [586](#)
- calculation type default setting [118](#)
- computing with SQL select [344–345](#)

**Area Graphs** [437](#)

**Arrow Keys, positioning selected objects** [306](#)

### ASCII Tables

- opening [145](#)
- registering [197](#)

**ASCII, defined** [758](#)

**ASRP Format (\*.Gen) Files, raster format 503****Attributes**

- bivariate map symbols **377**
- cartographic legends **488–489**
- graduated symbols **367–368**
- map object **309**
- theme legends **490**

**Autolabeler Tool**

- creating labels as text objects **174, 459**
- in layout windows **472**

**Automatic Geocoding 206****Automatic Labeling 460–463****Autoscroll**

- using Intellimouse **111**

**Autoscroll, defined 178****Autotrace**

- digitizing **614–615**
- tracing existing objects **313**

**Axis, defined 758****Azimuthal Projections**

- range **535, 653**

**B****Bar Chart Maps 370, 758****Bar Graphs 437****Base Maps, defined 758****Base Tables, defined 758****BIL Files, raster format 503****Bitmaps, defined 758****Bivariate Thematic Maps 377, 396****BMP Files**

- raster format **503**

**Borders**

- legend frames **488**

**Borders, printed files 244****Bound Objects, spatial queries 277****Boundaries**

- boundary region definition **758**
- geocoding **209, 213, 223**

**Boundary Select Tool Button 325****Bring to Front Command 470****Browser Windows**

- adding records in **263**
- defined **758**
- displaying coordinates **217**
- displaying tables in **262**
- editing prism maps **396**
- opening tables in **149**
- print options **242**
- seamless tables **165**
- using hotlink tool **563**
- viewing graphic information **256**

**Bubble Graphs 437****Buffer Regions**

- concentric ring **407**
- convex hull **408**
- creating **400, 402**
- creating search polygons **326**

**Buffer Regions (continued)**

- defined **758**
- methods in creating **406**
- radius **405**
- saving as new layer **402–403**
- saving as new table **403–404**
- segments per circle **405**
- width distance **406**

**C****Cadastral, defined 758****CADRG Format Files**

- raster format **503**

**Callout Lines 463****Cancelling Selections 326****Cartesian Calculations**

- buffer regions **406**

**Cartesian Calculations, as default setting 118****Cartesian Coordinates, defined 759****Cartographic Legends**

- adding frames **491–492**
- attributes and metadata **488–490**
- borders **488**
- choosing layers **486**
- creating **380–381, 481–485**
- definition **759**
- deleting frames **495**
- description **380**
- frame borders **488**
- frame defaults **487**
- frame titles **487**
- frames **487**
- in layouts **475**
- joined tables **490**
- modifying frames **493–494**
- styles **489**
- symbol text **488**
- window properties **487, 493**

**Cartography, defined 759****Centroids**

- defined **759**
- displaying **157**
- selecting using snap mode **311**

**CentroidX Function 587****CentroidY Function 587****Character Strings 574****Charset Clause 667****Checking Regions 425–426****Chr\$ Function 587****Cib Format Files**

- raster format **503**

**Citrix, support for 31****Cleaning Objects 427–428****Clear Cosmetic Layer Command 158****Clipping a Map**

- grid surface maps **389**
- setting the default methods **118**

**Cloning a Map View 480**

- Closing Tables** 170
- COGOline Tool**
  - (Create Line By Length) changes 185
  - draws lines of a specific length and angle 174
- Collection Objects**
  - grouping objects using 420–421, 423
  - legend styles 489
- Color**
  - custom symbols 302
  - in StreetPro maps 317
  - mif file symbols 678
  - raster image options 503, 510–511
- Column Aliases**
  - creating 337–338
  - metadata for HTML landing pages 565
- Column Graphs** 438
- Columns**
  - adding temporary columns 250
  - combining objects with 416
  - creating expressions 329
  - deriving 337
  - finding duplicate values in 349–350
  - grouping by with SQL select 342
  - labeling with 459
  - MIF files 670
  - placing graphic information in 256
  - spatial index 270
- Combining Objects**
  - creating territories 416
  - in districts 572
  - multipoint and collection 420–421, 423
  - set target 410
- Comparison Operators** 577
- Concentric Ring Buffers** 407
- Concentric Ring Buffers Tool**
  - creates concentric ring buffers around objects 174
- Conflict Resolution** 287–289, 759
- Conic Projections** 535, 652
- Contrast and Brightness** 510
- Control Points**
  - defined 759
  - digitizing 610–613, 616
  - raster image registration 506–507, 509
  - spot images 661
- Convex Hull Buffers** 408
- Coordinate Extractor Tool**
  - extracts x,y coordinates 174
- Coordinate Systems**
  - australian modifications (7.8) 654
  - creating 541
  - defined 759
  - elements of 541
  - entering a new projection for 540
  - euref89 added and reordered (7.8) 654
  - french rgf93 added (7.8) 653
  - origin point 534, 652
  - parameters of 521
  - projections ??–524, ??–642
  - rt90 added (7.8) 654
- Coordinate Systems (continued)**
  - selecting for spot images 658
  - sweref 99 added (7.8) 654
  - using a new projection in 539
- Coordinates**
  - converting d/m/s to decimal degrees 509
  - converting to different datum 693
  - defined 759
  - degree converter tool 235–236
  - digitizing 610, 615
  - displaying in browser windows 217
  - extracting using native coordinate system 216
  - geocoding 204
  - raster image control points 506–507, 509
  - setting the defaults for displaying 119
- Coordsys Bounds Manager Tool**
  - check and set coord sys bounds 174
- Copying Objects to Clipboard** 115
- Cos Function** 588
- Cosmetic Layer** 158
  - defined 158
- Cosmetic Objects**
  - saving 158
- Create Line By Length Tool**
  - draws lines of a specific length and angle 174
- Creating**
  - seamless map layers 166
- Creating .Tab Files From Other Data** 192
- Creating A Mapinfo\_Mapcatalog** 271
- Creating A Table**
  - procedure 257
- Creating a Table, using subset of a file** 332
- Creating Expressions** 329
  - constructing 573
  - entering values 574
  - functions 599
  - numeric clauses 581
  - numerical comparison 576
  - operator precedence 584
  - operators 577
  - using expression dialog 328–329
- Creating Layouts** 473–474
- Creating Points**
  - displaying points a map 239
  - displaying points on a map 239
  - for intersections 238
  - from Excel or Lotus tables 233
  - in projections 234
  - longitude/latitude 234
  - placing longitude/latitude coordinates on a map 231–232
  - vs. geocoding 190
- Creating Reports** 263
- Creating Territories**
  - combining objects 417
  - see also* redistricting
- Crystal Reports**
  - creating reports 263
  - installing user guide 112
  - setting the default open and save directories 123

- Curdate Function** 588
  - in expressions 588
- Custom**
  - ranged map type 366
- Custom Symbols** 299, 301
  - adding your own 303
  - understanding 301
- Custom Workstation Installation** 101
- Customer Service** 29
- D**
- D Key, digitizer mode** 615
- D/M/S Coordinates**
  - converting to decimal degrees 509
- Data Aggregation**
  - computing total population and area by continent 343–345
  - SQL select command 340–341
- Data Aggregation, defined** 759
- Data Disaggregation** 760
- Data Map**
  - with MapInfo tables 559
- Data Map Objects**
  - vs. MapInfo map objects 558
- Data Sources**
  - creating 277
- Data Sources, defined** 760
- Data, obtaining new** 110
- Databases**
  - defined 760
  - defining terminology in 140
  - what databases are supported 98
- Date Clauses** 583
- Date Comparison** 577
- Dates In Expressions** 575
- Datum Changes**
  - JGD conversion changes 655
  - KKJ projection algorithm 655
- Datums**
  - converting coordinates 693
  - defining custom 688–693
  - list of 643–651
  - mapinfo.prj id numbers 525–533
  - NAD 83 693
- Day Function** 588
- Dbase Files**
  - creating .tab files from 197
  - opening 145
- DBMS Catalog Tool**
  - creates a mapcatalog in remote databases 174
- DBMS Connections**
  - specifying default 122
- DBMS Count Rows In Table Tool**
  - updates mapcatalog entries to correct number of rows 174
- DBMS SQL Builder Tool**
  - builds queries, executes SQL statements remote dbs 174
- DBMS SQL Queries**
  - setting the default open and save directories 123
  - setting the default search paths 130
- DBMS Tables**
  - conflict resolution 287–289
  - data sources 277
  - disconnecting from database 290
  - downloading data to linked table 284
  - linked tables 278
  - live access 290
  - live remote access 285–286
  - making mappable 275
  - mapinfo\_mapcatalog 271
  - opening 142, 279–284
  - per-row styles 275
  - querying 352
  - read-only 291
  - requirements 266
  - saving 288
  - spatial index columns 270
  - spatial objects 291
  - SQL queries 285
  - storing and retrieving spatial objects 266
  - storing coordinate values 267, 269
  - symbol styles in mappable tables 276
- DBMS Toolbar** 136
- Decimal Degrees**
  - converting d/m/s coordinates to 509
  - converting degrees/minutes/seconds to 509
  - converting to d/m/s 509
  - converting to degrees/minutes/seconds 509
  - defined 760
  - setting the defaults for displaying coordinates in 119
- Default, defined** 760
- Degree Converter Tool** 509
  - converting coordinates 235–236
  - converting degrees/minutes/seconds to decimal degrees 509
  - converts coordinates 174
- Degrees Latitude, defined** 760
- Degrees Longitude, defined** 760
- Degrees/Minutes/Seconds**
  - converting to decimal degrees 509
  - setting the defaults for displaying coordinates in 119
- Deleting**
  - frames 495
  - nodes 295
  - tables 259
- Derived Columns, defined** 760
  - described 334
  - using 337
- Digitizer Mode**
  - d key 615
  - digitizer cursor 614, 616
  - opening a workspace 612
  - using the mouse 613
  - using tools 613
- Digitizer Setup**
  - configuring digitizer buttons 613
  - control points 610–613, 616
  - digitizer setup command unavailable 616–617
  - map units 610
  - projections 610

**Digitizing**

- digitizer definition **760**
- displaying a map **615**
- distances incorrect **616**
- drivers **609**
- polygon closure **617**
- procedure **614**
- puck **609**
- raster images **510**
- setting up equipment **609**
- snap to nodes **617**
- source map **609**
- tablet **609, 616–617, 760**
- tracing existing objects **614–615**
- with two maps **617**
- zoom levels **617**

**Directory Preferences**

- definition **113**

**Directory Preferences, specifying **122******Disaggregating Data**

- data disaggregation definition **760**
- selected objects **431**
- with set target model **410**

**Disperse Points Tool **236–237****

- disperses points located in the same position either systematically or randomly **174**

**Dispersion to the Right Method**

- dispersing points **237**

**Displaying a Map**

- see also* layer control command
- digitizing **615**

**Distance Calculations**

- buffer regions **406**

**Distance Calculations, default settings **118******Distance Calculator Tool, calculates distance from object to closest or farthest object **180******Distance Function, in expressions **589******Distance Units, default settings **118******Districts**

- creating new **568**
- grouping map objects into **566**
- reassigning existing **570–571**
- saving new **572**

**Districts Browser**

- defined **760**
- using **567**

**Document Panning, using intellimouse **111******Document Scrolling, using intellimouse **111******Documentation, accessing From CD **25******Dot Density Maps**

- defined **760**
- description **368**
- thematic **369**

**Drag Map Window Tool **557******Drawing Objects**

- custom symbols **302**

**Drawing Objects On A Map**

- custom symbols **299, 301**
- styles **296**

**Drawing Objects on a Map**

- commands **295**
- symbols **298**
- tool buttons **294**

**Drawing Objects on a Map, types of shapes **296******Drawing Objects on a Map, using ruler window **296******Drawing Toolbar **136, 294****

- defined **760**
- region style button **136**

**E****Earth Maps, Using **545******Easyloader Tool**

- supported DBMS connections **267**
- uploads .tab files to remote databases **174**

**ECW 2.0 Format Handler (\*.ecw), raster format **503******ECW Compressor, installing **110******Edit Handles, defined **761******Editing**

- graphs **440–444**
- labels **464**
- mapinfo.prj file **538–541**
- read-only tables **159**
- table structure **258**

**Editing Objects**

- attributes **309**
- autotracing **313**
- cleaning **427–428**
- commands **295**
- creating territories by combining **415**
- deleting **305**
- disaggregating **431**
- enclosing **424**
- erasing **432**
- multipoint and collection **420–421, 423**
- object conversion **314**
- object offset **306**
- overlying nodes **432**
- positioning and sizing **306**
- procedure **305**
- reshaping **310–311**
- rotating **308–309**
- set target model **410**
- smoothing/unsmoothing polylines **314**
- snap mode **313**
- splitting **413**
- thinning **428–431**

**Editing Street Maps **314–317******Ellipse Tool Button **294******Embedded Maps**

- printing **558**
- resizing **557**
- saving **557**
- sharing documents **558**

**Embedding**

- MapInfo map objects **555–556**
- OLE objects **555**

**EMF Files, raster format **503****

**EMF Files, generating for printing** 243

**Encapsulated Postscript (EPS) Files, With Layouts** 499

**Enhanced Metafile Format (\*.emf) Files**  
raster format 503

**Enhanced Metafiles (\*.emf), generating for printing** 243

**Equal Count, ranged map type** 365

**Equal Dispersion Method, dispersing points** 237

**Equal Ranges, ranged map type** 365

**Esri Shapefiles**  
setting the default open and save directories 123

**ESRI ShapeFiles, opening** 146

**Excel Files**  
creating points from 233  
creating tab files from 191  
opening 145

**Exiting MapInfo Professional** 130

**Export Formats**  
supported  
bitmap (.bmp) 172  
jpeg 2000 format (\*.jp2) 172  
jpeg file interchange format (\*.jpg) 172  
photoshop 3.0 (\*.psd) 172  
portable network graphics (\*.png) 172  
tagged image file format (\*.tif) 172  
tiff cmyk (\*.tif) 172  
Windows Enhanced Metafiles (\*.emf) 172  
Windows Metafiles (\*.wmf) 172

**Exporting**  
handling borders 173  
procedure 172  
raster overlay by pixel (rop) display method 173  
setting the raster image resolution 172  
setting the rules for exporting true color 173  
specifying resolution in 172  
supported file formats 172  
transparent fill patterns 173  
understanding the advanced options and settings 173

**Exporting Files**  
export definition 761  
layouts 499  
setting the output preferences 126  
translucent images 512

**Expressions**  
creating 328–329, 573  
defined 761  
entering values 574  
functions 599  
labeling with 460  
operator precedence 584  
operators 577

**Extracting Coordinates** 214–216

## F

**False Easting**  
defined 652

**False Easting, description** 535

**False Northing**  
defined 652

**False Northing, description** 535

**Fields, defined** 761

**File Formats**  
MapInfo Professional supported 143, 190  
supported export 172

**Files**  
defined 761  
opening 145

**Fill Patterns**  
defined 761  
printing 297  
region styles dialog 454  
setting transparent 173

**Fill Patterns, Scaling For Printing** 244

**Floating Windows**  
finding with MapBasic 607

**Font Styles**  
mif file text objects 678

**Fonts, defined** 761

**Format\$ Function, in expressions** 591

**Frame Tool Button** 474

**Frames**  
cartographic legend 487, 491–495  
drawing in layouts 474  
layout window 469, 473–474, 476

**Functions**  
in expressions 599

## G

**Gaps**  
cleaning 427–428  
finding in region objects 426

**Gen Files, raster format** 503

**Generalization, defined** 761

**Geocoded Points**  
displaying on a map 218, 239  
street inset and offset 211

**Geocoded Tables, extracting coordinates** 214

**Geocoding**  
abbreviations file 221–222, 224–227  
address errors 220, 227–229  
alternate street names 228  
appropriate map detail 204  
assigning coordinates to records 204  
automatically 206  
defined 761  
finding exact street matches 209  
geographic accuracy 205  
interactively 207  
making a DBMS table mappable for 275  
manually 207  
matching address numbers 212  
matching street names 212  
matching to regions 213  
post office boxes 228  
precision 209  
process overview 205  
refining boundaries 223

**Geocoding (continued)**

- result codes **229–231**
- selecting ungeocoded records **218**
- spelling errors in street names **227**
- ungeocoding **219**
- vs. creating points **190**

**Geographic Information System (GIS), defined **761******Geographic Operators **578******Georeferenced Raster Images **505******Get Info Command **309******GetFeatureInfo Support **617******GIF Files, raster format **503******Global Positioning Software**

- installing **112**

**GML Files, importing **198******Graduated Symbol Maps**

- customizing **367–368**
- defined **761**
- description **367**

**Graph Select Tool **449******Graph Windows**

- defined **761**
- opening a table in **149**

**Graphs**

- axis attributes **442**
- creating **439–440**
- editing **440–444**
- exploding a pie **445**
- general options **441**
- printing options **241**
- saving **450**
- selections **449**
- setting the default open and save directory support files **123**
- specifying titles **443**
- support file location **450**
- using 3D graphs **446–448**
- using pre- v. 5.5 graphs **451**
- using series **444**
- using templates **450**

**Graticule, defined **761******Grid Image Files**

- converting to .mig format **388**
- setting the default display settings **124**
- setting the default open and save directories **123**
- using **383**

**Grid Layers**

- opening **145**
- setting the zoom layering defaults **118**
- using layer control with **162**

**Grid Maker Tool, draws grid long/lat lines on maps **174******Grid Surface Maps**

- clipping **389–390**
- defined **761**
- handlers **384**
- inflection **386–387**
- interpolators **384–386**
- relief shading **387**
- specifying default handlers **119**
- translucent images **387**

**Grid Surface Maps (continued)**

- uses **382**
- using grid layers **388**
- vertical mapper grid handler **384**
- with info tool **388**
- zoom layering **388**

**Grid Tools **388–389****

- creates a native grid file from table of points and converts grids from any format **175**

**H****Heads-Up Digitizing **761******Help Button Bar **761******Help System, Using **26******Histogram Graphs **438******Hot Views, defined **762******Hotine Oblique Mercator Projection**

- oblique azimuth **652**

**Hotine Oblique Mercator Projection, Oblique Azimuth **535******Hotlink Tool**

- in browser windows **563**
- launching active objects **561–562**

**Hotlinks **563******HTML Image Map Tool**

- creates an HTML image map from a MapInfo map for a web page **175**

**HTML Image Maps **564******HTML Landing Pages **565****

- using column aliases in metadata **565**

**I****IDW Interpolator **384–385******Importing Files**

- import definition **762**
- setting the default open and save directories **123**
- web map service (wms) data **200, 202–203**

**Indices, searching for map objects **144******Individual Values Maps**

- defined **762**
- described **363**
- saving categories in templates **373**
- thematic **363**

**Inflection**

- grid surface maps **386–387**
- ranged thematic maps **366, 378–380**

**Info Tool**

- grid cell information **388**
- seamless layers **165**
- using **160, 357**

**InfoTips, in prism maps **396******Installation**

- before you install **99**
- controlling the location of the application data files **108**
- custom workstation **101**
- data **109**
- ECW compressor **110**
- global positioning software (gps) **112**
- metadata browser **111**

**Installation (continued)**

- modifying mapinfo.prf for directories **99**
- navigating the CD **99**
- network **104**
- online references **112**
- per-user installs **100**
- procedure **100**
- running from the c drive **112**
- setting up clients **105**
- troubleshooting **112**
- typical workstation **101**
- what are application data files **99**

**Instr Function**

- finding data substrings **347**
- in expressions **592**

**Int Function 593****Interactive Geocoding 207****Interactive Labelling 464****Interleaved Line Styles**

- editing **296**
- styles **455**

**Inverting Selections 326****J****Joining Tables**

- in cartographic legends **490**
- join definition **762**
- order of clauses **345**
- outer joins **345**
- through thematic mapping **360**
- using SQL select **342**
- where condition **345**

**JP2 Files**

- raster format **503**

**JPEG 2000 Format (\*.jp2) Files**

- raster format **503**

**JPEG File Interchange Format (\*.jpg) Files**

- raster format **503**

**JPG Files**

- raster format **503**

**L****Labeler Tool**

- labels as text objects **466–467**
- saves labels as text objects **175**
- using with layout windows **472**

**Labels**

- automatic **460–463**
- callout lines **463**
- content **459**
- controlling display **462**
- customized **460**
- design **459**
- editing **464**
- expression support for MWS (XML) files **32**
- interactive **464**
- label tool button **465**
- layer control options **157**

**Labels (continued)**

- legend styles **489**
- map **458**
- removing **467**
- rotating in layout window **473**
- saving **468**
- styles **463**
- using column information **459**
- using text objects **465–467**
- with expressions **460**
- zoom layering **461**

**Lambert Azimuthal Projection Map, example of 520****Latitude, defined 762****Layer Control Command**

- adding a layer to a map **154**
- display options **154–155**
- label options **157**
- making layers editable **159**
- making layers selectable **160**
- ordering thematic layers **162**
- raster and grid layers **162**
- removing a layer from a map **154**
- seamless layers **165**
- selecting objects in a layer **160**
- thematic layers **161**
- with MapInfo map **554**
- zoom layering **156**

**Layers**

- adding to a map **154**
- characteristics of seamless **165**
- clear cosmetic layer command **158**
- creating buffer **403**
- creating seamless map **166**
- defined **151**
- display options **154–155**
- displaying layer of current selection **26**
- displaying object attributes **157**
- grid theme layers **388**
- making layers editable **159**
- making layers selectable **160**
- objects in **152**
- opening seamless **164**
- removing from a map **154**
- reordering using layer control **153**
- saving thematic map **372**
- seamless **166–167**
- selecting for cartographic legends **486**
- selecting objects in **160**
- specifying search paths for component tables of a seamless map **167**
- thematic **361–362**
- using the info tool to get layer information **160**
- voronoi polygon **418**
- working with thematic **161**

**Layout Windows**

- adding a logo to **502**
- adding open windows to **473**
- aligning objects in **476**
- autolabeler tool **472**



**Layout Windows (continued)**

- creating [473](#)
- creating multiple map views [471](#)
- defined [762](#)
- exporting [499](#)
- frames [473–474](#)
- labeler tool [472](#)
- map scale [478–479](#)
- opening maps in [150](#)
- ordering overlapping objects [470](#)
- page layout [469](#)
- printing [497](#)
- rotating labels in [473](#)
- using legends [475](#)
- with labels [472](#)
- zoom level [470](#)

**Lcase\$ Function [593](#)****Left\$ Function**

- in expressions [594](#)

**Legend Frames**

- borders [488](#)
- default settings [487](#)
- deleting [495](#)
- modifying [493–494](#)
- symbol text [488](#)
- titles [487](#)

**Legend Manager Tool**

- gives you more control over the creation of legends [175](#)

**Legend Window Preferences Definition [113](#)****Legend Windows**

- adding frames [491–492](#)
- borders [488](#)
- creating cartographic [481–485](#)
- modifying properties [493](#)
- setting the default preferences [120](#)
- specifying properties [487](#)
- using in layouts [475](#)

**Legends**

- cartographic [380](#)
- thematic [382](#)

**Len Function**

- in expressions [594](#)

**Like Operator, wildcard characters [284](#)****Line Direction, displaying [157](#)****Line Graphs [438](#)****Line Objects [762](#)****Line Styles [455](#)**

- change styles tool button [295](#)
- editing [455](#)
- interleaved [296](#)

**Line Tool Button [294](#)****Linked Tables**

- conflict resolution [287](#)
- defined [762](#)
- downloading data to [284](#)
- using [278](#)

**Live Access Tables [285](#), [290](#)****Logical Operators [329](#), [580](#)****Logos, adding to a layout [502](#)****Longitude, defined [762](#)****Longitude/Latitude Coordinates**

- creating points [234](#)
- creating points on a map [231](#)
- extracting from geocoded tables [214](#)
- extracting to a new table [215](#)
- longitude/latitude definition [762](#)
- updating original table [215](#)

**Longitude/Latitude Projection Map, example of [517](#)****Lotus 1-2-3 Tables**

- creating .tab files from [197](#)
- creating points from [233](#)

**Ltrim\$ Function [594](#)****M****Main Toolbar [135](#)**

- defined [762](#)

**Manual Geocoding [207](#)****Map Layers**

- adding [154](#)
- changing the default styles for [155](#)
- characteristics of seamless [165](#)
- creating seamless [166](#)
- displaying object attributes [157](#)
- label options in layer control [157](#)
- making a layer editable [159](#)
- making layers selectable [160](#)
- objects in [152](#)
- opening seamless [164](#)
- removing [154](#)
- reordering using layer control [153](#)
- selecting objects in [160](#)
- selecting styles in layer control [155](#)
- specifying search paths for component tables of a seamless map [167](#)
- using the info tool to get layer information [160](#)
- using the layer control command [152](#)
- working with thematic [161](#)
- zoom layering [156](#)

**Map Scale**

- defined [763](#)
- displaying in status bar [26](#)
- in layout windows [478](#)

**Map Segment [763](#)****Map Windows**

- bringing into container application [556–557](#)
- converting to HTML images [564](#)
- defined [763](#)
- navigating in [148](#)
- opening tables in [148](#)
- preferences definition [113](#)
- printing [240](#)
- setting the preferences [117–118](#)

**MapBasic Language, defined [763](#)****MapBasic Programs**

- setting the default open and save directories [123](#)
- setting the default search paths [130](#)

**MapBasic Tools**

- autolabeler [459, 472](#)
- DBMS catalog [270](#)
- degree converter [509](#)
- grid tools [388](#)
- labeler [466, 472](#)
- rotatelabel [473](#)
- scalebar [479–480](#)
- set minimum bounding rectangle [271](#)

**MapBasic Window**

- accessing [602](#)
- angle from a horizontal [605–606](#)
- creating circle regions from points [604](#)
- creating circles around points [604](#)
- creating lines from coordinate information [603](#)
- default zoom level of a map [607](#)
- finding floating windows [607](#)
- selecting all records of specific object type [604](#)
- selecting streets by color [605](#)
- turning seamless layers on/off [167](#)
- using objectinfo function [604](#)

**MapInfo 3.0 Symbols, mif file symbol clause [676](#)****MapInfo FTP Site [29](#)****MapInfo Interchange Format (\*.Mif) Files**

- charset clause [667](#)
- coordsys clause [668–669](#)
- data section [671–673](#)
- file header [664](#)

**MapInfo Interchange Format (\*.mif) Files**

- columns [670](#)
- header version information [664–667](#)
- mid files [679](#)
- symbol styles [676–678](#)
- transform clause [670](#)

**MapInfo Map**

- commands [553–554](#)
- copying a map window to a container [556–557](#)
- drag map window tool [557](#)
- limitations [555](#)
- saving embedded maps [557](#)
- system requirements [550](#)
- tools [552](#)

**MapInfo Map Objects**

- embedding in containers [555–556](#)
- sharing [558](#)
- vs. data map objects [558](#)

**MapInfo Professional**

- airphotousa conterminous coord system added [654](#)
- australian coordinate system changes [654](#)
- CD browser [99](#)
- documentation set [25](#)
- exiting [130](#)
- features [21–22](#)
- improving performance [108](#)
- installation procedure [100](#)
- installing reference materials [112](#)
- list of changes by version [734–737](#)
- new features and enhancements [31](#)
- opening sample data [145](#)

**MapInfo Professional (continued)**

- program maintenance [106](#)
- purpose [20](#)
- removing [106](#)
- RGF93 coordinate system added [653](#)
- RT90 coordinate system added [654](#)
- sample data [695–700](#)
- starting [128](#)
- support options [22](#)
- supported file formats [143](#)
- SWEREF 99 coordinate system added [654](#)
- technical support [27–29](#)
- training [29](#)
- types of uses [356–357](#)
- understanding the files associated with [144](#)
- uninstalling [106](#)
- UTM zone32 EUREF89 coordinate system added [654](#)
- visible snap preference added [312](#)
- wfs, adding server [627](#)
- wfs, changing styles in [627](#)
- wfs, error messages (7.8) [628](#)
- wfs, refreshing layer in [627](#)
- what's new
  - adding column indices to wfs tables [64](#)
  - alignment of thematic legends [58](#)
  - arc grid support [79](#)
  - ASRP 1.2 support [78](#)
  - Baltic projections, Latvia/Lithuania [69](#)
  - Belgian coordinate system [69](#)
  - bi-variant layer capability [55](#)
  - bi-variant layer, in a range theme [55](#)
  - bi-variant layer, in an individual value [57](#)
  - British national grid coordinate system [69](#)
  - changing the find symbol style locally [49](#)
  - Chinese coordinate systems [69](#)
  - controlling embedded legends [88](#)
  - converting unsupported geometries [74](#)
  - custom sort order, individual value legends [54](#)
  - datum enhancements [69](#)
  - digitizing enhancements, auto node [89](#)
  - distance calc enhancements [84](#)
  - find selection in one window or all windows [49](#)
  - geographic tracker upgrade [88](#)
  - Guernsey grid coordinate system [69](#)
  - Hellenic geodetic reference system [69](#)
  - importing GML 2.1 files [72](#)
  - improved error messages for OCI and ODBC [77](#)
  - improved performance for live tables [76](#)
  - Informix and SQL server geometry conversion [75](#)
  - inserting styles into tables [46](#)
  - label, theme expression support, mws (xml) [32](#)
  - layer control shows more info [54](#)
  - MapInfo places enhancement [53](#)
  - mapping - new features and enhancements [46](#)
  - metadata extracted for easy access [91](#)
  - more formats for save window as [78](#)
  - mouse wheel support in browser [52](#)
  - new demographic variables added [94](#)
  - new features and enhancements [46](#)

**MapInfo Professional**

- what's new (continued)
    - new find features **48**
    - new mapping features **46**
    - new thematic legend swatches **61**
    - new toolbar buttons for sync windows **88**
    - New Zealand geodetic datum 2000 **69**
    - object size enhancements **51**
    - open wms table **64**
    - opening comma delimited files **51**
    - opening Shapefiles with m and z values **50**
    - Oracle geometry conversion behavior **74**
    - Oracle object map verification **74**
    - Oracle workspace manager support **34**
    - orthogonal polygon support added **47**
    - overriding default getmap pixel limits locally **72**
    - overriding default values, getmap limits locally **68**
    - printing, importing, exporting enhancements **69**
    - projection in open wms **64**
    - proxy server settings enabled **44**
    - raster **77**
    - sample data enhancements **91**
    - sample data upgraded to latest vintage **94**
    - samples of new theme templates **94**
    - save as native CSV, ASCII, Excel, Lotus **52**
    - saved queries, MWS (XML) files **31**
    - setting default behavior, bi-variant layer **58**
    - setting getmap request pixel limit globally **70**
    - setting the default find symbol style **48**
    - SQL select dialog box bigger **77**
    - sync windows enhancements **88**
    - terminal services and citrix support **31**
    - tools enhancements **79**
    - translating .tab files, AutoCAD 2004 **86**
    - web services preferences **65**
    - wfs table properties **62**
    - wfs/wms enhancements **62**
    - wms display in current map's coordinate system **65**
    - wms image quality improvements **70**
    - workspace resolver **81**
    - workspace resolver, finding, replacing .tab files **83**
    - workspace resolver, removing .tab references **81**
    - workspace resolver, setting search directories for **82**
  - window types **147**
  - Windows compatibility **21**
  - wms, error messages **619**
  - wms, getfeatureinfo support **617**
  - working with coordinate systems **516**
  - working with coordinate systems and projections **515**
  - workspace, saving as xml-based file **169**
- MapInfo Professional 8.0**  
major features **31**
- MapInfo Tables**  
creating **257**  
editing structure **258**  
with data map **559**
- MapInfo\_Mapcatalog**  
spatial index types **271**  
updating data bounds **271**

**Mapinfo\_Mapcatalog**creating **271****MapInfo-L Archive Database 30****Mapinfo.Prj File**

- custom datums **692**
- datum id numbers **525–533**
- editing **538–541**
- projection ID numbers **522–523**
- projection id numbers **641–642**
- unit ID numbers **534, 651**

**Mapinfo.Wor**saving upon exit **130****Mapping Wizard Tool**assists in creating thematic maps **175****Maps**

- earth and non-earth **545**
- opening in layout windows **150**
- printing **240**
- thematic types **363**

**MapX Geoset Tool**reads MapX geosets into MapInfo Professional **175****Marquee Select Tool Button 324****Mastermap GML Files**importing **198****Mastermap Topography Layer 199****Mathematical Operators 575****Maximum Function 594****Mdblauncher Tool**launches the metadata browser **175****Menu Shortcuts 634–638****Meridian, defined 763****Metadata**

- cartographic legends **488–489**
- HTML landing page content **565**
- linked tables **278**
- mdblauncher launches \_ browser **175**
- metadata browser **111**
- saving hotlinks options to **563**
- saving legend attributes to **490**

**Microsoft Access Tables**

- creating in MapInfo Professional **194**
- limitations with MapInfo Professional **196**
- opening **145**
- saving as another Access table **196**

**Microsoft Access Tables, saving 194****Microsoft Data Map**with MapInfo tables **559****Microsoft Data Map Objects**vs. MapInfo map objects **558****Microsoft Excel Files**

- creating points from **233**
- creating tab files from **191**
- opening **145**

**Microsoft Intellimouse, using with MapInfo Professional 111****Microsoft Windows, MapInfo Professional compatibility 21****Mid Files 679****Mid\$ Function 595****Mif Files***see* MapInfo interchange format (\*.mif files)

**Military Grid Reference System, setting the defaults for displaying coordinates in** 119

**Minimum Bounding Rectangle (MBR)** 763

**Minimum Function** 595

**Mode.Ini File, Example In Application Data Files** 109

#### Modifying

graph axis attributes 442

prism maps 396–397

raster image control points 510

tables for active objects 561

**Modifying, Thematic Maps** 372

**Month Function** 595

#### Moving

graph objects 441

**Moving, Selected Objects** 323

**MrSID Format (\*.sid) Files, raster format** 503

#### Multipoint Objects

combining objects with 423

grouping objects using 420–421, 423

**Multipoint Objects, legend styles** 489

#### MWS

caveats for label expression support 32

caveats for thematic expression support 33

how to tell if label expressions were translated 33

how to tell if the thematic expressions were translated 33

label and theme expression support for 32

saved query support for 31

## N

**NAD 83 Datum** 693

#### Named Views Tool

saves a map's current zoom and center as a named view 175

**Native Projections, defined** 763

**Natural Break, ranged map type** 366

**Network Installation** 104

**NITF Format (\*.ntf) Files, raster format** 503

#### Nodes

add node tool button 295

defined 763

deleting 295

displaying 157

duplicate 118

maximum number of 310

moving duplicate 313

overlying 432

reshape mode 310

selecting multiple 310

selecting using snap mode 311

set target editing model 432

snap tolerance 429

thinning and generalization 430

#### Non-Earth Maps

defined 763

using 545

**North Arrow Tool, adds north arrow to a map or layout** 175

**NTF Files, raster format** 503

**Numeric Values, in expressions** 575

## O

#### Object Linking and Embedding (OLE)

MapInfo map tools 552

registering objects with containers 550

terminology 551

**Objectinfo Function** 604

**Objectlen Function** 596

#### Objects

highlighting 128

removing cosmetic \_ from the cosmetic layer 158

rotating selected 323

saving cosmetic 158

setting the default style settings 128

**Objects, drawing** 296

#### Objects, Editing

attributes 309

autotracing 313

cleaning 427–428

deleting 305

enclosing 424

object conversion 314

object offset 306

positioning and sizing 306

procedure 305

set target model 410

smoothing/unsmoothing polylines 314

snap mode 313

#### Objects, editing

combining with set target 410

creating territories by combining 415

disaggregating 431

erasing 432

multipoint and collection 420–421, 423

overlying nodes 432

reshaping 310–311

rotating 306, 308–309

splitting 413

styles 296

thinning 428–431

#### Objects, Selecting

using selectable layers 160

#### Objects, selecting

tool buttons 323

**Oblique Azimuth** 535, 652

#### ODBC Administrator

creating data sources 277

**ODBC Drivers, adding** 103

#### ODBC Tables

defined 763

drivers 763

**Offsetting Map Objects** 306

#### Online Reference Guides

adobe acrobat reader 112

crystal reports 112

installing 112

**Opening**

- data files [145](#)
- ESRI Shapefiles [146](#)
- Excel (.xls) files, dbase (.dbf) files, ASCII files (.txt) [145](#)
- file formats supported [143](#)
- grid layers [145](#)
- maps in layout windows [150](#)
- raster images [504–506](#)
- remote tables [142](#)
- sample data [145](#)
- tables [129](#), [141](#)
- tables in browser windows [149](#)
- tables in graph windows [149](#)
- tables in map windows [148](#)
- web mapping service (wms) layers [200](#)

**Operators**

- comparison [577](#)
- expressions [329](#)
- geographic [578](#)
- logical [580](#)
- mathematical [575](#)
- operator precedence [584](#)
- string [575](#)
- string comparison [577](#)

**Oracle Spatial [276–277](#)****Oracle Workspace Manager [34](#)**

- creating a workspace [38](#)
- deleting a workspace [39](#)
- disabling Oracle table versioning [35](#)
- enabling versioning for an Oracle table [34](#)
- merging a table to its parent workspace [40](#)
- opening a version-enabled table [36](#)
- opening a version-enabled table in [36](#)
- refreshing a table from its parent workspace [42](#)
- resolving conflicts in workspaces [43](#)
- what is an Oracle workspace [34](#)

**Outer Joins**

- queries [345](#)

**Outer Joins, defined [763](#)****Output Settings Preferences**

- definition [113](#)
- specifying [124–125](#)

**Overlaps**

- cleaning [427–428](#)
- finding in region objects [426](#)

**Overlaying Nodes [432](#)****Overview Tool**

- opens map to provide an overview of another map [175](#)

**P****Packing a Table [259](#), [460](#), [763](#)****Page Layout**

- layout windows [469](#)

**Page Setup**

- layout windows [497](#)
- preparing to print [240](#)

**Parameters, projections [536](#), [653](#)****Parsing Data, across multiple columns [254](#)****Pattern Scaling**

- printing fill patterns [244](#)

**PCX Files, raster format [503](#)****Performance, improving [108](#)****Perimeter Function [597](#)****Per-User Installation [100](#)****Photoshop 3.0 (\*.psd) Files, raster format [503](#)****Pie Chart Maps [371](#)****Pie Graphs**

- exploding [445](#)
- graph type [438](#)

**Pin Maps [763](#)****Pixels [763](#)****Places Bar, Setting the Accessing Folders [130](#)****PNG Files, raster format [503](#)****Point Objects, defined [764](#)****Point Size, defined [764](#)****Pointer, defined [764](#)****Points**

- creating circle regions from [604](#)
- creating for intersections [238](#)
- creating from coordinates [231](#)
- creating from Excel/Lotus tables [233](#)
- creating in a projection [234](#)
- dispersing [236–237](#)
- displaying geocoded [218](#)

**Polyconic Coordinate Systems [536](#)****Polyconic Projection [536](#), [653](#)****Polyconic Projection Map, example of [519](#)****Polygon Objects**

- area thinning [430](#)
- closure when digitizing [617](#)
- creating search [326](#)
- creating search polygons [326](#)
- creating voronoi [417–420](#)
- defined [764](#)
- drawing [297](#)

**Polygon Overlay, defined [764](#)****Polygon Select Tool Button [325](#)****Polygon Tool Button [294](#)****Polyline Objects**

- converting regions to [314](#)
- converting to regions [297](#)
- creating regions from [424–425](#)
- defined [764](#)
- drawing [297](#)
- node limits [310](#)
- smoothing and unsmoothing [314](#)
- snapping nodes [429](#)
- splitting map objects using [413](#)

**Polyline Tool Button [294](#)****Population**

- computing with SQL select [344–345](#)

**Population Density**

- computing with SQL select [335](#), [338–339](#)

**Portable Network Graphics Format (\*.png) Files, raster format [503](#)****Post Office Boxes**

- geocoding to [228](#)

**Preferences**

- address matching [122](#)
- address matching definition [113](#)
- directories [336](#)
- directory definition [113](#)
- graph support files location [450](#)
- legend window definition [113](#)
- map window definition [113](#)
- output settings [124–125](#)
- output settings defaults [124](#)
- output settings definition [113](#)
- printer [126](#)
- printer definition [113](#)
- setting the default directory search options for tables, workspaces [124](#)
- setting the default legend window [120](#)
- setting the directory [122](#)
- setting the legend window defaults [120](#)
- setting the map window [117–118](#)
- setting the output settings [124](#)
- setting the startup [121](#)
- setting the system settings [114](#)
- setting the two-digit years [116](#)
- startup [121](#)
- startup definition [113](#)
- style [128](#)
- style definition [113](#)
- system settings definition [113](#)
- web services definition [113](#)

**Print Options**

- 3Dmap [243](#)
- browser windows [242](#)
- graph [242](#)

**Printer**

- overriding the default [245](#)
- storing information in workspaces preference setting [121](#)

**Printer Preferences**

- definition [113](#)
- specifying [127](#)

**Printers, storing information in workspaces [139](#)****Printing**

- a document with an embedded map [558](#)
- advanced options [243](#)
- display and color options [244](#)
- fill patterns [297](#)
- layout windows [497](#)
- map windows [240](#)
- output methods [244](#)
- page setup [240](#)
- setting defaults [125](#)
- translucent images [512](#)
- troubleshooting [246](#)

**Prism Maps**

- bivariate [396](#)
- creating [395](#)
- defined [390–391, 394](#)
- modifying [396–397](#)
- row values of objects [396](#)

**Projection, creating in the mapinfo.prj file [538](#)****Projection Types**

- mapinfo.prj ID numbers [522–523](#)

**Projections**

- additional resources [655](#)
- choosing [654](#)
- creating points in [234](#)
- datums [525–533, 643–651](#)
- defined [764](#)
- digitizing [610](#)
- examples of mapinfo.prj entries [536](#)
- extracting coordinates from geocoded tables [216](#)
- frequently asked questions [545](#)
- mapinfo.prj id numbers [641–642](#)
- origin point [534, 652](#)
- parameters [640–641](#)
- raster images [512](#)
- resources [521](#)
- units [534, 651](#)
- with ocean and grid tables [547](#)
- with web mapping service (wms) [203](#)

**Proper\$ Function [598](#)****Proportion Average Function**

- update column command [260](#)

**Proportion Sum Function**

- update column command [260](#)

**Proportion Weighted Average Function**

- update column command [262](#)

**PSD Files, raster format [503](#)****Puck, digitizing [609](#)****Push-Pin Maps, defined [763](#)****Q****Quantile, ranged map type [366](#)****Queries**

- bound objects in spatial [277](#)
- collecting and deriving data [327](#)
- in DBMS tables [352](#)
- saving as query tables [336](#)
- saving in workspaces [336](#)
- saving in workspaces startup preference settings [121](#)
- select command [328, 330](#)
- using templates [336](#)

**Query Tables**

- defined [764](#)
- saving [336](#)
- setting the default open and save directories [123](#)

**Query Templates [336](#)****Quick Start, setting the display preference [122](#)****R****Radius**

- calculating buffer [405](#)

**Radius Select Tool Button [324](#)****Range**

- projections [535, 653](#)

**Ranged Maps**

- defined [364](#)
- styles [366](#)
- types [365](#)
- using [356](#)

**Raster Format**

- ECW format handler [503](#)
- emf files, (\*.emf) [503](#)

**Raster Images**

- color options [503](#), [510–511](#)
- converting coordinates [509](#)
- converting d/m/s coordinates to decimal degrees [509](#)
- defined [764](#)
- displaying multiple images [510](#)
- layer control display options [163](#)
- modifying control points [510](#)
- opening [504–506](#)
- opening registered [505–506](#)
- placing a logo on a page layout [502](#)
- projection limitations [512](#)
- registering [506–507](#), [509–510](#)
- ROP display method [244](#)
- search order when opening [506](#)
- setting the default display settings [124](#)
- setting the default ROP display method [126](#)
- setting the zoom layering defaults [118](#)
- style override [511](#)
- support for [144](#)
- supported file formats
  - file formats
    - raster images [503](#)
- transferring vector coordinates to [508](#)
- translucent images [512](#)
- world file (\*.tfw) support [505](#)
- zoom layering [512](#)

**Raster Overlay By Pixel (ROP) Display Method, printing raster images [244](#)****Raster Tables**

- data limitations in [512](#)

**Read-Only Tables**

- DBMS [291](#)
- making \_ editable [159](#)

**Records**

- defined [764](#)

**Rectangle Tool Button [294](#)****Redistricting**

- assign selected object button [569](#)
- closing a redistricting session [572](#)
- combining objects in a district [572](#)
- creating districts [568](#)
- defined [764](#)
- definition and purpose [566](#)
- district styles [572](#)
- grouping map objects into districts [566](#)
- reassigning existing districts [570–571](#)
- records with no graphic objects [572](#)
- saving new districts [572](#)
- target district [567](#)

**Refining Boundaries [223](#)**

- geocoding [223](#)

**Refreshing Frames [495](#)****Region Objects**

- checking for errors [425–426](#)
- converting polylines to [297](#)
- defined [764](#)
- node limits [310](#)

**Region Styles [454](#)**

- change styles tool button [295](#)

**Regions, geocoding matches [213](#)****Register Vector Tool**

- allows you to put control points into a vector image and reference points in a map and does affine transform [175](#)

**Registering**

- ASCII data [197](#)
- OLE objects with containers [550](#)

**Registering A Raster Image**

- converting coordinates [509](#)
- error values [510](#)
- spot image control points [661](#)

**Registering a Raster Image**

- control point coordinates [506–507](#)
- error values [509](#)
- modifying control points [510](#)
- opening registered images [505–506](#)
- registration definition [765](#)
- spot image files [658](#), [660–661](#)

**Registry Settings**

- application data files [733](#)
- setting the advanced [107](#)

**Registry Settings, modifying [107](#)****Relief Shading [387](#)****Remote Database Tables**

- conflict resolution [287–289](#)
- data sources [277](#)
- disconnecting from database [290](#)
- downloading data to linked table [284](#)
- linked tables [278](#)
- live access [285–286](#), [290](#)
- making mappable [275](#)
- mapinfo\_mapcatalog [271](#)
- opening [142](#), [279–284](#)
- per-row styles [275](#)
- read-only [291](#)
- requirements [266](#)
- saving [288](#)
- spatial index columns [270](#)
- spatial objects [291](#)
- SQL queries [285](#)
- storing and retrieving spatial objects [266](#)
- storing coordinate values [267](#), [269](#)
- symbol styles in mappable tables [276](#)

**Remote Databases**

- disconnecting from [290](#)

**Remote Tables**

- setting the default open and save directories [123](#)

**Removing**

- cosmetic objects from the cosmetic layer **158**
- labels **467**
- layers from a map **154**
- MapInfo Professional **106**
- tools from tool manager **178**

**Renaming**

- StreetPro streets **316**
- tables **259**

**Reports, creating **263******Reshape Mode **311****

- moving arc endpoints **310**
- moving duplicate nodes **118**
- reshape tool button **295**
- reshaping map objects **310**

**Resizing**

- an embedded map **557**
- graph objects **441**

**Result Codes **219, 229–231******Right\$ Function **598******ROP Display Method, printing/exporting transparent images **512******Rotate Label Tool **473****

- rotates all map layer labels at once **175**

**Rotate Map Window Tool**

- rotates content of map specified number of degrees **175**

**Rotate Symbols Tool**

- rotates all symbols in a map layer at once **175**

**Rotating**

- 3D graphs **447**
- map objects **308–309**
- objects **306**
- selected objects **323**

**Round Function **599******Rounded Rectangle Tool Button **294******Rows**

- adding to tables **257**
- appending to a table **253**

**Rtrim\$ Function **599******Ruler Window, with drawing tools **296******S****S Key**

- snap mode **311**

**Sample Data**

- copyright information **695–700**
- opening **145**

**Saved Queries **31******Saving**

- access and MapInfo tables **194**
- access table as another access table **196**
- buffer regions to tables **403–404**
- copies of tables **171**
- cosmetic objects **158**
- DBMS tables **288**
- embedded maps **557**
- graph templates **451**
- graphs **450**

**Saving (continued)**

- hotlink options to metadata **563**
- labels **468**
- labels as text objects **466**
- legend attributes to metadata **490**
- MapInfo tables as access tables **195**
- MapInfo workspaces **168**
- new districts **572**
- printer information to a workspace **139**
- queries **336**
- queries in workspaces startup preference settings **121**
- query templates **337**
- thematic map layers **372**
- thematic templates **372**
- voronoi polygons **418–420**
- workspace as an xml-based file **169**
- workspaces **168**

**Scale**

- displaying in status bar **26**
- layout windows **479**

**Scale Bar, defined **765******Scale Factor**

- transverse mercator projection **652**

**Scale Factor, transverse mercator projection **535******Scalebar Tool**

- creates a custom distance scalebar for your map **175**
- creating scalebars **479–480**

**Scaling Fill Patterns **244******Scanned Images**

- compared to digitized maps **608**

**Scanning**

- defined **765**

**Scatter Graphs **438******Scroll Bars**

- defined **765**
- setting the default display **118**

**Seamless Map Layers**

- available features **165**
- creating **166**
- info tool **165**
- opening **164**
- specifying search paths for component tables **167**
- toc tool **176**
- turning on and off **167**
- using **166–167**

**Seamless Table Manager Tool, creates and manages seamless layers **175******Search and Replace Tool, searches a character column for a specific string and replaces it with another **175******Search Polygons **326******Select Tool Button **323******Selectable Layers**

- selecting objects **322**

**Selecting by Querying**

- aggregating data **340**
- calculating distance to a fixed point **351**
- DBMS tables **352**
- expressions **328–329**
- finding duplicate values in a column **349–350**



- Selecting by Querying (continued)**
  - grouping by column **342**
  - instr function **347**
  - joining tables **342, 345**
  - objects of specific type **604**
  - query templates **336**
  - saving queries **336**
  - select command **330**
  - specific table records **349**
  - SQL select command **321, 333**
  - SQL select examples **335, 338–339, 345**
  - StreetPro tables **351**
  - streets by color in MapBasic **605**
  - ungeocoded records **218**
  - where condition **345**
- Selecting from the Screen**
  - creating search polygons **326**
  - graph objects **440**
  - in browser windows **263**
  - multiple nodes **310**
  - selectable layers **322**
  - tool buttons **323**
- Selection Tools**
  - seamless layers **165**
- Selections**
  - cancelling **326**
  - defined **320**
  - in graphed tables **449**
  - inverting **326**
  - labeling the current **467**
  - specifying map highlighting **128**
  - symbol hot spot **323**
- Selections, Moving and Rotating Objects** **323**
- Self-Intersections**
  - cleaning **427–428**
  - finding in region objects **426**
- Send to Back Command** **470**
- Send to MapX Mobile Tool**
  - writes a custom MapX geoset for MapX Mobile **175**
- Set Map Statement**
  - changing default zoom level **607**
- Set Target Apply Action Editing Model, overlaying nodes** **432**
- Set the Minimum Bounding Rectangle Tool**
  - sets the minimum bounding rectangle for ODBC live access-based tables **175**
- Shapefiles**
  - opening **146**
  - setting the default open and save directories **123**
- Shields Tool**
  - draws decorative frames around text **175**
- Shortcuts** **634–638**
- SID Files, raster format** **503**
- Simple Truncation, abbreviations file** **224**
- Sin Function** **599**
- Smoothing Polylines** **314**
- Snap Mode**
  - selecting nodes and centroids **311**
- Snap Radius**
  - display preference **312**
- Snap to Nodes**
  - defined **765**
  - digitizing **617**
- Snap Tolerance**
  - map window preference **312**
  - nodes in different objects **429**
  - setting the map window preference **119**
- Space-Delimited Substitution, abbreviations file** **224**
- Space-Delimited Truncation, abbreviations file** **225**
- Spaces**
  - in abbreviations file **226**
- Spatial Analysis, defined** **765**
- Spatial Index Columns** **270**
- Spatial Index Types** **271**
- Spatial Objects**
  - read only **291**
  - storing and retrieving requirements **266**
- Spatial Queries**
  - bound objects **277**
- Spatialize SQL Server Table Tool**
  - accommodates spatial data in a SQL table **176**
- Spatialware**
  - bound objects in spatial queries **277**
  - live access limitations in v. 4.6 **286**
- Special Characters, abbreviations file** **226–227**
- Spherical Calculations**
  - buffer regions **406**
- Spherical Calculations, as default setting** **118**
- Spherical Coordinates, defined** **765**
- Spider Graph Tool, draws lines between objects in a single table or between tables** **179**
- Splitting Objects** **413**
- Spot Image Files**
  - control points **661**
  - coordinate system information **658**
  - raster format **503**
  - registering **658, 660–661**
- Spot Images**
  - control points **661**
- SQL Select Command**
  - calculating distance to a fixed point **351**
  - finding duplicate values in a column **349–350**
  - grouping by column **342**
  - instr function **347**
  - joining tables **342, 345**
  - population density **335, 338–339**
  - querying DBMS tables **352**
  - selecting by querying **333**
  - selecting streets by color in MapBasic **605**
  - SQL query defined **765**
  - StreetPro tables **351**
  - total population and area **344–345**
  - where condition **345**
- Standard Deviation**
  - defined **765**
  - ranged thematic maps **366**
- Standard Parallels**
  - conic projections **535, 652**
- Standard Toolbar** **134**

- Starting MapInfo Professional** 129
  - Startup Preferences**
    - definition 113
    - specifying 121
    - specifying the default 121
  - Startup Workspace** 129
  - Statistics Window, defined** 765
  - Status Bar**
    - defined 765
    - using 26
  - Status Bar, Using** 26
  - Str\$ Function** 600
  - Street Inset**
    - placing geocoded points 211
  - Street Maps**
    - editing 314–317
  - Street Names**
    - correcting errors for geocoding 227
    - geocoding matches 212
  - Street Numbers**
    - matching to address range 212, 228
  - Street Offset, Placing Geocoded Points** 211
  - StreetPro Maps**
    - adding new streets 316
    - adding segments 315
    - editing street colors 317
    - renaming streets 316
  - StreetPro Tables**
    - post office boxes 228
  - StreetPro Tables, with SQL select** 351
  - Streets**
    - characteristics of MapInfo data 608
    - finding exact matches 209
    - geocoding precision 208
  - String Clauses** 582
  - String Comparison** 577
    - operators 577
  - String Operators** 575
  - Structured Query Language (SQL), defined** 765
  - Style Preferences**
    - definition 113
  - Style Preferences, specifying** 128
  - Styles**
    - cartographic legends 489
    - changing symbol 298
    - collection objects 423
    - custom symbols 300
    - districts 572
    - drawn objects 296
    - interleaved line 296
    - labels 463
    - line 455
    - multipoint objects 423
    - override option for raster and grid images 511
    - ranged thematic maps 366
    - region 454
    - symbol 456–457
    - text 457
    - using per row 275
  - Subselect, defined** 766
  - Substitutions In Abbreviations File**
    - using spaces 226
  - Substitutions In Abbreviations File, adding lines** 221–222
  - Substitutions In Abbreviations File, simple** 225
  - Substitutions In Abbreviations File, space-delimited** 224
  - Support**
    - customer service 29
    - MapInfo Professional training 29
    - mapinfo-l archive database 30
    - printed resources 30
    - tech tip archive 22
    - technical support 27–29
    - web sites 30
  - Supported File Formats**
    - opening files in MapInfo Professional 190
    - raster images 503
  - Surface Graphs** 438
  - Symbol Maker Tool**
    - creates, edits, deletes symbols 176
  - Symbol Styles** 457
    - changing 298, 456
    - mappable DBMS tables 276
    - style change tool button 295
  - Symbols**
    - custom 299, 301
    - custom (full view) 302
    - defined 766
    - displaying attributes 377
    - drawing 298
    - for bivariate maps 377
    - mif files 676–678
    - pre-version 4.0 116
    - selection hot spot 323
    - supported fonts 299
    - symbol tool button 295
    - transparent 173
  - Synchronize Windows Tool**
    - share changes in one map with all others in sync 184
  - System Requirements**
    - MapInfo map 550
  - System Requirements, Oracle Spatial** 276
  - System Settings**
    - preferences definition 113
    - setting the preferences 114–115
  - System, Advanced Options and Settings** 106
- ## T
- Table Manager Tool**
    - gets information about all open tables 176
  - Table Rows, defined** 766
  - Tables**
    - associated files 144
    - closing 170
    - creating points from Excel/Lotus 233
    - creating, procedure 257
    - defined 766
    - extracting coordinates 214–216

- Tables (continued)**
  - how renaming `_` affects workspaces **138**
  - ungeocoding **219**
  - update column **251**
- Tables, creating, using subset of a file **332****
- Tables, displaying, new browser window command **262****
- Tables, managing**
  - browsing **262**
  - deleting **259**
  - exporting **761**
  - importing **762**
  - indices **144**
  - making read-only tables editable **159**
  - packing **259**
  - renaming **259**
  - selecting records **349**
  - setting preferred view **142**
  - updating **252**
- Tables, modifying**
  - adding rows **257**
  - adding temporary columns **250**
  - appending rows to **253**
  - collecting data using update column **260**
  - correcting errors for geocoding **227**
  - editing structure **258**
  - for active objects **561**
  - joining **342, 360**
  - parsing data to multiple columns **254**
- Tables, opening**
  - in browser windows **149**
  - in graph windows **149**
  - in workspaces **123**
  - procedure **129**
  - procedure for **141**
  - setting the default directories **123**
  - setting the preferred view options **142**
- Tables, Remote Database**
  - conflict resolution **287–289**
  - data sources **277**
  - disconnecting from database **290**
  - downloading data to linked table **284**
  - linked tables **278**
  - live access **285–286, 290**
  - making mappable **275**
  - mapinfo\_mapcatalog **271**
  - opening **142, 279–284**
  - per-row styles **275**
  - read-only **291**
  - requirements **266**
  - saving **288**
  - spatial index columns **270**
  - spatial objects **291**
  - SQL queries **285**
  - storing and retrieving spatial objects **266**
  - storing coordinate values **267, 269**
  - symbol styles in mappable tables **276**
- Tables, saving**
  - Access and MapInfo **194**
  - Access table as another Access table **196**
- Tables, saving (continued)**
  - buffer regions as tables **403–404**
  - MapInfo tables as Access **195**
  - setting the default directories **123**
- Tablet**
  - digitizing **616–617**
- Tablet, digitizing **609****
- Tagged Image File Format (\*.tif) Files, raster format **503****
- Targa (\*.tga) Files, raster format **503****
- Target District**
  - defined **766**
  - setting **567**
- Target Objects, specifying highlighting **128****
- Technical Support**
  - obtaining **27–28**
- Templates**
  - graph **450**
  - saving thematic **372**
- Temporary Tables, selections **321****
- Terminal Services, support for **31****
- Territories, creating by combining objects **417****
- Text Objects**
  - text cursor **766**
  - using text in maps **305**
  - with labels **465–467, 472**
- Text Styles **295, 457****
- Text Tool Button **295****
- Tfw Files**
  - supported raster format **505**
- TGA Files, raster format **503****
- Thematic Layers**
  - setting order using layer control **162**
  - using with layer control **161**
- Thematic Maps**
  - bivariate **377**
  - creating/modifying with MapInfo map **554**
  - defined **766**
  - expressions with **359**
  - grid surface **382, 385–389**
  - inflection points **378–380**
  - joining tables in **360**
  - layers **361–362, 766**
  - modifying **372**
  - obtaining data **360**
  - saving **372**
  - shading **766**
  - thematic mapping definition **358**
  - types of **363**
  - using update column command **373**
  - variables **766**
- Theme Legends**
  - defined **766**
  - in layouts **475**
  - modifying **495**
  - selecting attributes **490**
- Theme Templates**
  - saving **373**
  - setting the default open and save directories **123**
- Thinning Objects and Nodes **428–431****

**TIF Files, raster format** 503

**TIN Interpolator** 385–386

**TOC Tool**

builds a seamless tble from files listed in a toc file 176

**Tool Manager**

adding a tool to 177

listing of tools 175

loading tools 176–177

removing tools 178

**Tool Manager, listing of pools** 174

**Toolbars** 766

DBMS toolbar, buttons on 136

drawing toolbar, buttons on 136

hide/display 134

main toolbar, buttons on 135

removing 134

reshaping 134

standard toolbar, buttons on 134

tools toolbar, buttons on 178

**Tools**

autolabeler defined 174

cogoline defined 174

concentric ring buffers defined 174

coordinate extractor defined 174

coordsys bounds manager defined 174

create line by length defined 174

DBMS catalog defined 174

DBMS count rows in table defined 174

DBMS SQL builder defined 174

degree converter defined 174

disperse points defined 174

distance calculator defined 180

easyloader defined 174

grid defined 175

grid maker defined 174

HTML image map defined 175

labeler defined 175

legend manager defined 175

mapping wizard defined 175

MapX geoset defined 175

mdblauncher defined 175

named views defined 175

north arrow defined 175

overview defined 175

register vector defined 175

rotate label defined 175

rotate map defined 175

rotate symbols defined 175

scalebar defined 175

seamless table manager defined 175

search and replace defined 175

search and replace updates 186

send to MapX mobile defined 175

set the minimum bounding rectangle defined 175

shields defined 175

spatialize SQL server table defined 176

spider graph 179

spider graph tool defined 179

symbol maker defined 176

**Tools (continued)**

synchronize windows defined 184

table manager defined 176

toc defined 176

universal translator defined 176

universal translator, log file viewer 182

window manager defined 176

workspace packager defined 176

**Tools Toolbar** 178

**Tooltips**

HTML image maps 565

**Topography Layer** 199

**Tracing Existing Objects**

digitizing 614–615

**Transformation, defined** 766

**Translucent Images**

grid surface maps 387

printing and exporting 512

raster 511

**Transparent Fill Patterns, Printing** 244

**Transparent Images**

raster 511

rop display method 512

**Transparent Symbols**

printing 244

setting defaults in exported files 173

**Transverse Mercator Projection**

scale factor 652

**Transverse Mercator Projection Map, Example Of** 518

**Transverse Mercator Projection, scale factor** 535

**True Color, Printing Raster and Grid Images** 244

**Truetype Font Symbols**

mif file symbol clause 677

**Truncation In Abbreviations File, simple** 224

**Truncation In Abbreviations File, space-delimited** 225

## U

**Ucase\$ Function** 600

**Undo Command** 115

**Ungeocode, defined** 766

**Ungeocoding Tables** 219

**Units**

mapinfow.prj ID numbers 534, 651

**Universal Translator**

imports and exports MapInfo data to and from popular mapping file formats 176

using the log file viewer 182

**Unregistered Raster Images, opening** 504

**Unsmoothing Polylines** 314

**Update Column Command**

adding temporary columns 250

parsing data to multiple columns 254

placing graphic information in columns 256

updating tables 252

using aggregate functions 260

using proportion sum and proportion average 260

using proportion weighted average 262

with thematic mapping 360

**Us\_Zips.Tab, Geocoding to Postal Code Centroids** 209

**UTM Projection Map**

example of 520

## V

**Val Function** 600

**Vector Images, defined** 767

**Vector Maps, transferring coordinates to raster image** 508

**Vertical Mapper Grid Handler** 384

**Virtual Tablet Interface**

digitizing 609

**Voronoi Polygons** 417–420

## W

**Warning Messages**

controlling display of 117

**Web Map Service (WMS)**

importing files 200, 202–203

projection issues 203

**Web Services Preferences**

definition 113

**Weekday Function** 601

**Weighted Averages**

defined 767

**WFS**

adding wfs server 627

changing coordinate system 626

changing wfs styles 627

error messages 628

refreshing wfs layer 627

**Where Condition** 345

**Wildcard Characters, With Like Operator** 329

**Window Manager Tool, allows you to customize the look of map, browser, graph, layout, and redistricter windows** 176

**Windows**

adding to a layout 473

defined 767

**Windows 2000, accessing MapInfo Professional-specific folders** 130

**Windows Bitmap (\*.Bmp) Files**

raster format 503

**Windows Enhanced Metafiles (\*.emf), generating for printing** 243

**Windows Metafile Format (\*.wmf) Files, raster format** 503

**Windows Registry**

setting the advanced settings 107

**Windows Registry, modifying** 107

**WMF Files, raster format** 503

**WMS**

adding getfeatureinfo support 617

error messages 619

**Workspace Packager**

creates a copy of a workspace table files in a new location/  
folder and saves all the data in the same place 176

**Workspace Resolver** 81

**Workspaces**

defined 767

digitizer mode 612

how renaming tables affects 138

mapinfow.wor 130

saved data in .mws files - what is lost 170

saved data in .mws files - what is saved 170

saving 168

saving as .mws file (xml-based) 169

saving cosmetic objects in 158

saving printer information in 139

saving queries startup preference settings 121

saving queries to 336

setting the default open and save directories 123

setting the default search paths 130

setting the default table search paths 123

storing printer information preference settings 121

thematic maps 372

using 139

using the startup 129

**Workstations**

custom installation 101

**World Files (\*.Tfw) 505**

## Y

**Year Function** 601

## Z

**Zoom Layering**

defined 767

grid surface layers 388

labeling 461

raster layers 512

setting the raster and grid layer defaults 118

specifying in layer control 156

**Zoom Level**

digitizing 617

displaying in status bar 26

layout windows 470

setting map default via MapBasic 607

using intellimouse 111

**Zsoft Paintbrush (\*.PCX) Files, raster format** 503