4ᵗʰ Dimension

User Reference

4ᵗʰ Dimension
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4th Dimension User Reference
Version 6.0

Contents

Preface

4th Dimension is a powerful relational database for the Macintosh and Windows platforms. As an integrated database environment, 4th Dimension offers a complete solution to your database needs.

Terminology Changes in 4D

ACI's products are undergoing major changes. One effect of these changes is the modification of terms used in our software and documentation. ACI products have adopted the standard terms used in the database business, on all platforms.

The terminology used in this manual reflects this change — "database files" are now called "database tables," "layouts" are now called "forms," "procedures" are now called "methods," and so on.

Of course, these changes do not invalidate any code that was written with previous releases of 4th Dimension. When you convert a database to version 6, the affected commands are automatically updated to reflect the revised terminology.

About the Manuals

The manuals described below provide a guide to the features of both 4th Dimension and 4D Server. The only exception is the *4D Server Reference*, which describes features exclusive to 4D Server and is included only in the 4D Server package.

The *Installation Guide* provides a guide to installing 4th Dimension.

The *Utilities Guide* provides a guide to the utilities available with 4th Dimension and 4D Server such as 4D Tools, 4D Customizer, and 4D Insider.

Discovering 4th Dimension leads you through example lessons where you create and use a 4th Dimension database. These examples provide hands-on experience that help you become familiar with the concepts and features of 4th Dimension and 4D Server.

The *User Reference* provides a description of the User environment — the environment in which you use databases and forms to enter and manipulate data.

The *Design Reference* is a guide to the Design environment and provides detailed descriptions of the operations that you can perform in this environment. You should use it in conjunction with the other volumes in your documentation package.

The *Language Reference* is a guide to using the 4th Dimension language. Use this manual to learn how to customize a database by incorporating 4th Dimension commands and functions.

The *4D Server Reference* is a guide to installing 4D Server and managing multi-user databases with 4D Server. This manual is included only in the 4D Server documentation package.

About This Manual

This manual serves as a reference to 4th Dimension's User environment and provides detailed descriptions of the operations that you can perform in this environment. It should be used in conjunction with the other manuals in the 4th Dimension package.

To use this manual effectively, you should first work through the exercises in *Discovering 4th Dimension* and start to create your own database, referring to the *4th Dimension Design Reference* when you need to review a process or explanation.

You can then proceed to enter and manipulate data in your database, referring to this manual when you need to review a process.

Cross-Platform

This manual explains the use of 4th Dimension both on the Macintosh and Windows platforms. Although the concepts and functionality of both versions of 4th Dimension are nearly identical, the manual addresses any differences where necessary. Such differences include the graphical user interface and keyboard commands.

This manual contains graphics illustrating the Windows environment. If there is a substantial difference in the appearance of the Macintosh version of a window or dialog box, it is also presented.

Chapter Descriptions

This manual is divided into the following chapters and appendices.

- Chapter 1, "Introduction to the User Environment" introduces you to some basic User environment concepts such as the current selection, using tables and forms, and processes. It also describes some basic operations, such as entering a password-protected database, and provides an overview of the User environment menus.

- Chapter 2, "Managing Structure and Data Files" provides an overview of 4th Dimension desktop files.

- Chapter 3, "Data Entry and Display" describes how to use input and output forms and how to access forms from different tables.

- Chapter 4, "Selecting Records" explains how to create a selection of records using the commands in the Queries menu and how to use the various search methods to select a specific record or group of records.

- Chapter 5, "Working with Records" explains how to add, modify, and delete records. It also describes how to use the Formula editor to automatically update records based on a formula (for instance, adding two days to the vacation balance in each employee's record).

- Chapter 6, "Sorting Records" describes how to place a selection of records in order by sorting them based on the values in one or more fields.

- Chapter 7, "Form Reports" explains how to print reports that use forms created in the Design environment.

- Chapter 8, "Quick Reports" explains how to use the Quick Report editor to print data in a columnar report. The chapter describes how to design the report using fields from your database as columns in the report and how to enhance the report by dividing data into sorted groups and performing summary calculations for each group.

- Chapter 9, "Labels" explains how to use the Label Wizard to design and print labels.

- Chapter 10, "Graphs" explains how to create various types of graphs using 4D Chart. It also describes how to print graphs and how to copy graphs for use in 4th Dimension and in other applications.

- Chapter 11, "Managing 4D Chart" explains the basics of managing and printing 4D Chart documents.

- Chapter 12, "Choosing a Graph Type" discusses the types of two- and three-dimensional graphs that you can create using 4D Chart.

- Chapter 13, "Creating a Graph" explains the basic steps for creating a graph.

- Chapter 14, "Modifying Graph Features" explains how to modify graph features.

- Chapter 15, "Adding Objects and Text" explains how to add a variety of objects to your graphs, and how to add dynamic references to field values or to 4th Dimension expressions.

- Chapter 16, "Using Hot Links" explains how to share information among 4th Dimension plug-ins.

- Chapter 17, "Executing Methods" provides instructions on how to execute a project method in the User environment and how to start a new process for the method or run it on the server computer as a stored procedure.

- Chapter 18, "Importing and Exporting Data" explains how to import and export records and how to use an ASCII map to transfer records with different field and record delimiters.

- Chapter19, "Web Server" provides an overview of 4th Dimension's capabilities as a Web server and explains how to start and stop Web service from the User environment.

- Appendix A, "ASCII Maps" describes how to create ASCII maps for importing and exporting data. ASCII maps are normally not needed for transferring data between Windows applications, but may be needed for transferring data between 4th Dimension for Windows and applications running on other platforms.

■ Appendix B, "Keyboard Equivalents for Graphing" describes the Windows and Macintosh keyboard equivalents for menu commands and commands for manipulating objects.

Conventions

All the manuals in your documentation package, including this one, use certain conventions to help you understand the material.

The following explanatory notes are used:

Note Text emphasized like this provides annotations and shortcuts that will help you use 4th Dimension more productively.

4D Server Throughout the manual, 4th Dimension and 4D Server/4D Client are referred to simply as 4th Dimension. Differences between the operation of the two products are explained in 4D Server notes, which provide information about using 4D Server/4D Client. This information is provided only when the operation of 4D Server/4D Client differs from that of 4th Dimension.

Notes like this alert you to important pieces of information and alert you to situations where data might be lost.

In addition, all table names are shown in brackets in the text to help distinguish them from the names of fields, forms, and other items. For instance, the Employees table is written as the [Employees] table.

Using Hypertext

If you are reading this manual online, you can take advantage of the hypertext buttons that have been added to this manual. All hypertext buttons are printed in blue text. A hypertext button looks like this: "For information on using 4th Dimension as a Web server, see Chapter 19, "Web Server," on page 303."

You can click a hypertext button to read additional information about the topic. You can then use the Adobe Acrobat Go Back button to retrace your steps.

1 Introduction to the User Environment

This chapter provides an overview of the 4th Dimension User environment. It describes important User environment concepts and the User environment menus.

In this chapter, you will learn about:

■ The 4th Dimension environment

■ The 4th Dimension plug-ins

■ 4D Server and 4th Dimension

■ The User environment

■ User environment concepts such as the current selection, tables and fields, and multi-tasking

■ Opening a database with another data file

■ Choosing a log file

■ Entering and using a password-protected database

■ The User environment menus

1 Introduction to the User Environment

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■ The User environment menus

The 4th Dimension Environments

4th Dimension manages data, performs calculations on that data, and produces output such as summary reports and graphs. These types of operations are performed in 4th Dimension's User environment.

The *User environment* is the environment in which you enter and manage data. You use the User environment to:

- Add, modify, and delete records

- Search for a specific record or group of records

- Create labels, reports, and graphs that use the information in your database

- Import and export data between 4th Dimension and other applications

- Execute methods

You perform these operations on databases that have been created in the Design environment. The *Design environment* is the environment in which you create a database. You design its structure by creating tables and fields to store data, forms for data entry and reports, and other features such as a password access system.

You can also use the Design environment to create a custom application. A custom application has its own menu bars, entry screens, and editors. By creating menus and menu bars in the Design environment, you can design an application that suits your needs exactly and includes only the features you want.

A custom application can be used in 4th Dimension's *Custom Menus environment* or deployed on 4D Server and 4D Client.

Using the 4th Dimension language, you can include some or all of the functions of the User environment in a custom application. For example, a custom application can include menu commands that display the User environment's Quick Reports and Labels editors.

To create a stand-alone Windows or Macintosh application, you can use 4D Compiler to compile your application and merge it with a 4D engine.

The 4th Dimension Plug-ins

In addition to the built-in functionality of 4th Dimension, ACI offers several plug-ins that work with your database to enhance its capabilities. These plug-ins include the following:

- 4D Chart, a graphing application that is included with 4th Dimension,

- 4D Write, a word processing application,

- 4D Draw, an object-oriented drawing application,

- 4D Calc, a spreadsheet application,

- 4D Backup, a database backup utility,

- 4D SQL Server, a developer's tool that allows you to communicate directly with SYBASE SQL Server,

- 4D for Oracle, a developer's tool that allows you to communicate directly with an Oracle server,

- 4D Open, a developer's tool that lets other applications access data in 4D Server.

These products are designed to be used within your 4th Dimension database. The 4D Write, 4D Draw, and 4D Calc plug-ins allow you to include such things as letters, drawings, and spreadsheets in special areas called plug-in areas. These areas appear as part of your data, just like a name or any other piece of information. The 4D Chart plug-in is already built into 4th Dimension to facilitate graphing of your database information.

You can also treat the 4D Write, 4D Draw, 4D Calc, and 4D Chart plug-ins as if they were separate applications by using them in their own windows. Your work within these windows can be independent of your database or linked to information in your database or in other plug-ins.

4D Server and 4th Dimension

You can create single-user and multi-user databases with:

■ 4th Dimension (single-user)

■ 4D Server and 4D Client (multi-user)

4th Dimension is a single-user database application. In a single-user database, operations such as entering data into a record or searching for a specific record are performed by one user at a time, working on a single computer. Both 4th Dimension and the database on which the user is working are stored locally on the user's machine.

4D Server and 4D Client together form a multi-user database application in which database operations can be performed by several users at a time. The users connect to databases from client computers that are connected over a network to a dedicated computer (a server) running 4D Server.

To set up a multi-user database, you install 4D Server along with the database on a separate computer. A copy of 4D Client is then installed on each user's computer. A user accesses the database by launching his or her copy of 4D Client.

Whenever a user performs an action such as entering data or generating a report, 4D Server updates the tables on the server computer and performs all necessary calculations. Changes made by one user are updated on the server so that all users view the most recent information. For more information about 4D Server and 4D Client, refer to the *4D Server Reference* manual.

The User Environment

The User environment is where you work with your data. The menus and editors in this environment provide a complete set of tools for managing information. You can use the User environment to:

■ Import or export data

■ Enter, modify, or delete records

■ Search for records and sort lists of records

■ Create and print reports, labels, and graphs

- Choose a log file

- Run processes that enable you to perform more than one operation simultaneously, also known as *multi-tasking*

  Choosing a log file and multi-tasking are discussed later in this chapter. All other User environment features are explained in the remainder of this manual.

Tables and Forms

In a 4th Dimension database, you store information in *tables.* Ideally, each table stores a different type of information. For example, a Contacts database might have one table that stores information about people and another table that stores information about companies.

In the User environment and custom applications, you use *forms* to enter and manage data. Each table in your database has an input form and an output form.

An *input form* displays one record at a time. You use an input form to enter, view, and modify information in a single record. In the User environment and custom applications, the input form is sometimes called the *Detail form.*

An *output form* displays several records as a list. You use an output form to browse through records, select and sort records, and print a selection of records. You can also enter and modify records directly in an output form. In the User environment and custom applications, the output form is sometimes called the *List form.* When you are working with a List form, you can display an individual record in its Detail form by double-clicking a record.

You can switch from one table to another and change the input and output forms with which you work. You will learn how to do this in Chapter 3.

The Current Selection

When managing data, you select the group of records with which you want to work. This group of records is called the *current selection.* The current selection can contain none, one, some, or all records in a table. Every table has a current selection of records.

The current selection is an important concept in 4th Dimension. The most common data management operations are performed on the records in the current selection.

These operations include:

■ Sorting records

■ Viewing and modifying individual records

■ Updating a group of records

■ Printing a report

■ Generating labels

■ Graphing data

■ Exporting records

The current selection of records is always the set of records most recently selected. For instance, you might have a company database that uses an employees table to keep track of employee records. Suppose that you decide to search for the records of all engineers in the company.

When this query begins, the current selection may contain the records of all employees in the company — salespeople, production personnel, engineers, and so on. When the query is completed, the current selection contains *only the engineers' records.*

If you were to print a list of records, the list would contain only the records in the current selection — in this case, the records for all of the engineers in the company. If you were to graph employee salaries, your graph would display the salaries for all of the engineers in the company.

The current selection remains the same until you perform an operation that changes it. You change the selection of records in a table whenever you select records manually or do a query that selects records. Search operations are performed by menu commands in the Queries menu, such as Query by Example, which searches for records based on the entries you specify for fields in a form.

To restore the current selection to all of the records in the table, you choose Show All from the Queries menu.

For more information about selecting records, refer to Chapter 4.

Multi-tasking in 4th Dimension

When you are working with a database, you typically perform a single action at a time — one query, one sort, printing one report.

At times, you would like to be able to perform several actions at once. For example, you might want to enter data into an employee's record while a large group of records is printing. You might also want to view two selections from the same table (such as engineers in one window and salespeople in another) simultaneously.

4th Dimension provides such multi-tasking capabilities by enabling you to perform operations in separate processes. A *process* is a 4th Dimension task that executes actions specified by a method.

Although you write methods in the Design environment, you can execute them in the User environment. When you do so, you can choose to start a new process for the method. The method then executes in a separate process, allowing you to continue working in another process.

You can start as many processes as you want. The number of processes open concurrently is limited only by the amount of memory on your computer.

For information about using Execute Method to start a new process, refer to Chapter 17 of this manual. For complete information about creating and managing processes, refer to the *4th Dimension Design Reference.*

4th Dimension Desktop Files

On Windows, a 4th Dimension database consists of three disk files: a structure file, a resource file, and a data file. When you create a new database, 4th Dimension creates a directory (a folder, on Macintosh) and places the structure, database resource, and data files in the directory. On Macintosh, the contents of the structure and resource files are contained in a single file, the structure file.

■ The structure file (denoted by the file extension .4DB on Windows) contains all of your specifications for the design of the database.

■ The database resource file (denoted by the file extension .RSR on Windows) contains resources used by the database. These resources might include pictures or strings. On Macintosh, there is no resource

file. The contents of the Windows resource file is stored in the Macintosh structure file.

■ The data file (denoted by the file extension .4DD on Windows) contains your data and any indexes you build. On Macintosh, the data file has the suffix ".data".

Please refer to Chapter 2 for details on database files.

Choosing and Opening a Log File

For many databases, it is essential to protect important data from corruption or from inadvertent errors. Data that has been accidentally deleted or modified by a user can mean anything from extra work to reenter the data to a situation in which the data is irretrievably lost.

4th Dimension's backup utility, 4D Backup, can help prevent this type of problem by allowing you to back up your database before such an accident occurs. With 4D Backup, you create a backup of your database and a log file that tracks all changes since the last backup. If necessary, the database can be restored to the state it was in at a previous point in time—before records were deleted, changed, and so on.

▶ To open an existing log file:

1 **Open the database.**

2 **Choose Log File from the File menu.**
   An open-file dialog box appears.
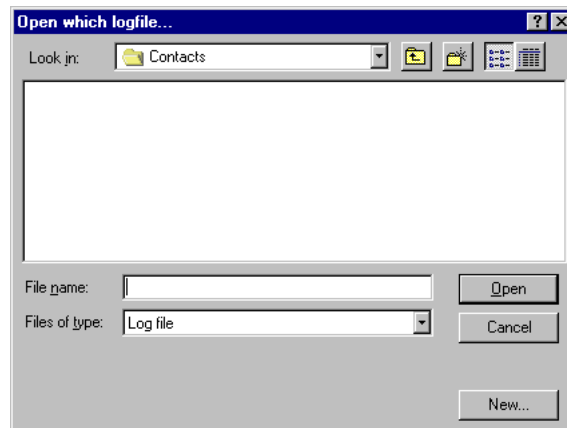
3 **To use an existing log file, select the log file name and click OK.**
OR
Double-click the log file name in the list of filenames.

Note Log files in 4th Dimension for Windows are denoted by the file extension .4DL. On Macintosh, the log files have the suffix ".log".

► To create a new log file:

1 **Open the database.**

2 **Choose Log File from the File menu.**

3 **Click the New button in the Open File dialog box.**

If you have created a backup, 4th Dimension displays the following dialog box:

In the File Name text area, 4th Dimension automatically enters a name for the new log file based upon the name of the current structure file.

4 **To enter a new name for the log file, type the name in the File Name area.**

Names of any other log files associated with the structure file are displayed in the scrollable area below the File Name text area.

5 **Click OK.**

4th Dimension creates a log file that keeps track of all changes made to the database since the last backup.

> *Unlike 4ᵗʰ Dimension databases, log files created in 4ᵗʰ Dimension for Windows cannot be used in 4th Dimension for Macintosh. Similarly, a log file created in 4ᵗʰ Dimension for Macintosh cannot be used in 4ᵗʰ Dimension for Windows. A log file can be used only on the platform on which it was generated.*

If your database becomes damaged or if you want to reverse a user error, you can use 4D Backup to return the database to a previous state. For complete information about using 4D Backup, refer to the documentation that comes with 4D Backup.

Note To disable a log file, choose No Log File from the File menu.

4D Server If you are using 4D Server, the Log File and No Log File menu commands are available only on the server. You cannot choose a log file, create a new log file, or disable a log file from 4D Client's User environment.

Password Protection

4ᵗʰ Dimension's Design environment includes a comprehensive password access system. The access system is used to selectively grant access to parts of a database. Access can be granted to tables, record operations (e.g., adding, modifying, deleting, and viewing records), forms, menu commands, methods, and plug-ins.

The password access system is based on a set of passwords. Each user of the database is given a user name and a password. Depending on the type of access system implemented in your database, you must do one of two things:

- Select your user name from a list and type your password, or

- Type both your user name and password

The latter option provides extra security for a database by requiring that users enter both a valid user name and password. For more information about specifying this option for a password access system, refer to the *4ᵗʰ Dimension Design Reference*.

Entering a Password-protected Database

If a database is password-protected, you must identify yourself as a valid user before you are permitted access to the information in the database. 4th Dimension automatically displays an Enter Password dialog box whenever you open a password-protected database. You will be required to either enter your password or enter both your name and password.

▶ To enter a database protected by a password access system:

1 **Open the database as you normally would, by double-clicking the 4th Dimension icon or by clicking the icon and choosing Open from the File menu.**

2 **If 4th Dimension displays the following Enter Password dialog box, select your user name from the user list and type your password in the password entry area at the bottom of the dialog box.**

Select your name ——————
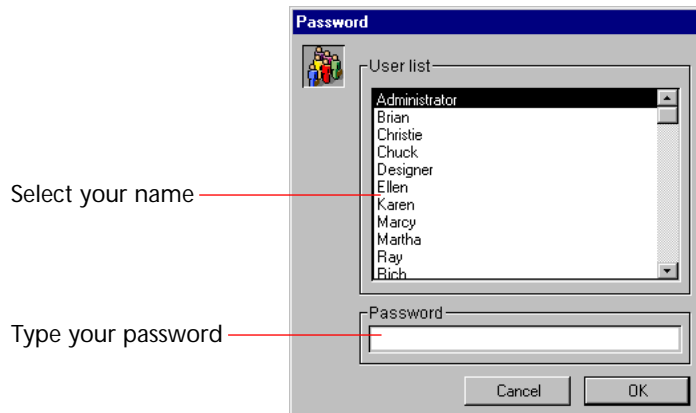
Type your password ——————

3 **If 4th Dimension displays the following Enter Password dialog box, type both your user name and password in the entry areas.**
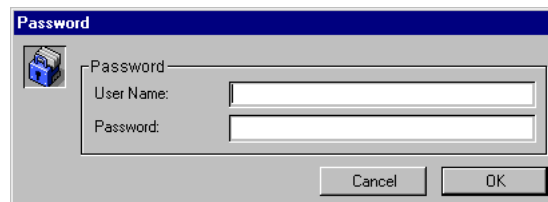
Note that in both dialog boxes, a Lock icon is displayed in place of each character you type in the password entry area.

Note Because the password access system is case sensitive, be sure to type your password using the correct uppercase and lowercase characters.

If you type the password correctly, you are given the level of access to the database that was specified when the access system was designed. If you type the password incorrectly, the computer beeps and does not allow you to open the database.

Using a Password-protected Database

After you have entered a password-protected database, you can use any part of the database to which you have been granted access. Unless you are the designer of the database or part of a group of users that has been given access to the Design environment, you will be unable to enter the Design environment.

The access system grants access to tables, record operations, forms, menus, methods, and plug-ins. If you try to use part of the database to which you do not have access, 4th Dimension displays an alert dialog like the ones shown.
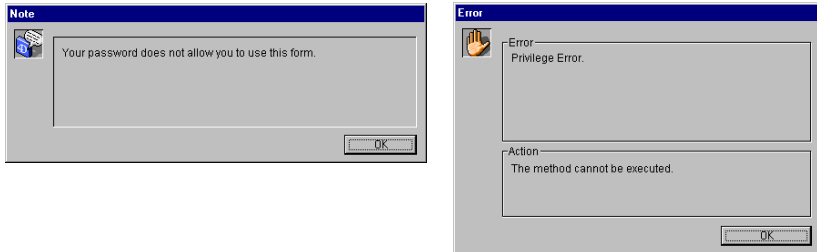
User Environment Menus

This section briefly describes the commands in the User environment menu bar.

Menu Bar

The User environment menu bar contains the following menus:

Toolbar

The User environment also includes a toolbar of command buttons for easy access to frequently used menu commands. The buttons are grouped by the menu to which they correspond. When you move the pointer over a button, a button help message box (Tool tips) displays the command.

File	Edit	Use	Enter	Queries	Report	Special

New Database	Undo	Design	New	Show All	Quick	
Open Database	Cut	User	Record	Query	Labels	
Import Data	Copy	Custom	Apply	Order by	Charts	
Export Data	Paste	Menus	Formula			
Print	Clear					
	Select All					

Execute
Method
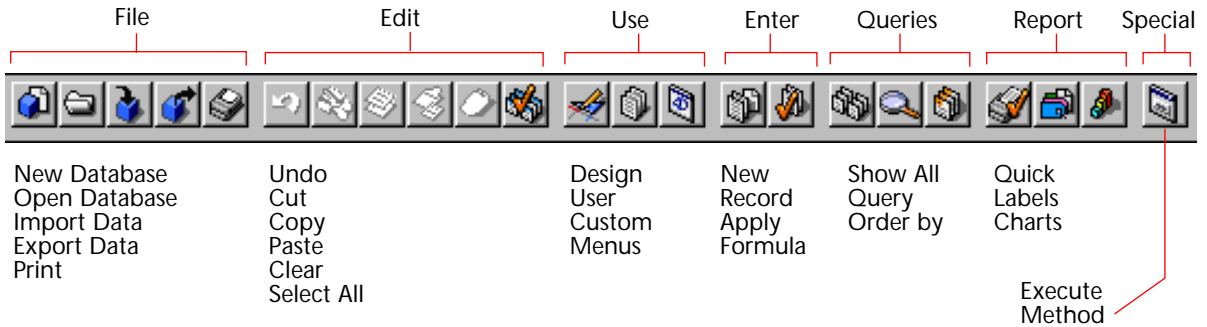
To choose a command from the toolbar, click its button.

Custom Menus and Toolbars

In addition to the built-in User environment menus and command buttons, you can add custom menus and buttons that will appear in the menu bar and the toolbar when a form is displayed. You use these custom commands to simplify complex or time-consuming tasks.

File Menu

The File menu contains the following commands for performing standard file operations:

- **New Database** Displays a dialog box for you to enter the name of a new database. Before opening the new database, 4th Dimension first closes and saves the database that is currently open.

- **Open Database** Displays an open-file dialog box so you can open an existing database. Before opening the database, 4th Dimension first closes and saves the database that is currently open.

- **Import Data** Displays the Data Import dialog box so you can import data into the current table. For a discussion of importing and exporting data, refer to Chapter 18.

■ **Export Data** Displays the Export Data dialog box so you can export the records in the current selection.

■ **Log File** Displays a dialog box for you to select a log file or create a new one. For more information about log files, refer to "Choosing and Opening a Log File" on page 8.

■ **No Log File** Disables the log file so that 4th Dimension and 4D Backup no longer keep track of the database operations being performed. For more information about log files, refer to "Choosing and Opening a Log File" on page 8.

■ **Choose Table/Form** Displays the Choose Table/Form dialog box so you can change tables or forms. For a discussion of choosing tables and forms, refer to "Choosing Tables and Forms" on page 55.

■ **Page Setup** Displays the Page Setup dialog box for the printer that you have specified.

■ **Print** Displays the Choose Print Form dialog box so you can print reports using a form. For a discussion of printing reports using forms, refer to Chapter 7.

■ **Quit** Closes and saves the current database.

4D Server In 4D Client, the operations found in the User environment File menu differ from those listed, due to the division of the application between 4D Server and 4D Client. First, the New Database menu command is not available for creating new databases since new databases are created directly on the server. For information about creating new databases, refer to the *4D Server Reference* manual. Remember that you can always open a database located on the server by choosing **Open Database** from the **File** menu.

When you want to exit the database that is currently open, you choose **Quit** from the **File** menu. This operation exits the database on your client machine but does not close the database on the server.

Finally, **Log File** and **No Log File** are not available in the 4D Client User environment **File** menu since log files can be created or disabled only on the server.

Edit Menu   The Edit menu contains the following standard editing commands:

Edit	
Undo	Ctrl+Z
Cut	Ctrl+X
Copy	Ctrl+C
Paste	Ctrl+V
Clear	
Select All	Ctrl+A
Show Clipboard	
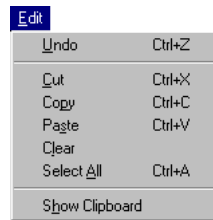
- Undo
- Cut
- Copy
- Paste
- Clear
- Select All
- Show Clipboard

Your system's standard editing operations are covered in the user guide that came with your system. You can use these menu commands when managing data with 4th Dimension.

Use Menu   The Use menu contains the names of the three 4th Dimension environments: Design, User, and Custom Menus. You use this menu to enter either the Design or the Custom Menus environments from the User environment.

Use	
Design	Ctrl+Y
✓ User	Ctrl+U
Custom Menus	Ctrl+I
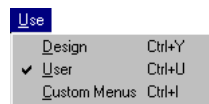
The Use menu contains the following commands:

- **Design** Switches to the Design environment. When you enter the Design environment, all of the Design environment menus and editors are available to help you design your database.

- **User** The check mark next to this menu command indicates that you are currently in the User environment. If this command is checked, selecting it has no effect.

- **Custom Menus** Switches to the Custom Menus environment. When you enter the Custom Menus environment, a custom menu bar replaces the User environment menu bar. If no custom menu bars have

been created, this menu command is dimmed because the Custom Menus environment does not exist for the database.

Note The Design menu command is dimmed if you do not have access privileges to this environment or if the database with which you are working has been compiled.

Enter Menu

The Enter menu contains the following commands used for entering and modifying data in records:

Enter	
New Record	Ctrl+N
Modify Record	Ctrl+M
Apply Formula...	
Enter in List	Ctrl+,
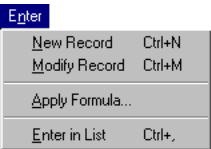
- **New Record** Displays a blank input form for data entry. Choose New Record to begin entering data.

- **Modify Record** Displays the selected (highlighted) record using the current input form. Modify Record is dimmed if no records are highlighted or if you are currently using an input form.

- **Apply Formula** Displays the Formula editor. Choose Apply Formula to make changes to the current selection of records using a formula.

- **Enter in List** Toggles the Enter in List mode which allows you to enter and modify data using an output form. When the Enter in List mode is active, a check mark appears next to the menu command.

For information about entering, modifying, and updating records, refer to Chapter 5.

Queries Menu

The Queries menu contains the following commands for selecting, searching, and sorting records:

Queries	
Show All	Ctrl+G
Show Subset	Ctrl+H
Query...	Ctrl+S
Query by Example...	Ctrl+L
Query and Modify...	
Query by Formula...	
Order by...	Ctrl+T
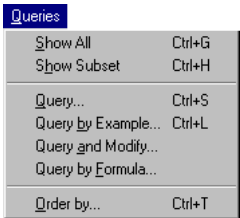
- **Show All** Displays all the records in the table you are working with in the output form. Show All is dimmed if you are currently using an input form.

- **Show Subset** Displays only the group of records that is highlighted in the output form. Show Subset is dimmed if no records are highlighted or if you are using an input form.

- **Query** Displays the Query editor. The Query editor is a general purpose search editor that you can use to perform many types of queries.

- **Query by Example** This menu command displays the current input form as a query-by-example window.

- **Query and Modify** This menu command also displays the current input form as a query-by-example window. When you use Query and Modify, the first record located by the query is displayed in the input form.

- **Query by Formula** This menu command displays the Formula editor. Use Query by Formula when you want to search for records based on the results of a formula.

- **Order By** This menu command displays the Order By editor. Use Order By to sort the current selection.

  For a discussion of selecting and searching for records, refer to Chapter 4. For a discussion of sorting records, refer to Chapter 6.

Report Menu

The **Report** menu contains commands that display the Quick Report, Label, and Chart editors. You use these editors to create a wide range of printed output.

The **Report** menu contains the following commands:

- **Quick** Displays the Quick Report editor. Use it to create and print columnar reports.

- **Labels** Displays the Label editor. Use it to create and print labels.

- **Charts** Displays the Chart Wizard. Use it to graph data.

The Quick Report, Label, and Chart editors are discussed in Chapters 8, 9, and 10 respectively.

Special Menu

The Special menu contains three commands that control various features of the User environment.

Special
Edit Output ASCII Map...
Edit Input ASCII Map...
Execute Method...   Ctrl+E
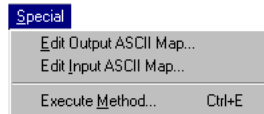
- **Edit Output ASCII Map** This command displays the Output ASCII Map dialog box. Use it to create or choose an ASCII map for exporting data.

- **Edit Input ASCII Map** This command displays the Input ASCII Map dialog box. Use it to create or choose an ASCII map for importing data.

- **Execute Method** This command displays the Execute Method dialog box. Use it to execute a project method from the User environment. When you execute a method from this dialog box, you can choose to execute the method in another process. For more information about processes, refer to "Multi-tasking in 4th Dimension" on page 7.

ASCII maps are described in detail in Appendix A. The Execute Method dialog box is discussed in Chapter 17.

Web Server

The Web Server menu contains two commands that turn the Web Server on and off, Start Web Server and Stop Web Server.

Web Server
Start Web Server
Stop Web Server

4th Dimension or 4D Server can act as a server to browsers on the World Wide Web. If your database is intended to provide this service, you can enable this feature using this menu or the Publish Database at Startup property in Database Properties. Database Properties can be set only in the Design environment. For information on Web service, see Chapter 19.

For information on configuring a database as a Web server, see the *4th Dimension Language Reference*.

Help Menu (Windows)

The **Help** menu gives you access to the Windows Help available for the application. The About 4th Dimension menu command displays the About box for 4th Dimension.

Balloon Help (Macintosh)

To help you use the User environment menus on the Macintosh, 4th Dimension features balloon help for all menus and menu items. When you place the pointer over a menu name, a balloon describing the menu appears to its right. When you select an item from a menu, as shown, a balloon explaining its function appears to its right.

Note To use balloon help with 4th Dimension, you must have 4D Help installed in your System folder and be using System 7 (or later) with balloon help turned on. For more information on installing 4D Help, refer to the *4th Dimension Installation Guide*.

Plug-ins Menu

The Plug-ins menu at the far right of the User environment menu bar lists the names of any 4th Dimension plug-ins are installed in your database. 4D Chart is automatically listed in this menu. The upper portion of the menu contains the names of all plug-ins that have been installed. Choosing a plug-in from the Plug-ins menu opens a window (document) for that plug-in.

The bottom portion of the Plug-ins menu contains the names of any currently open plug-in documents. You can open as many documents for each plug-in as allowed by available memory.

Custom Menus for Forms

With the Form editor in the Design environment, you can associate a menu bar with a form. Whenever the form is used as an input form, the menus on the custom menu bar are appended to the User environment's menu bar.
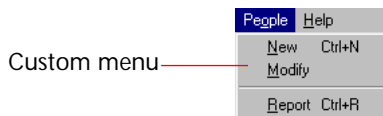
Custom menu ———

You use the menus and menu commands on the custom menu bar for specialized functions. For example, a custom menu might contain menu commands that display custom search dialog boxes, print reports, or import data using a special format. You use custom menu bars as you would use menus and menu commands in any application.

Refer to the *4th Dimension Design Reference* for more information about designing custom menu bars and associating menu bars with forms.

2 Managing Structure and Data Files

This chapter provides an overview of 4th Dimension desktop files.

4th Dimension Desktop Files

On Windows, a 4th Dimension database consists of three desktop files: a structure file, a resource file and a data file. When you create a new database, 4th Dimension creates a directory and places the structure, resource, and data files in the directory.

■ The structure file (denoted by the file extension .4DB) contains all of your specifications for the design of the database.

■ The database resource file (denoted by the file extension .RSR) contains resources used by the database. These resources might include pictures or strings.

■ The data file (denoted by the file extension .4DD) contains your data and any indexes you build.

Note If you are using Windows 95 or Windows NT 4.0, you can use long filenames. The DOS filenames are maintained internally by your OS.

On Macintosh, a 4th Dimension database consists of two desktop files, the structure file and the data file. The resource file is merged with the Macintosh structure file. The structure file has no suffix on Macintosh, while the data file has the suffix .data.

Naming Directories

The directory (folder on Macintosh) is given the name you assign to the database. For example, if you name a database Contacts, the directory will be named Contacts, the structure file will be named Contacts.4DB, the database resource file will be named Contacts.RSR, and the data file will be named Contacts.4DD.

On Macintosh, the folder is given the name you assigned to the database, followed by an "ƒ". The data file is also given the same name, followed by ".data". For example, if you name a database "Contacts," the folder will be named Contacts ƒ, the structure file will be named Contacts, and the data file will be named Contacts.data.

On Windows, an optional data resource file (denoted by the file extension .4DR) may also be present. The resource file contains Macintosh resources pertaining only to the data file, such as the WEDD resource that links a data file with a particular structure file.

Note For more information on file types found in the Windows environment, refer to the on-line documentation.

Structure and Data File Locations

4th Dimension does not require that the structure and data files have the same names, be in the same directory, or be on the same volume. You can move either the structure or data file to new locations on the same hard disk or to different hard disks. However, the structure and resource files must always be in the same location. In addition, if an optional data resource file exists, it must be kept in the same location as the data file.

When you open a structure file, you can choose to use a data file other than the one you initially created or you can create a new data file. This option gives you the ability to use more than one set of data with the same structure file. For example, a developer can use a "dummy" data file while working on the database off-line and then redeploy the improved structure file with the "real" data file when the development is finished.

If you separate the data file from the structure file by moving it, you will need to indicate the data file's new location. By displaying the Open Data File dialog box, 4th Dimension asks for the location of the data file the first time you open the structure file.
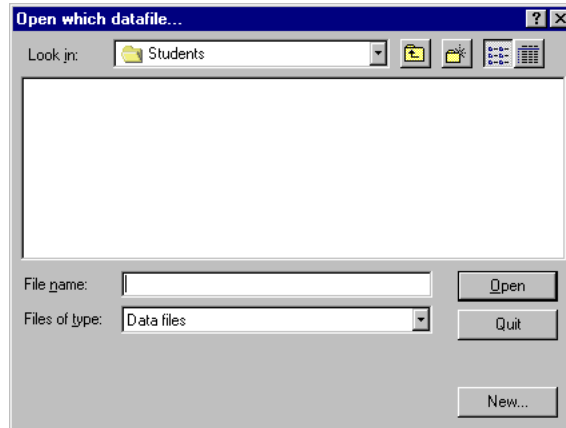
Opening a Database

You can open a database by double-clicking the 4th Dimension application icon and using the Open File dialog box to open the desired structure file. 4th Dimension will then look in the directory that contains the structure file for a data file with the same name. If 4th Dimension finds the data file, it will open it automatically.

If the data file is not in the same directory or is missing, 4th Dimension displays an Open Data File dialog box. Open the data file by double-clicking its filename or by selecting the filename and clicking **Open**.

You also use the Open Data File dialog box when you want to specify a different data file or create a new one. That data file will become the default and will open automatically the next time you open the database the next time.

4D Server You can choose a different data file or create a new data file in the same manner by holding down the **Alt** key (**Option** key on Macintosh) while opening a database with 4D Server.

Opening a Different Data File

You can prevent 4th Dimension from opening the default data file automatically.

▶ To open a different data file:

1 Hold down the Alt key (Option key on Macintosh) while opening any structure file.

This forces 4th Dimension to display the Open Data File dialog box.

2 Double-click the desired data file name or select the data file and click Open.

Opening a New Data File

You can also create a new data file by preventing 4th Dimension from opening the default data file automatically.

▶ To create a new data file:

1 Hold down the Alt key (Option key on Macintosh) while opening any database.

This forces 4th Dimension to display the Open Data File dialog box.

2 Click the New button.

4th Dimension displays a create-file dialog box.
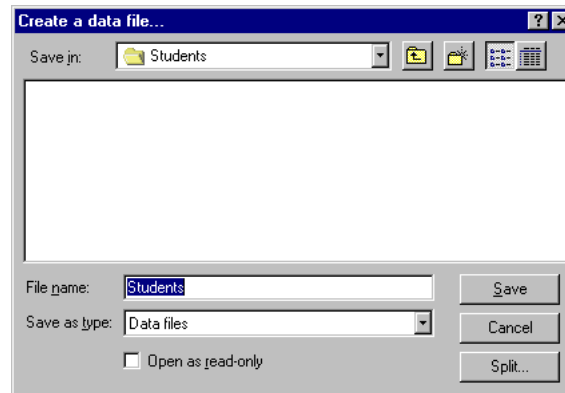
In the File Name text area, 4th Dimension automatically enters a name for the new data file based on the name of the current structure file.

3 If you wish to enter a new name for the data file, type the name in the File Name area.

The names of any other data files in the directory are displayed below the directory name. If you enter a name of an existing data file, 4th Dimension displays a message asking you if you want to replace the existing data file with the new data file.

4th Dimension will "remember" where the data file is from then on (4th Dimension stores the pathname of the data file). The Open Data File dialog box will not be displayed again unless you move the data file to a new location, change its name, or hold down the Alt key (Option key on Macintosh) while launching the database.

Segmenting Data Files

If you are creating a data file that may become very large, you may need to segment the data file. You need to segment a data file if

- The data file will not fit on your hard disk,

- The data file will become larger than 2 gigabytes.

Using data file segmentation, you can store a single data file on two or more volumes. Each segment can grow to a maximum of 2 gigabytes. The maximum size of a 4th Dimension data file is 128 gigabytes. You do not need to segment a data file when you first create it. You can wait until it becomes too large to manage on your hard disk.

For complete information on segmenting data files, see Appendix A of the *4th Dimension Design Reference*.

3   Data Entry

This chapter covers the basic skills required to manage information using input and output forms. These skills are used whenever you work with data — entering new records, modifying existing records, or working with a list of records.

Input and Output Forms
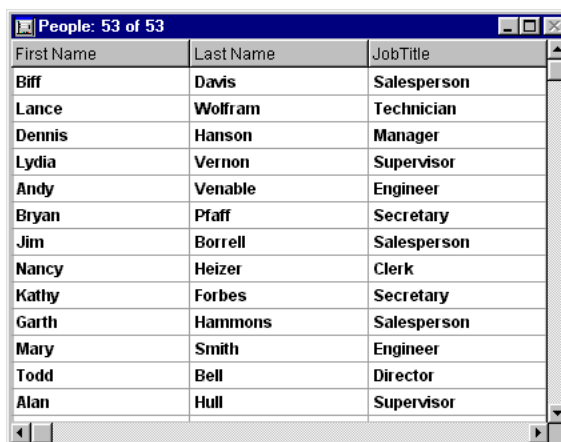
Input and output forms provide access to the information in your database. You use forms to enter, view, modify, and print information.

Input forms display one record at a time. The have enterable areas for fields and buttons for working with records. For details, see the section "Using Input Forms" on page 32. Here is an input form that was created using a standard form template.

Output forms display several records as a list. Each row is a record and each column is a field. Typically, only a few fields appear in the output form. Output forms are described in detail in the section "Using Output Forms" on page 29. Here is an output form that was created using a standard form template.

People: 53 of 53		
First Name	Last Name	JobTitle
Biff	Davis	Salesperson
Lance	Wolfram	Technician
Dennis	Hanson	Manager
Lydia	Vernon	Supervisor
Andy	Venable	Engineer
Bryan	Pfaff	Secretary
Jim	Borrell	Salesperson
Nancy	Heizer	Clerk
Kathy	Forbes	Secretary
Garth	Hammons	Salesperson
Mary	Smith	Engineer
Todd	Bell	Director
Alan	Hull	Supervisor

You use an output form to do the following:

■ Scroll a list of records

■ Highlight a subset of records

■ Double-click a record to display it in the input form

■ Enter or modify records in the list using the Enter in List mode (in the User environment only)

The Enter in List mode changes the way in which you use an output form by enabling you to modify records directly in the output form instead of having to use an input form. When you are in the Enter in List mode, fields in the output form become enterable.

Input forms display one record at a time. You can enter and modify information, move from one field in the form to another, and move from one record to another.

An input form usually has buttons that you use to:

■ Save a new record to disk or save modifications to an existing record

■ Cancel changes to a record

■ Navigate from one record to another

■ Delete a record

Using Output Forms

An output form lists records. Although any form can be used as an output form, most output forms have these features:

■ Each row is a record

■ Each column is a field or a variable

■ Each column is labeled at the top of the window

The following is a typical output form.

Table name ————

Number of records
in current selection ————

Number of
records in table ————

Scroll bars ————

People				
First Name	Last Name	Hire Date	Salary	JobTitle
Biff	Davis	01/02/80	43780	Salesperson
Lydia	Vernon	01/15/80	34373	Supervisor
Bryan	Pfaff	01/22/80	26440	Secretary
Jim	Borrell	01/22/80	36540	Salesperson
Kathy	Forbes	01/28/80	18840	Secretary
Garth	Hammons	02/06/80	50100	Salesperson
Alan	Hull	02/20/80	41460	Supervisor
George	Lyle	02/28/80	47900	Salesperson
Calvin	Margolis	03/20/80	52000	Salesperson
Laurence	Nanneman	04/01/80	55900	Salesperson
Jeff	Muldoon	04/30/80	50200	Salesperson
Steve	Baldwin	05/01/80	43990	Supervisor
Keith	Stephens	05/12/80	44790	Salesperson
Martin	LeVitus	06/05/80	47200	Salesperson
Jeff	Eubanks	06/23/80	29310	Secretary
Betsy	Ohren	06/24/80	35590	Supervisor
Harry	Conrad	06/25/80	35710	Salesperson

Window title bar: People: 22 of 53

Output Form Modes An output form can be used in either of two modes:

■ **Regular mode**, in which you can scroll, highlight, and double-click records. Fields on the output form are not enterable in this mode.

■ **Enter in List mode**, in which the fields on the output form are enterable. You can add new records or modify existing records directly in the output form.

Working with Output Forms

There are four basic ways to work with output forms:

- Scrolling to locate records
- Highlighting to select records
- Double-clicking to view a record
- Entering and modifying data in fields

Scrolling

An output form has standard horizontal and vertical scroll bars. You can scroll records by clicking either of the scroll arrows, clicking the scroll bar, or dragging the scroll box. If the output form has more fields than can be displayed in the window, you can scroll horizontally using the scroll bar at the bottom of the window.

Highlighting

You highlight (select) a record by clicking it. You can highlight one record, two or more adjacent records, or two or more non-adjacent records. After highlighting records, you can perform operations such as displaying them as a subset or deleting them.

▶ To highlight a record:

- **Click a record displayed in the output form**.
The record you clicked is highlighted.

▶ To highlight several adjacent records:

1 **Click the first record you want to highlight**.
2 **Hold down the Shift key and click the last record you want to highlight**.
All records between the first and last ones you clicked are highlighted.

▶ To highlight several non-adjacent records:

1 **Click the first record you want to highlight**.
2 **Hold down the Ctrl key (Command key on Macintosh) and click another record**.
3 **Continue clicking records while holding down the Ctrl key (Command key on Macintosh)**.
Each record you click is highlighted.

▶ To highlight the entire current selection of records in the output form:

- **Choose Select All from the Edit menu**.

All records displayed in the output form are highlighted. To highlight all records in the table, choose Show All from the Queries menu before choosing Select All from the Edit menu.

Double-clicking

To view a record in the input form:

■ **Double-click the record in the output form.**

When you double-click a record, the input form replaces the output form in the frontmost window. The selected record is displayed in the input form, ready for modification.

Adding and Modifying Records

You can add and modify records in an output form using Enter in List mode. Enter in List mode is especially useful for modifying a few adjacent records because several records are displayed on the screen simultaneously.

You can only enter or modify fields in the current table. You cannot enter or modify data in variables, fields from other tables, or subforms.

When you are in Enter in List mode, you can:

■ Add a new record, using the Enter key on the Windows numeric keypad or the New Record menu command

■ Move from field to field, using the Tab or Enter keys on the alphanumeric keyboard (Return key on Macintosh)

■ Select and edit fields

The following illustration shows an output form in Enter in List mode.

People: 22 of 53				
People				
First Name	Last Name	Hire Date	Salary	JobTitle
Biff	Davis	01/02/80	43780	Salesperson
Lydia	Vernon	01/15/80	34373	Supervisor
Bryan	Pfaff	01/22/80	26440	Secretary
Jim	Borrell	01/22/80	36540	Salesperson
Kathy	Forbes	01/28/80	18840	Secretary
Garth	Hammons	02/06/80	50100	Salesperson
Alan	Hull	02/20/80	41460	Supervisor
George	Lyle	02/28/80	47900	Salesperson
Calvin	Margolis	03/20/80	52000	Salesperson
Laurence	Nanneman	04/01/80	55900	Salesperson
Jeff	Muldoon	04/30/80	50200	Salesperson
Steve	Baldwin	05/01/80	43990	Supervisor
Keith	Stephens	05/12/80	44790	Salesperson
Martin	LeVitus	06/05/80	47200	Salesperson
Jeff	Eubanks	06/23/80	29310	Secretary
Betsy	Ohren	06/24/80	35590	Supervisor
Harry	Conrad	06/25/80	35710	Salesperson

A selected field in Enter in List mode

▶ To enter and modify fields using an output form:

■ Choose Enter in List from the Enter menu.

The fields in the output form become enterable. A check mark appears next to this menu command to indicate that you are in Enter in List mode.

To leave Enter in List mode, choose Enter in List from the Enter menu again.

Note When using the Enter in List mode, you cannot click to highlight a record or double-click to open the input form.

Saving Changes Tabbing out of a field or clicking on another field saves your changes.

Using Input Forms

The input form is the primary tool for entering and modifying data. Most input forms have the following elements to manage information:

■ **Enterable Areas** Input forms have enterable areas (fields or variables) in which data can be entered. You use enterable areas to enter values into the database.

- **Accept Button** A button for accepting the record. You use the Accept button to save a new record or to save changes to an existing record. When you *accept* a record, you request 4th Dimension to add the new record (or your changes to an existing record) to the database.

- **Cancel Button** A button for canceling the record. You use the Cancel button to discard changes you make to an existing record or to discard a new record. If you press the Cancel button while entering a new record, 4th Dimension does not add the record to the database. If you press the Cancel button while modifying an existing record, 4th Dimension ignores any changes you have made. The record you were modifying is not affected by your changes.

- **Navigation Buttons** Buttons to navigate from one record to another (e.g., First Record, Last Record, Next Record, Previous Record) and buttons for moving from one page to another (e.g., First Page, Last Page, Next Page, Previous Page) within the same record.

  When you press a record navigation button, 4th Dimension accepts the record you were adding or modifying before displaying a new record.

- **Delete Button** A button for deleting the record. You use the Delete button to permanently delete a record from the database.
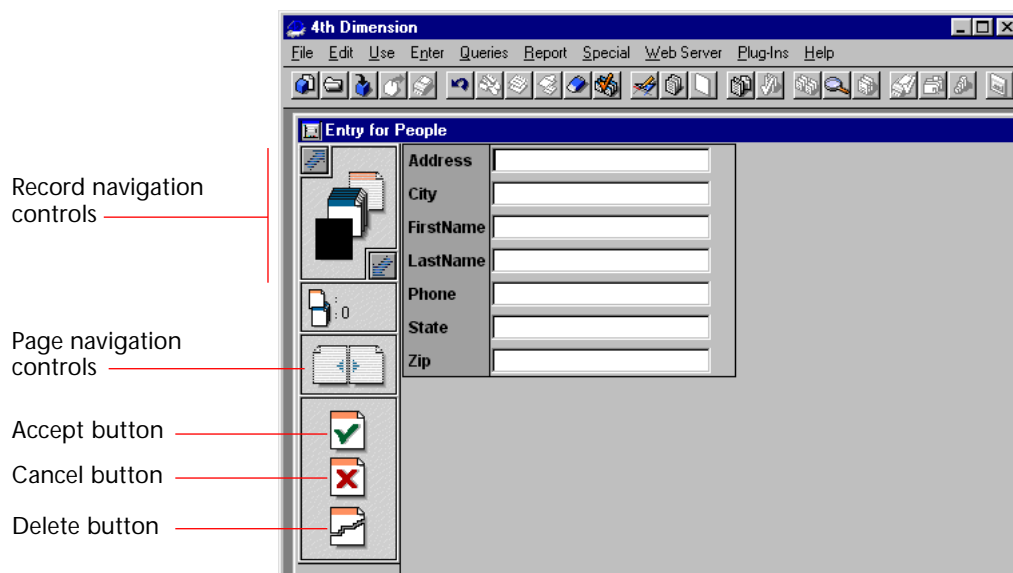
  4th Dimension ships with a wide variety of button styles. When an input form is created, the database designer can choose among these button designs or use other designs. The following illustration shows a sample of button styles that are included with 4th Dimension.
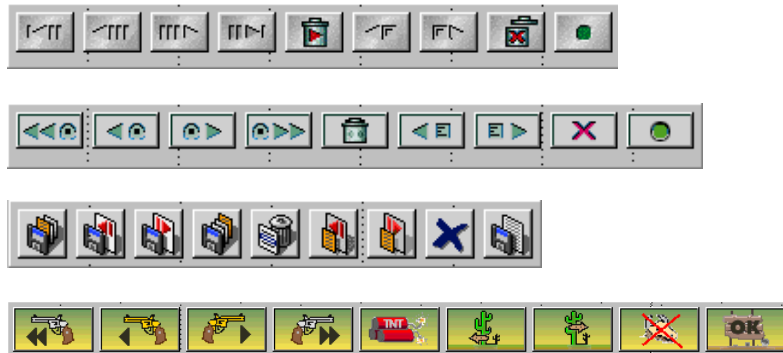
Your database may use one of these styles or use custom buttons. If the database uses any of the standard button styles, you can move the pointer over any button to view a Tip, as shown in the following illustration.

Last Record

If your input form has no buttons, 4th Dimension adds a default control panel when the form is used for data entry. The default control panel is shown in the following illustration.

Record navigation controls

Page navigation controls

Accept button

Cancel button

Delete button

Enterable Areas and the Data Entry Order

You enter data into enterable areas. An enterable area can be either a field or a variable.

When entering or modifying data, you move from one enterable area to another in a consistent order. This order is called the *data entry order*. Every enterable area into which you can type a value is included in the data entry order. Boolean fields (shown as radio buttons or check boxes), subforms, combo boxes, and areas that accept pictures are also included in the data entry order.

Thermometers, rulers, and dials can also be used to enter data. These objects, however, are not included in the data entry order. You select them by clicking on them.

The data entry order can be changed in the Design environment's Form editor. The data entry order for a particular form may not

necessarily move from left to right or top to bottom. A form with a
custom data entry order is shown below.

Refer to the *4th Dimension Design Reference* for information about
changing the data entry order.

► To move forward in the data entry order:

■ Press the Tab key or the Enter key on the alphanumeric keyboard.

Note In a Text field, pressing the Enter key on the alphanumeric keyboard
(Return key on Macintosh) ends the paragraph you are writing and
moves the insertion point to the next line in the field. In this case, use
the Tab key to move forward in the data entry order.

► To move backward in the data entry order:

■ Hold down the Shift key and press Tab.

► To select any enterable area:

■ Click in the area or tab into it using either Tab or Shift+Tab.

Accept Button

When you are satisfied with your entry, you can accept the record. When you accept a record, you tell 4th Dimension to add the record to the database.

▶ To accept a record:

■ Click the Accept button.
OR
Press the Enter key on the numeric keypad.
4th Dimension adds the record to the database.

Depending on the design of the input form, the Accept button may be represented in different ways.

In multi-page forms, the fields on all the pages are part of the same record. In a multi-page form, clicking the Accept button on any page saves the entire record. Similarly, pressing the Enter key on the numeric keyboard while on any page saves the entire record.

Note 4th Dimension updates the data file stored on your hard disk at regular intervals. You can specify this interval using the Database Properties dialog box in the Design environment. See the *4th Dimension Design Reference* for more information about setting Database Properties.

Cancel Button

If you decide you don't want to add a record to the database or save modifications to an existing record, you can cancel the entry. When you cancel an entry, the data you entered is not saved. If you were modifying an existing record when you canceled, 4th Dimension ignores the modifications. No changes are made to the record stored on disk.

▶ To cancel a record:

■ Click the Cancel button.
OR
Press Ctrl+Period. (⌘–Period on Macintosh)
4th Dimension discards any data you have entered or modified for that record and displays the output form.

## Record Navigation Buttons

A form often contains buttons or icons for moving from one record to another. 4th Dimension automatically disables navigation buttons when appropriate.

The four navigation buttons are:

■ First Record

■ Last Record

■ Previous Record

■ Next Record

Clicking any of these buttons accepts the current record and then moves to another record.

The following illustration shows record navigation buttons from one button style that is shipped with 4th Dimension.

First Record ——————— Last Record

Previous Record ——————— Next Record
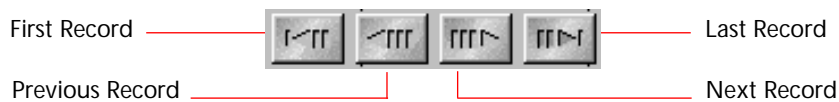
4D Server If a record to which you are attempting to move is being used by another user, 4D Client displays a message stating that the record is locked and you will be unable to modify the record. The record remains locked while the other user is working with it. You will only be able to enter the view the locked record until the other user frees the record by clicking the Cancel or Accept button or by using the navigation buttons or icons to move to another record.

Page Navigation Buttons

An input form can consist of more than one page. Multi-page forms must provide some way for the user to move from one page to another. The database designer may use page navigation buttons. The four page navigation buttons are:

■ First Page

■ Previous Page

■ Next Page

■ Last Page

Clicking a page navigation button displays another page in the form but does not accept or cancel the record.

Some forms contain the page navigation buttons shown below. You use these buttons to move to the previous or next page of the form.

Previous Page ——————— ——————— Next Page

Note Page navigation buttons are not added to all input forms automatically. Your database may use other page navigation controls or not use multi-page input forms.

The Delete Button

An input form may have a Delete button. It is used to delete the record being displayed. Deleting a record cannot be undone. Before deleting the record, 4th Dimension displays a dialog box in which you can confirm or cancel the deletion.
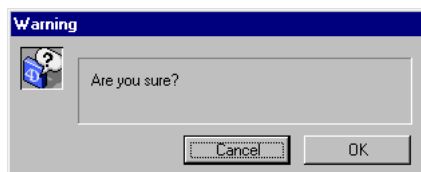
▶ To delete the record, click the OK button.

Editing Data

While you are entering or modifying data, you can edit the values you enter before accepting the record. Highlight the value you want to edit and use standard text editing techniques. You can use the Cut, Copy and Paste commands in the Edit menu to modify any entry. You can select text by double-clicking or dragging the insertion point over it.

If you make a typing error, you can press the Backspace key (Delete key on Macintosh keyboards) to backspace over the incorrect characters. You can also choose Undo from the Edit menu to undo your last action.
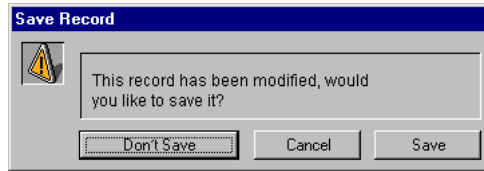
For more information about data entry, see the section "Entering and Modifying Different Types of Data" on page 39.

Interrupting Data Entry

When you use an input or output form, you can choose any menu command that is not dimmed. For example, you can do a query, print a quick report or a set of labels, or graph data.

If you choose a menu command while you are in the process of entering or modifying a record, 4th Dimension displays an alert box

asking you whether you want to accept the record, discard the record, or cancel the menu selection and return to the record being entered.

Save Record

This record has been modified, would you like to save it?

[Don't Save]   [Cancel]   [Save]

Entering and Modifying Different Types of Data

Each field in a form has a field type that dictates the kind of data you can enter. Most fields are numeric or alphanumeric. You enter data in these fields simply by typing. Other types of fields accept data only in particular formats.

Alpha, Numeric, Date and Time fields can have display formats associated with them. When you tab out of a field with a display format, 4th Dimension applies the format to the data you entered. For example, a salary field could have a format that displays a dollar sign ($) and two decimal places. If you entered 100.500, tabbing out of the field would produce $100.50. For more information about the available formats for each data type, refer to the *4th Dimension Design Reference.*

Note The database designer can also use triggers, object methods, and form methods to process data as it is entered. These tools may be used to validate data, update the contents of other tables, or compute values of variables whenever data is saved or modified. The database designer may also use methods or triggers to provide customized feedback to the user. For more information about triggers, object methods, and form methods, see the *4th Dimension Design Reference.*

Alpha Fields

An Alpha field can contain alphanumeric characters (letters and num-bers), punctuation marks, and special characters such as *, %, and {. The maximum length of an Alpha field is set in the Design environ-ment. If you type more characters than the maximum allowed, the extra characters are truncated.

An entry filter can be associated with an Alpha field. An entry filter validates the entries that you type on a character-by-character basis.

See the section for more information.

Numeric Fields

4th Dimension supports three types of numeric fields:

- **Real** This type of field stores real numbers to $\pm1.7e\pm308$ (15 digits).

- **Integer** This type of field stores integers from -32767 to 32767.

- **Long Integer** This type of field stores integers from -2^{31} to 2^{31} -1.

If you enter a decimal point and numbers to the right of the decimal in an Integer or Long Integer field, the number will be truncated.

Numeric fields do not store formatting characters such as the dollar sign or the comma. If you enter a formatting character, it is ignored. To format a numeric field, assign a display format to the field in the Design environment.

The only non-numeric characters which are significant when entered in a number field are the following:

Character	Purpose	Example
Decimal point (.)	Used as the decimal separator	54.3321
"e" or "E"	Used in scientific notation	1.1e5
Hyphen (-)	Used for negative numbers	-2090

Note In the United States, the decimal point (.) is used as the decimal separator in real numbers. Other countries use a different character such as the comma (,) as the decimal separator. When entering numbers in an international version of 4th Dimension, you should use the character specified by your operating system.

Text Fields

A Text field functions like a text processor. It can hold up to 32,000 characters. Text fields are used for entering long blocks of text such as notes or comments. A Text field can have a vertical scroll bar.

A Text field provides basic text editing features: scrolling, word wrapping within the field, and double-clicking to select words. It also supports use of the arrow keys and the standard cut, copy, and paste operations. Using the **Enter** key on the keyboard (or **Return** on Macintosh), you can type a Return character into a Text field to form paragraphs. If you press the **Enter** key (**Return** on Macintosh), the insertion

point moves to the next line. You cannot insert Return characters in an Alpha field.

You cannot use tabs in a Text field. If you press the Tab key while in a Text field, the insertion point moves to the next enterable area in the data entry order.

4th Dimension lets you paste text into a text field. For example, you can paste the contents of a letter written in a word processor into a Text field.

As an alternative, you can install the 4D Write word processing plug-in in the database. 4D Write supports multiple fonts, font sizes, styles, text alignment, and integrated mail-merge. For more information about using 4D Write, refer to the documentation that comes with the 4D Write plug-in.

Date Fields

A Date field accepts any date entered in a standard month/day/year format (*MM/DD/YYYY*). 4th Dimension stores dates between the year 100 A.D. and the year 32,767. You can enter the year using either two or four digits. If you use two digits, 4th Dimension assumes the date is in the 20th century and adds "19" before the digits.

Note The default century can be changed programmatically using the command SET DEFAULT CENTURY.

The month, day, and year can be separated by any character except a number. Some example date entries are shown below. The results are shown in the format *MM/DD/YYYY*.

Entry	Result
6:23:95	6/23/1995
6/23/95	6/23/1995
6 23 1995	6/23/1995
6/23/1995	6/23/1995

Note The United States specifies dates in the month/day/year (*MM/DD/YYYY*) format. Other countries use different formats, such as *DD/MM/YYYY* for British systems and *YY/MM/DD* for Swedish systems. When entering dates in 4th Dimension, you should use the format specified by your operating system.

Time Fields

A time can be entered in 12- or 24-hour format. The time is stored in hours/minutes/seconds format (*HH:MM:SS*). The entries can be separated by any character except a number.

During data entry, 4th Dimension will attempt to interpret partial entries. For example, the entry "1 p" is interpreted as 1:00 PM or 13:00:00. The "p" tells 4th Dimension to add 12 hours to the value you enter. The entry "6 a" is interpreted as 6:00 AM or 6:00:00.
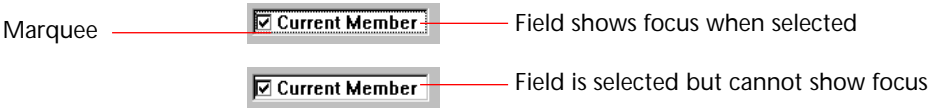
If you enter "36 3 7", 4th Dimension interprets the entry as "36 hours 3 minutes 7 seconds."

Some example time entries are as follows:

Entry	Result
11 a	11:00:00
3 p	15:00:00
3h 11m	3:11:00
23:43	23:43:00
6:00:05	6:00:05
23 8 6	23:08:06

Boolean Fields

A Boolean field takes on one of two values, TRUE or FALSE. A Boolean field is displayed as either a check box or a pair of radio buttons. Boolean fields can be in the data entry order. When a Boolean field is selected, it is outlined by a marquee (a border that surrounds the field)[1]. In the following illustration, the check box is outlined by a marquee.

Marquee —————— ☑ Current Member ———— Field shows focus when selected

☑ Current Member ———— Field is selected but cannot show focus

4th Dimension interprets a check box that has been selected (checked) as a yes (TRUE) value and an empty box as a no (FALSE) value. If a Boolean field is displayed as a pair of radio buttons, the value of the

1. The marquee appears if only the field is given the "Show Focus" property in the Form editor. Otherwise, it does not change its appearance when selected. You can click an enterable check box or radio button even if the field does not have the Show Focus property.

Boolean field is TRUE if the first radio button is selected. If the second radio button is selected, the value of the field is FALSE.

► To enter a value for a Boolean field displayed as a check box:

■ Click the check box to enter the value of TRUE for the field.

If there is a marquee surrounding the check box, you can press the Space bar to toggle between checked and unchecked or type "Y".

► To enter a value for a Boolean field displayed as a pair of radio buttons:

■ Click on either radio button.

If there is a marquee surrounding the radio button, you can press the Space bar to toggle between the two radio buttons or use the keyboard equivalents.

The first letters of the labels for the radio buttons can be used as keyboard equivalents. For example, if the radio buttons are labeled "Male" and "Female," you can use the "M" and "F" keys. Also, the "Y" and "N" keys can be used to enter values. Typing "Y" is equivalent to clicking the first radio button; typing "N" is equivalent to clicking the second radio button.

Picture Fields

A Picture field accepts bitmapped or object-oriented graphics.

► To enter a picture into a Picture field:

1 Copy the picture to the Clipboard.

2 Select the Picture field into which you want to paste the graphic.

Select the field either by clicking or by using the Tab key. A selected Picture field is inverted.

3 Choose Paste from the Edit menu.

Graphics stored in a Picture field appear in one of the following display formats specified by the database designer:

■ Truncated (Centered and Non-centered) The boundaries of the Picture field act like a "cookie cutter" on the graphic that you paste into the field. If the format of the field is Truncated (Centered), the picture is centered in the field and any portions that do not fit in the field are cropped. If the format of the field is Truncated (Non-centered), the upper-left corner of the picture is placed in the upper-left corner of the field and any portions that do not fit in the field are cropped.

Truncated
(Centered)

Truncated
(Non-centered)
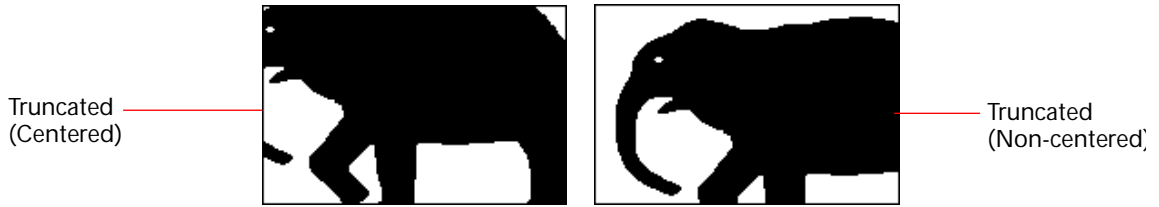
4th Dimension saves the entire picture, even if only a portion is shown on the input form.

If you print the form, only a portion of the picture will be printed unless the **Print with Variable Frame** check box has been selected for the Picture field. For more information about printing with variable frame, refer to the *4th Dimension Design Reference*.
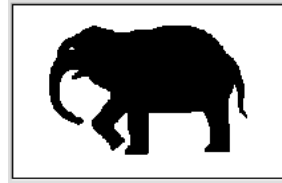
■ **Scaled to Fit** In this display format, 4th Dimension resizes the graphic to fit the dimensions of the field area. Because 4th Dimension may compress or elongate the graphic to fit the dimensions of the Picture field, the picture may appear distorted in the form.
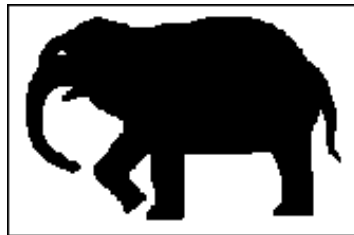
■ **Scaled to Fit (proportional and proportional centered)** In this display format, the picture pasted into the form is reduced proportionally on all sides to fit the area created for the picture. If the picture is smaller than the area defined in the form, the picture will not be modified. If you use Scaled to Fit Centered (Proportional) the image will be centered rather than occupying the top-left area. If the picture is bigger than the area defined in the form, the picture is proportionally reduced, and will not appear distorted.
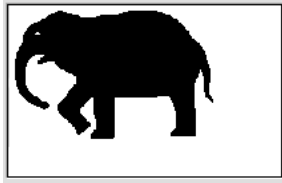
Scaled to fit (proportional)   Scaled to fit centered (proportional)

■ **On Background** In this display format, the graphic pasted into the form is transparent — any object behind the pasted graphic is visible through the graphic. When a picture is displayed in this format, you can move the pasted picture around the inside of the picture field by dragging it. 4th Dimension remembers the position of the picture after you save the record.
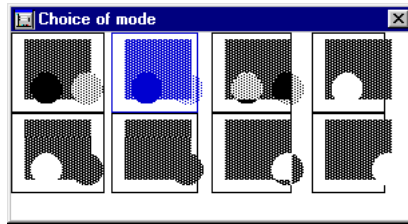
On Background
graphic
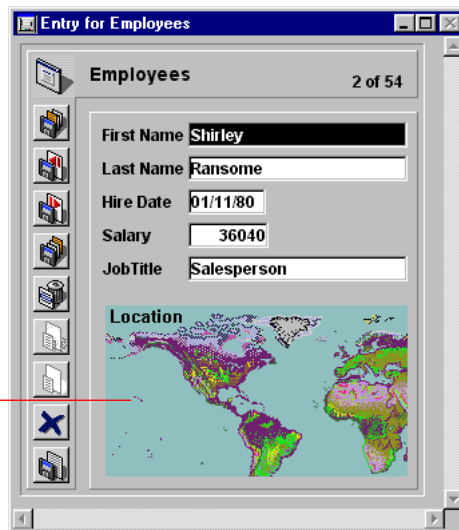
You can change the contrast between the picture and the background.

▶ To change the contrast of a background picture:

1 Double-click the field.

The Choice of Mode palette appears.

2 Select one of the contrasts from the palette.

4th Dimension applies the new contrast to the picture.

The following illustration shows the effect of each Choice of Mode selection. The examples are arranged in the same position as the buttons in the Choice of Mode palette. Each illustration shows how the picture field appears when it is *not* selected for data entry.

A variable that displays the name of the graphic is placed on top of the On Background picture.
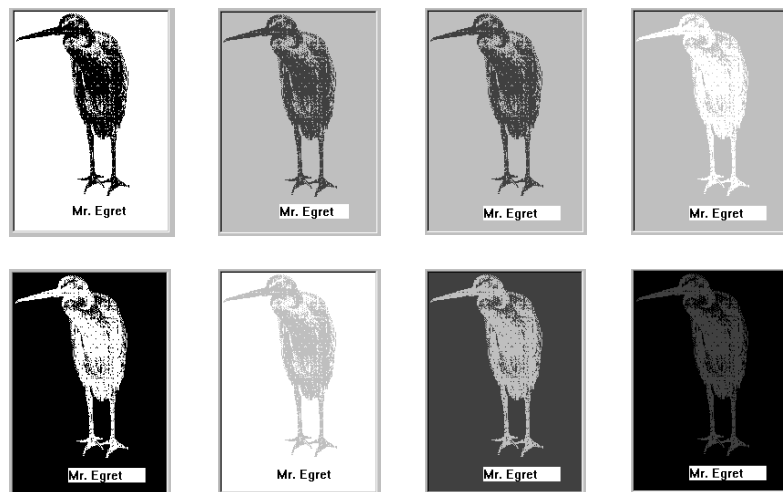
You can produce additional combinations by setting the foreground, background, and fill properties of the objects placed on top of or behind the On Background picture field.

Entering Data in Fields with Data Entry Controls

The database designer may have used certain standard data entry controls that restrict the values that can be entered into fields. The following standard data entry controls may be used:

■ Mandatory attribute,

■ Unique attribute,

■ Range of acceptable values,

■ Entry filters,

■ Choice lists.

These constraints affect the way in which 4th Dimension processes data and provide feedback to users. This section discusses how standard data entry controls affect data entry.

Note In addition, the database designer may enforce business rules programmatically. In this case, the nature of the data entry constraint and the type of feedback provided to the user is under the control of the database designer. For example, he or she can build in the same types of constraints but provide more specific user feedback or build highly customized constraints. See your system administrator for information on custom data entry constraints.

Mandatory Fields

Mandatory fields contain data that is essential to the database such as a field that uniquely identifies each record in a table. Any field type can be given the Mandatory attribute.

If a field is mandatory, you must enter a value for that field before the record can be accepted. If you do not enter a value into a mandatory field, 4th Dimension displays an alert box when you try to accept the record.

Note

The field LastName in table [People] is mandatory.

OK
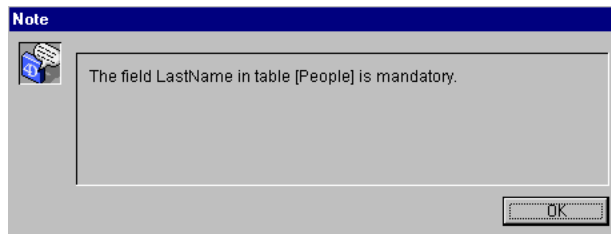
After you put away the alert box, you can enter a value into the mandatory field and accept the record. 4th Dimension will not let you accept the record until you have entered a value into the mandatory field.

Unique Fields

A field with the Unique attribute accepts only entries that uniquely identify each record in the table. For example, the Unique attribute is usually assigned to the primary key field of a table such as a Social Security number or invoice number field.

When you enter a value into a unique field and press the Tab key, 4th Dimension determines whether or not the entry is unique. If you enter a value that already exists, 4th Dimension displays an alert box that informs you that the value has already been entered. You can then enter a new value.

Note

This key already exists for the field LastName.

OK
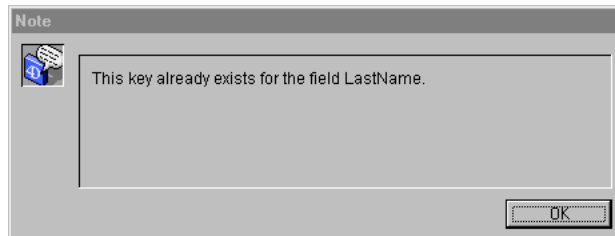
Note You cannot enter more than one record with a null value in a unique field.

Fields with a Validation Range

A validation range specifies the minimum and maximum values that may be entered in an area. If you enter a value above the maximum value or below the minimum value, 4th Dimension displays an alert box when you press the Tab key. The alert box will tell you the minimum or maximum value you have exceeded.

Note

The number must not be greater than 25000.

OK
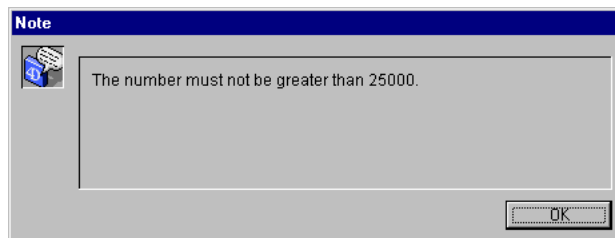
Fields with an Entry Filter

An entry filter is a data validation tool. It examines each character as it is typed. As you type, 4th Dimension compares each character you enter to the set of characters specified by the entry filter. If you type an invalid character, 4th Dimension rejects the character and does not display it on the screen. Invalid characters are disregarded and valid characters are displayed normally.

When a field with an entry filter is selected for data entry, the display format appears. In the following illustration, a telephone number field uses an entry filter and display format. The display format specifies parentheses surrounding the area code, a space after the closing parenthesis, and a dash between the third and fourth characters. The entry filter itself accepts only numeric characters.

When the field is selected, the first enterable position is highlighted. Notice that the parenthesis is for display only; it cannot be selected or edited.

Phone   (█) 000-0000

As you type numbers, 4th Dimension accepts your entries. If you type an alphabetic character, the character is filtered out. As you type each number, the next enterable position is highlighted.

Phone   (415) 55█-0000
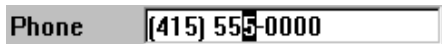
If you want to delete a character, press Backspace (Delete on Macintosh). An entry filter can also specify the maximum number of characters that can be entered in a particular field. When you enter the last character, the insertion point automatically moves to the next enterable area. You do not need to press the Tab key to move to the next field in the data entry order. For instance, entering a state abbreviation such as "CA" in a two-letter State field automatically moves the text insertion point to the next field in which you can enter data.

The cut, copy, and paste functions do not work normally if an entry filter is associated with an enterable area. You cannot cut or copy more than one character and you cannot paste into a field with an entry filter.

Fields with a Choice List

Moving the insertion point into a field with a choice list displays a list from which you can choose a value. The list is displayed in the Choice List window. An example Choice List window is shown below.
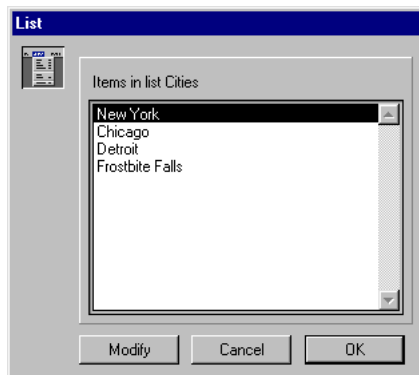
A choice list is often used to limit entries to specific values and prevent misspellings. For example, a Payment Type field in an Invoices database can be associated with a list of all the procedures used for payment.

A list can also be used to exclude values from a field or require that only certain values be entered. Excluded lists contain values that are not acceptable. If you type a value that appears on an excluded list, an alert box will be displayed indicating that the value you typed is not allowed.

▶ To enter data using a choice list:

1 **Select the field for data entry by pressing Tab or clicking in the field.**
   The choice list for the field appears.

2 **Double-click the desired item to select and enter the item.**
   OR

1 **Click the value you want to enter.**
   OR
   If the list is sorted, type an entry.
   OR
   Use the Up and Down Arrow keys to highlight values on the list.
   If you type an entry, the list scrolls to match the value you type.

2 **Press Enter on the alphanumeric keyboard (Return on Macintosh) to select a highlighted value.**
   To cancel the entry, click Cancel.

Modifying Choice Lists

A choice list can be designated as modifiable. If a list is modifiable, you can do the following:

- Add items to the list

- Modify items on the list

- Delete items

- Sort the list alphabetically

► To modify a choice list:

- **Click the Modify button.**
  The Items in List dialog box appears.
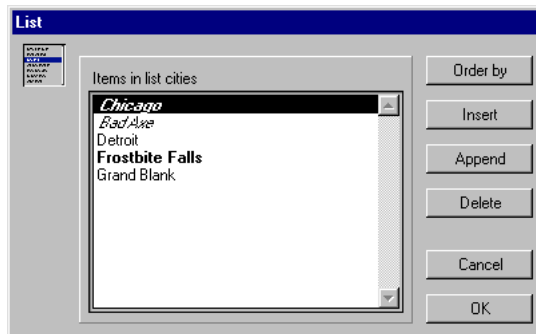
The dialog box lists the items on the list. The buttons on the right side of the dialog box are used to modify the list.

Adding Items

If the value you wish to enter is not on the list, you can add the item to the list. You should do so if the item will be used again.

► To add items to the end of the list:

1 **Click the Append button.**
  4th Dimension highlights the empty area below the last entry in the list and places the insertion point in the entry area.

2 **Type an item.**

Inserting Items   If you insert an item rather than appending it, you can place it above a selected element.

▶ To insert an item in the list:

1 Click an item on the list.

2 Click the Insert button.
   4th Dimension creates an entry area above the item you clicked on and places the insertion point in the entry area.

3 Type an item.

Modifying Items   You can also edit any item.

▶ To modify an item:

1 Ctrl+click (Command-click on Macintosh) the item you want to modify. The item becomes editable.

2 Edit the item as needed.

3 Press Tab or click outside the entry area to save your changes.

Deleting Items   You can delete an item that is not appropriate for data entry.

▶ To delete an item:

■ Click the item in the list and click the Delete button.
   4th Dimension deletes the item from the list and removes the space it occupied.

Sorting the List   You can sort the list to facilitate data entry.

▶ To sort the list:

■ Click the Order By button.
   4th Dimension sorts the list alphabetically. Sorting the list allows you to select an item by typing.

   Click OK to save the modified list, close the dialog box, and enter the selected item in the field. Or, click Cancel to discard any changes you made and close the dialog box.

Entering Data in Subforms

Some of your forms may contain subforms — forms from other tables or subtables that are nested within the current form. The current form in this context is sometimes called the *parent* form.

Subforms provide a way for you to add data to a subtable or to a related table without switching tables or forms. You can enter data into an subform in either of two ways:

■ List form You can enter multiple records directly in the subform area on the parent form. An subform that supports entry is called *enterable.*

■ Detail form You can also enter data using a Detail form belonging to the related table or subtable. A subform that supports this entry method is called *double-clickable.*

A subform can be both enterable and double-clickable. If a subform is both enterable and double-clickable, you can enter data directly in the subform or through an input form belonging to the related table or subtable.

Note A subform can also be *selectable.* If a subform is selectable, it cannot be enterable. You can select records in a selectable subform, but you cannot add or modify records in the List form.

▶ To enter data using the subform:

1 Select the subform area by clicking it or by tabbing into it.
   When an subform is selected, a flashing triangle points to it.

2 Click the Add to Subform button (if it is included on the form) or press Ctrl+/. On Macintosh, **press ⌘–Tab.**
   4th Dimension creates a new record or subrecord and selects the first empty field in the subform.

Add to subform
button
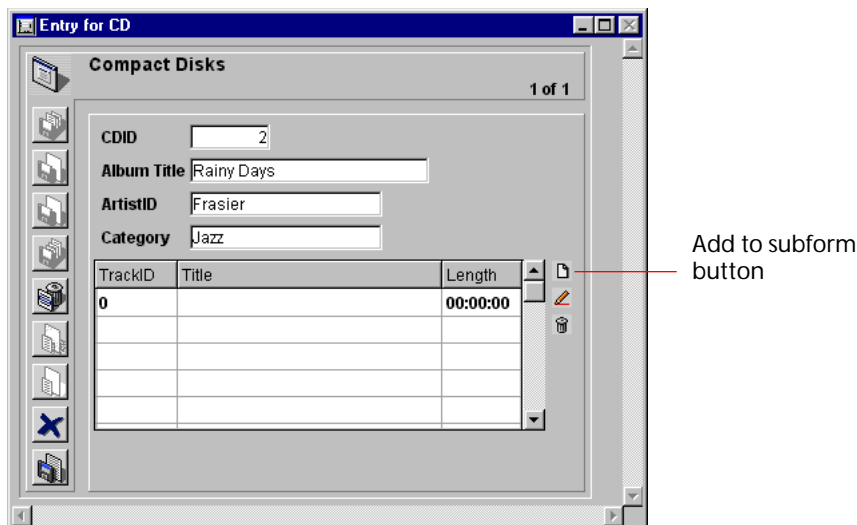
Ctrl+/ (⌘–Tab on Macintosh) is the default keyboard command for creating a record in a subform. If you wish, you can use Customizer Plus to change the keyboard command.

3 Enter data in the subform. Use the Tab key to move through the data entry order within the subform.

The new record in the subform is saved when you tab out of the subform or click another enterable area in the parent form. If the subform belongs to a subtable, the new subrecord is not saved until you accept the parent record.

4 If you want to create another record, press Ctrl+/ (⌘–Tab on Macintosh) again.

5 Click any field in the parent record to return to the parent form.

If the subform has a Detail form associated with it, you can enter data directly into the input form of the related table or subtable.

► To enter a new record using a Detail form:

1 **Double-click anywhere in the subform area below the last record displayed in the subform.**

   4th Dimension displays the input form for the subtable or related table. If the subform is not double-clickable, double-clicking does nothing.

Note You can also use a button in the parent form to display the detail form. For more information, see the description of the Open Subform button action in the *4th Dimension Design Reference.*

2 **Enter data in the Detail form as you would in any other input form.**

3 **Press Enter on the numeric keypad or click the Accept button to add the new record to the database and return to the parent form.**

► To modify a record using a Detail form:

1 **Double-click the record you want to modify.**

   4th Dimension displays the record using the Detail form.

   If the subform does not have a Detail form associated with it, double-clicking does nothing.

2 **Modify the record.**

3 **Press Enter on the numeric keypad or click the Accept button to save your modifications and return to the parent form.**

Choosing Tables and Forms

In the User environment, you can switch between tables whenever you need to work with data in another table. For example, while entering data into a company table, you may need to look up a home telephone number stored in an employee table.

Each table can have many forms attached to it. You can create different forms to meet specific needs. For example, different report forms can be used for different types of reports and different forms can be used for different monitor sizes. In the User environment, you can switch between tables and forms at any time.

Each table has a current input form and a current output form. You specify a default input form and a default output form in the Design environment for each table in the database. These forms are used

unless you specify different forms in the User environment. There are two ways of choosing tables and forms:

■ Using the Choose Table/Form menu item in the File menu

■ Using the List of Tables window.

These two methods can be used interchangeably. They carry out exactly the same functions. An advantage of Choose Table/Form is that it displays a thumbnail picture of the form. The List of Tables window is more convenient for switching tables or for switching forms when you do not need to view a thumbnail.

You can choose a new table or a new form while you are using either an input or an output form. Your choices are implemented immediately.

Note The changes you make are temporary. The permanent selections are made using the Explorer in the Design environment.

Using the Choose Table/Form Dialog Box

You can use the Choose Table/Form dialog box in two ways:

■ You can switch to another table and use the current input and output forms for that table.

■ You can select new input or output forms, for the current table or another table.

► To choose a table using the Choose Table/Form dialog box:

1 Choose Choose Table/Form from the File menu.

The Choose Table/Form dialog box appears, listing the names of the tables and forms in the database as a hierarchical list.
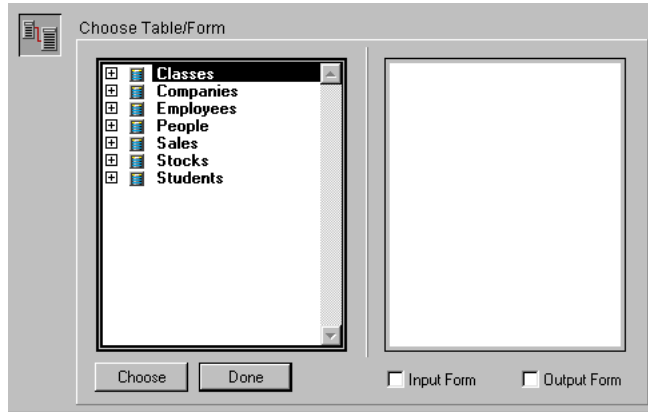
2 Select a table and click **Choose**.

4th Dimension displays the current selection of the new table in the current output form for that table.

► To select new input or output forms:

1 Choose **Choose Table/Form** from the File menu.

The Choose Table/Form dialog box appears, listing the names of the tables and forms in the database as a hierarchical list.

2 Click the plus sign (on Windows) or arrow (on Macintosh) to expand the desired table.

4th Dimension displays the forms belonging to that table. The current input and output forms are indicated by the "I" and "O" on the right of the hierarchical list of tables.

3 Highlight a form that you want to designate as the input or output form.

A preview of the form appears in the preview area on the right.
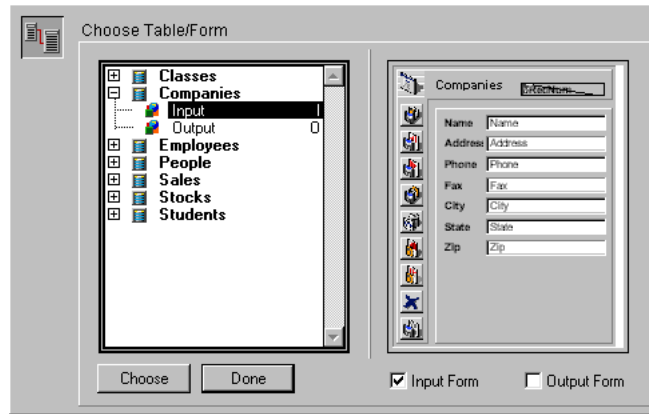
4 **Click the Input Form or Output Form check box below the preview area to designate the selected form as the current input or output form.**

An "I" or "O" appears to the right of the highlighted form name[1].

5 **Click the Choose button to change the current table and input or output forms.**

Your changes remain in effect until you change them again.

To cancel your changes and return to the form you were using previously, click the **Done** button.

Using the List of Tables Window

You can perform the same operations with the List of Tables window.

▶ To choose a table using the List of Tables window:

1 **If the List of Tables window is not visible, hold down the Ctrl key (⌘ key on Macintosh) and press the Space bar to bring it to the foreground.**

The List of Tables window moves to the front.

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1. If you click both Input and Output, the letter B appears, indicating that the form will be used for both purposes.

If necessary, use the scroll bar or the size box to view the names of additional tables.

Each table name in the List of Tables window is accompanied by two icons that represent input and output forms. The left icon represents input forms. The right icon represents output forms.

2 Click the name of the table in the List of Tables window.

4th Dimension displays the current selection for that table using the output form.

▶ To change forms:

1 Click either the input or output icons next to a table name in the List of Tables window and hold down the mouse button.

A pop-up menu appears, listing the names of all forms belonging to that table. An underline in the pop-up menu indicates the current input or output form.
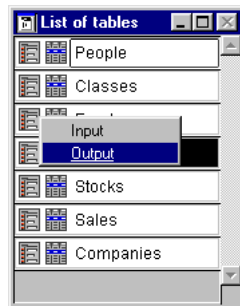
2 Select the name of the form you want to specify as the current input or output form.

▶ To hide the List of Tables window:

■ **Press Ctrl+Space bar (⌘–Space bar on Macintosh).**
The List of Tables window moves to the back.

4   Selecting Records

You select records in your database to access information that you want to use. For example, you might search a database of contacts to look up the telephone number of a person you need to call or to select the people to whom you want to send product information.

In 4th Dimension, the group of records you have selected is called the *current selection*. The current selection can be any subset of records in a table — from no records up to all the records. For more information about the concept of the current selection, see the section .

You can change the current selection by:

- Selecting all records
- Selecting a subset of records
- Searching for records

The current selection is the group of records on which operations are performed. For example, you can:

- Sort the current selection
- Perform a global update of records in the current selection
- Print the records using a form
- Print the records using a quick report
- Print labels
- Graph data
- Modify or delete records
- Export records

In other words, creating a current selection in a table is the first step in many other data management operations.

The title bar of the output form tells you how many records are in the current table and how many records from the table are in the current selection.

Table name

Number of records
in current selection

Number of
records in table

First Name		Last Name	Hire Date	Salary	JobTitle
Biff		Davis	01/02/80	43780	Salesperson
Lydia		Vernon	01/15/80	34373	Supervisor
Bryan		Pfaff	01/22/80	26440	Secretary
Jim		Borrell	01/22/80	36540	Salesperson
Kathy		Forbes	01/28/80	18840	Secretary
Garth		Hammons	02/06/80	50100	Salesperson
Alan		Hull	02/20/80	41460	Supervisor
George		Lyle	02/28/80	47900	Salesperson
Calvin		Margolis	03/20/80	52000	Salesperson
Laurence		Nanneman	04/01/80	55900	Salesperson
Jeff		Muldoon	04/30/80	50200	Salesperson
Steve		Baldwin	05/01/80	43990	Supervisor
Keith		Stephens	05/12/80	44790	Salesperson
Martin		LeVitus	06/05/80	47200	Salesperson
Jeff		Eubanks	06/23/80	29310	Secretary
Betsy		Ohren	06/24/80	35590	Supervisor
Harry		Conrad	06/25/80	35710	Salesperson

People: 22 of 53

People

Every table in a database has its own current selection. In a relational database, changing the current selection in one table can change the current selections in related tables. For example, in a database consisting of related [Employees] and [Departments] tables, a opening an input form in the [Departments] table changes the current selection in the [Employees] table. That is, the employees belonging to that department become the new current selection in the [Employees] table. For more information about relations, see the *4th Dimension Design Reference.*

If you are using several processes to perform database tasks, you can have several current selections for a table simultaneously. Each process acts like a separate 4th Dimension environment, allowing you to perform separate tasks.

The ability to have more than one current selection per table can be very useful, especially when comparing two or more subsets of records, such as the monthly invoices from several sales territories. For more information about processes, see the section "Multi-tasking in

4th Dimension" on page 7. For information about creating processes, refer to the *4th Dimension Design Reference.*

Selecting All Records

When using an output form to display records, you can reset the current selection so that it contains all the records in the current table.

▶ To select all records:

■ **Choose Show All from the Queries menu.**

All the records in the current table are placed in the current selection.

Note Show All is dimmed if you are using an input form.

Selecting a Subset of Records

You can create a new current selection directly in the output form by highlighting records and defining the highlighted records as the new current selection.

▶ To create a subset:

1 **Highlight one or more records.**

Instructions for highlighting a contiguous or discontiguous set of records is found in the section "Highlighting" on page 30.

2 **Choose Show Subset from the Queries menu.**

4th Dimension displays the new current selection in the output form.
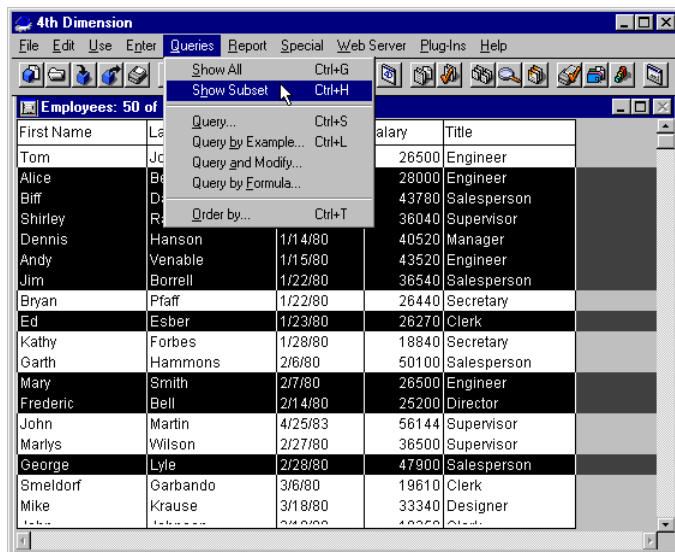
Searching the Database

Searching is one of the most common database operations. It is often the most convenient way to select the records with which you want to work.

The term *searching* refers to finding a group of records in the database based on the contents of one or more fields. You perform a search by specifying a query. A *query* is the set of instructions that tells 4th Dimension which records to include in the new current selection, such as "Company Name is equal to ACI".

A query always has three elements: *field name*, *comparison operator*, and *value*. The field name is from the current table or a related table. The comparison operator tells 4th Dimension how to compare the contents of the field to the value you specify (equal to, greater than, less than, and so forth). The value specifies the number, string, or other value to which each record is compared.

Suppose you want to see all the records for employees with salaries greater than $30,000. The query you would use is "Salary is greater than 30000." "Salary" is the field, "is greater than" is the comparison operator, and "30000" is the value.

When you search a database, 4th Dimension compares the contents of the field in the query to the value you specify. The new current selection is made up of records that satisfy the rules stated in the query. The new current selection can be no records, one record, a group of records, or all the records in the table.

You can perform a query while you are using either an input or an output form. If you perform a query while you are using an input form, the first record in the new current selection is shown in the input form. You can view, modify, or print the record. If the new current selection consists of more than one record, you can move through the records using the navigation buttons (Previous Record, Next Record, First Record, Last Record). If you modify a record before pressing a navigation button, 4th Dimension will save the modifications to disk.

In relational databases, you can search on fields from other tables, provided that a relation between the tables has been established. For more information about relations, see the *4th Dimension Design Reference.*

If you do the query while using an output form, the new current selection is displayed in the output form. You can reset the current selection to all the records in the current table by choosing Show All from the Queries menu.

Note If a field in the database structure is not used in the current database, the database designer can elect to hide the field by giving it the Invisible attribute. Only tables and fields which are visible appear in the Query editor. For information about making tables and fields invisible, refer to the *4th Dimension Design Reference.*

Indexed and Sequential Queries

4th Dimension can carry out queries very quickly if it has an ordered list of records to work from. An ordered list is called an *index.* An index is associated with a particular field and is stored on disk as part of the data file.

A query that is performed without an index is slower than an indexed query because the program must start at the beginning of the table and examine each record until it finds the records that meet the criteria you have set. To be sure that it has found all the records you are looking for, it must examine every record in the table sequentially. This process is called a *sequential* search.

If an index is available, the program "knows" where the target records are located. If you are searching for everyone whose last name is Smith, the program will know where in the table the Smiths are located. Thus, it doesn't need to examine every record in the table.

A good analogy for an index is a card catalog in a library. The card catalog is an alphabetized list of all the books in the library. Each record in the catalog contains information about where the book is physically located. If you are looking for a particular book, it would be very inefficient to conduct a sequential search of the library's entire holdings. It is much faster to consult the card catalog, obtain the location of the book, and then search the particular shelf on which the book is stored.

When you are designing a database, you should index the fields that you are likely to use often for searching. As you enter or import records, 4th Dimension automatically updates all indexes. When you do queries, 4th Dimension automatically uses indexes if they are available.

Note If you perform a search on a field that is currently being re-indexed by 4th Dimension, the search will be sequential.

Comparison Operators

When you write a query, you tell 4th Dimension how to compare the value you specify to the contents of the database. For example, the query, "Last Name equals 'Smith'" uses the "is equal to" comparison operator. It tells 4th Dimension to compare the values in the Last Name field to the string "Smith."

Comparisons involving alphanumeric values are not case-sensitive. A search on the last name "Smith" will find records containing "smith," "SMITH," "sMith," and so on.

The following comparison operators are available:

- Is equal to
- Is not equal to
- Is greater than
- Is greater than or equal to
- Is less than
- Is less than or equal to
- Contains

■ Does not contain

Note Queries using the Contains and Does Not Contain operators are always sequential queries.

The Wildcard Character

To make queries easier to specify, 4th Dimension has a wildcard character (@) that can replace one or more characters in a search involving an Alpha or Text field. For example, if you are looking for all occurrences of the name "Belmondo" in a field, you may specify the search value in several ways:

A search for:	Finds
Bel@	All values beginning with "Bel"
@do	All values ending with "do"
Bel@do	All values starting with "Bel" and ending with "do"
@elm@	All values containing "elm"

Wildcard queries are not case-sensitive. A search for "@F" is the same as a search for "@f".

Simple and Compound Queries

You can search on one or more fields. A query on one field is called a *simple* query. For example, the search "Last name equals 'Smith'" is a simple query. When you do a simple query, 4th Dimension examines the contents of one field when searching the database.

A query on two or more fields is called a *compound* query. When you do a compound query, you combine separate queries using a *conjunction operator*. The conjunction operator tells 4th Dimension how to combine the results of the individual queries. There are three conjunction operators:

■ **And** This operator finds all the records that meet two conditions simultaneously. For example, the query "Find all the employees who work in the engineering department *and* who make over $50,000" will find the records of only those engineering employees who make over $50,000.

■ **Or** This operator finds all the records that meet either of two simple queries. For example, the query "Find all the employees who work in the engineering department *or* who make over $50,000" will find the records of all the people in the engineering department, as well as all

the people who make over $50,000 regardless of the department in which they work.

- **Except** This operator is the equivalent of "not." The query "Find all the engineers *except* those who make over $50,000" will exclude the engineers making more than $50,000.

The conjunction operators let you create compound queries such as "Find the salespeople in New York *or* California *and* who have commission rates in excess of 30 per cent *and* who had sales volume less than $20,000."

The figure below shows this query being specified in the Query editor.
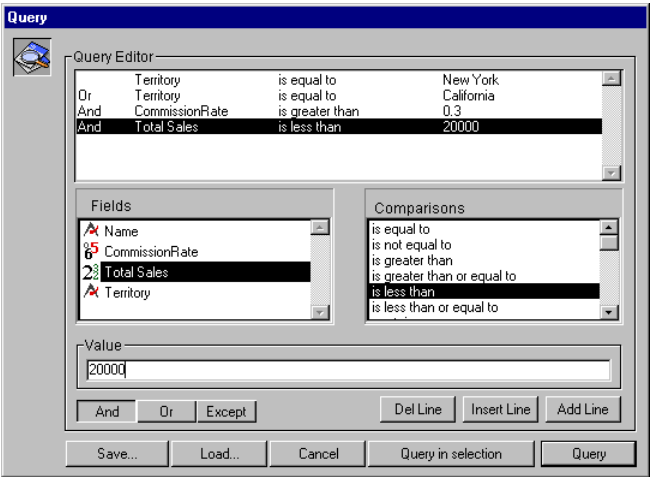
When this query is executed, 4th Dimension finds all the New York and California salespeople who may be getting high commissions for low volume sales.

Additional examples of the uses of comparison and conjunction operators are given for each search method.

Using the Queries Menu Commands

4th Dimension provides several powerful methods for searching a database. You can use any of the search methods to create a query. Records that meet the condition become the new current selection.

You can choose any search method when you are using either an input or an output form.

```
Show All          Ctrl+G
Show Subset       Ctrl+H

Query...          Ctrl+S
Query by Example... Ctrl+L
Query and Modify...
Query by Formula...

Order by...       Ctrl+T
```

The Queries menu provides four menu commands related to searching. Each menu command displays a different dialog box or window or provides different options. They differ in the types of queries they carry out and the way in which the current selection is displayed.

The four menu commands represent four different search methods:

■ **Query** This menu command displays the Query editor. It is a general-purpose search dialog box that can be used to perform simple or compound queries. You can specify compound queries using the conjunctions. You can also save queries to disk and restrict the query to the current selection.

■ **Query by Example** This menu command displays the current input form for use as a search window. You specify a query by typing the values for which you want to search in the areas corresponding to the fields to be searched. You can specify compound queries by typing values into more than one area. The results of your query are displayed in the current output form.

■ **Query and Modify** This menu command also displays the current input form for use as a search window. You specify a query by typing the values for which you want to search in the areas corresponding to the fields to be searched. You can specify compound queries by typing values into more than one area. Unlike Query by Example, the results of your query are displayed in the current input form.

■ **Query by Formula** This menu command displays the Formula editor. You use the Formula editor to construct a query that uses a formula as the query. For example, you can use Query by Formula to search on the last three digits of a six-digit part number. A valid formula returns a Boolean expression (TRUE or FALSE).

Query Editor

The Query editor is a general-purpose editor that can be used to create simple or compound queries:

- You can create compound searches linked with the And, Or, or Except conjunctions. For example, you can use the Query editor to perform a query for all employees who are over 60 years old *or* who have an income in excess of $45,000.

- You have the choice of searching through the current selection of records or all the records in the table. The other three search methods always search the entire table.

- You can save queries to disk and open them when you want to repeat the query.

- The Query editor remembers your last query. You can edit the query or clear it and enter a new query.

You can search on fields in the current table and fields in related tables. You can also search on subfields in the current table or subfields in related tables.

If your database includes subtables, you can use subfields in your queries. A query on subrecords creates a new current selection of parent records, not subrecords. This group of parent records contain at least one subrecord that meets the query. However, the query does not remove the other subrecords from the parent record. All subrecords stay attached to their parent records.

Suppose a database for employees includes a subtable for information about employee children. The fields in the subtable, called subfields, are First Name, Middle Name, and Last Name. To find all the employees with a child named John involves searching the subrecords for John in the First Name subfield. 4th Dimension finds all the parent records with at least one subrecord with the name "John" in the first name subfield. In this case, the selection contains the parent records — not just the subrecords themselves.

If your database includes related tables, you can include fields from related tables in your query. A query on a field in a related Many table works like a search of subrecords. The new current selection in the One table consists of all records that are related to at least one record in the Many table that meets the query. Queries on related tables are always sequential, even if the field being searched on is indexed.

For example, if employees are stored in the One table and children are stored in a related Many table instead of a subtable, a query for employees with children named John would produce the same current selection of employees.

The Query editor is shown below.
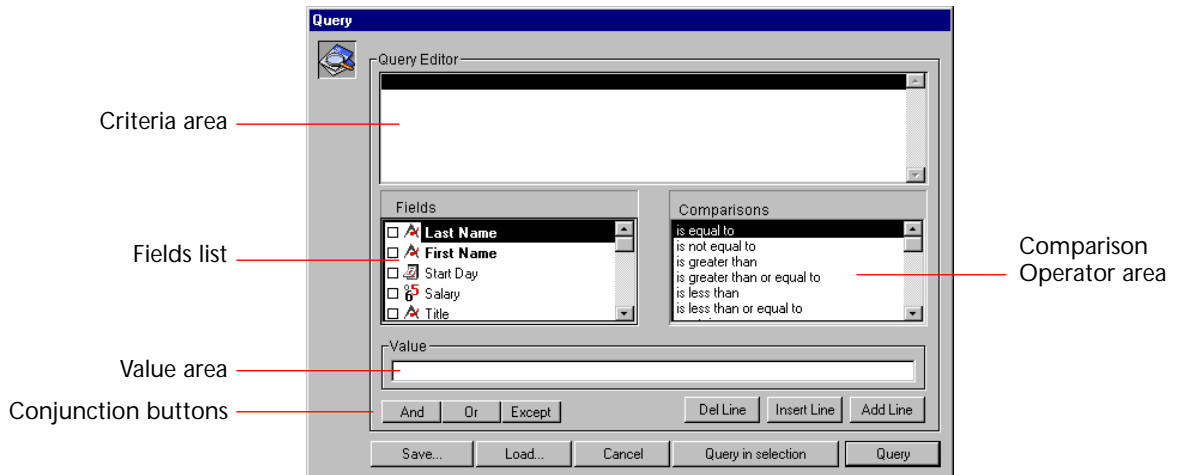
The Query editor contains the following areas:

- **Criteria area** This area displays the query as you create it or after you load it from a disk file.

- **Fields list** This area displays a hierarchical list of the fields in the current table. Indexed fields are shown in boldface. If there are related tables, the foreign key fields in the current table can be expanded to display the fields in the related tables.

- **Comparison Operator area** This area displays a list of comparison operators.

- **Conjunction buttons** This area contains three buttons that correspond to conjunction operators you can use to join the current simple query to the previous simple query.

- **Value area** You enter the value for which you want to search in this area.

- **Query in selection button** This button performs the query only on the records in the current selection.

■ **Query editor buttons** You use this area to save your queries, load other queries from disk, cancel the query, or execute the query.

▶ To create a query:

1 Choose Query from the Queries menu.

4th Dimension displays the Query editor, highlighting the first row of the Criteria area.

2 Click a field name in the Fields list[1].

4th Dimension displays the field name in the Criteria area and adds the "is equal to" comparison operator, as shown below.

Field name
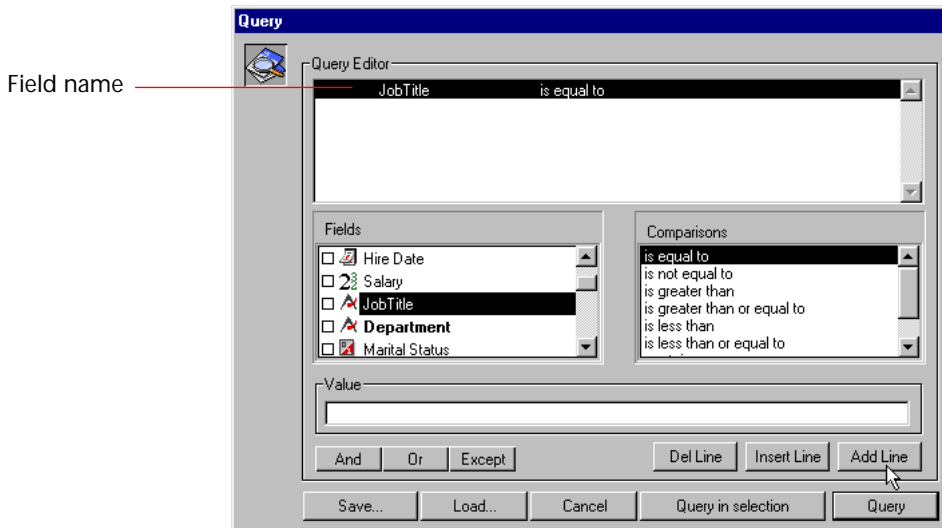
3 If you don't want to use the "is equal to" operator, click the desired comparison operator.

---

1. If the desired field is in a related table, you need display the fields in the related table. See the section "Selecting a Field from Another Table" on page 77.
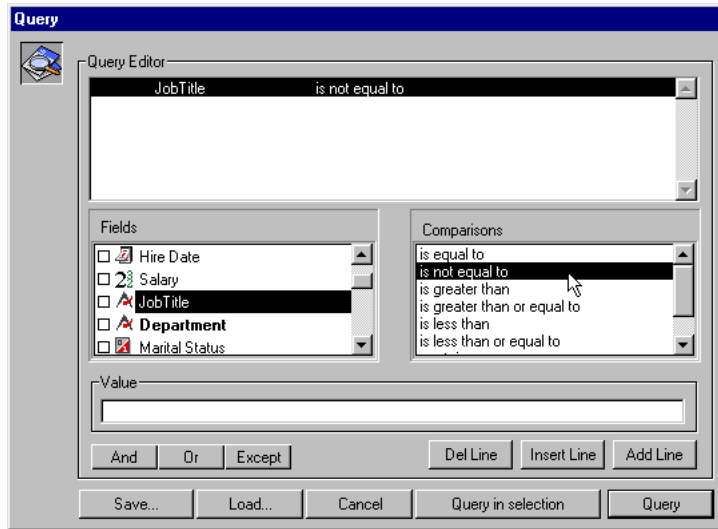
Your choices are:

- Is equal to
- Is not equal to
- Is greater than
- Is greater than or equal to
- Is less than
- Is less than or equal to
- Contains (Alpha and Text fields only)
- Does not contain (Alpha and Text fields only)

If you want to use the "starts with" comparison (on Alpha or Text fields only), see the section "Using the "Begins With" Operator" on page 77.

4 **Type the value for which you want to search in the Value area.**

Value ————

Query

Query Editor

| JobTitle | is equal to | Engineer |

Fields

- ☐ First Name
- ☐ **Last Name**
- ☐ Hire Date
- ☐ Salary
- ☐ JobTitle

Comparisons

- is equal to
- is not equal to
- is greater than
- is greater than or equal to
- is less than
- is less than or equal to

Value

| Engineer |

| And | Or | Except | | Del Line | Insert Line | Add Line |

| Save... | Load... | Cancel | Query in selection | Query |
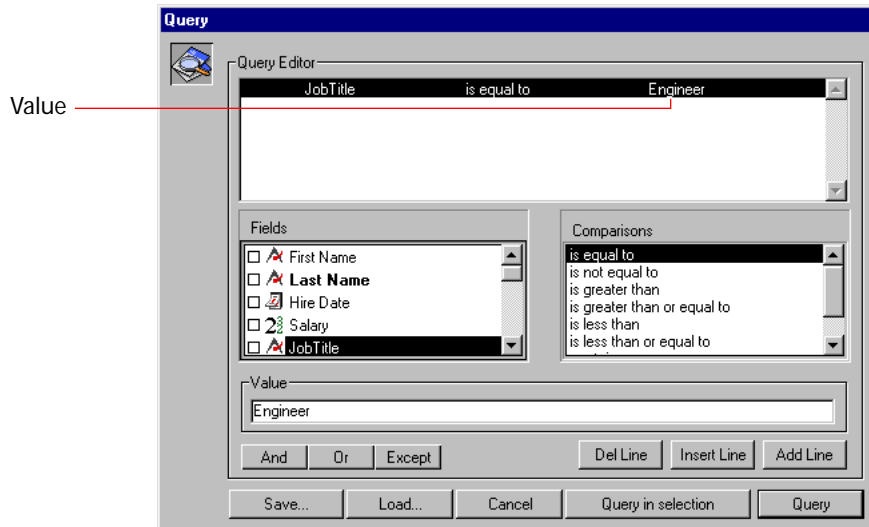
In a Text or Alpha field you can use the wildcard character (@) at the end of the value to request a "Begins with" search.

If the field you selected is associated with a choice list, 4th Dimension displays the list and prompts you to select a value. If the field you selected is a Boolean field, 4th Dimension displays a pair of radio buttons. If the field you selected is a subtable, a window listing the subfields is displayed.

5 **If you want to add another simple query, click Add Line.**

4th Dimension adds a new line using the "And" conjunction operator.

6 **If you want to use the "Or" or "Except" operator, click the desired conjunction operator button.**

Repeat steps 2 through 4 to build the second simple query.
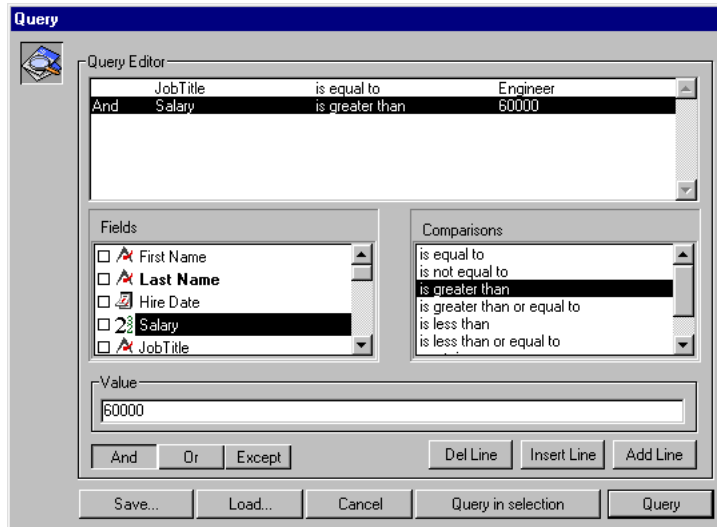
When you build a compound query, 4th Dimension evaluates the simple queries in the order in which they appear in the Query editor (i.e., from top to bottom). There is no precedence among the conjunctions. That is, *And* doesn't have priority over *Or*. Thus, if you use more than two simple queries in building the compound query, the order in which you enter the simple queries can affect the results of the query.

If you need to add a third simple query, you can choose to either add the condition to the existing compound query or insert the new simple query between the first two simple queries. To add the new query to the end of the existing queries, click Add Line. To insert the new query, highlight the last query and click Insert Line. The new query is inserted above the line you highlighted. The following illustration shows the results of clicking Insert Line.
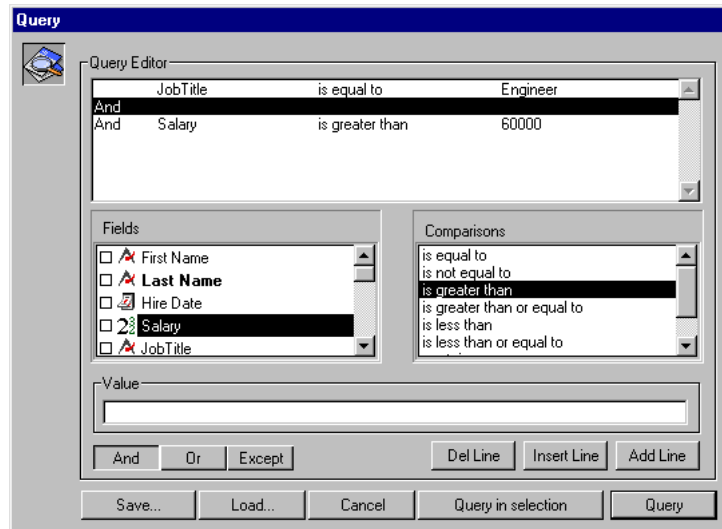
As you build the compound query, you can modify existing parts of the query by clicking the line you want to change and clicking a new field or operator or typing a new value. For example, if you decided to replace the Salary search field with the Department field, you would select the second line and click the Department field.

You can remove a simple query by selecting the line and clicking **Del Line**. In a compound search condition, you can remove one line of the condition by clicking the **Del Line** button.

7 **To save the query to disk, click the Save button and enter a filename in the create-file dialog box.**

You do not need to save your query to perform the search.

8 **Click Query to search the entire table.**
   OR
   Query in Selection to restrict the query to the current selection.

Click the **Cancel** button to put away the Query editor without doing a query.

Selecting a Field from Another Table

You can use the Query editor to search on related tables and subtables. If the field you want to search on is in a related table, expand the foreign key field in the master table to display fields from the related table. The following illustration shows an expanded foreign key field.

▶ To select a field from another table:

1 Expand the foreign key field by clicking the plus sign (on Windows) or arrow (on Macintosh) in the hierarchical list of fields.

The fields belonging to the related table appear in the hierarchical list.

Foreign key field

Fields in related table
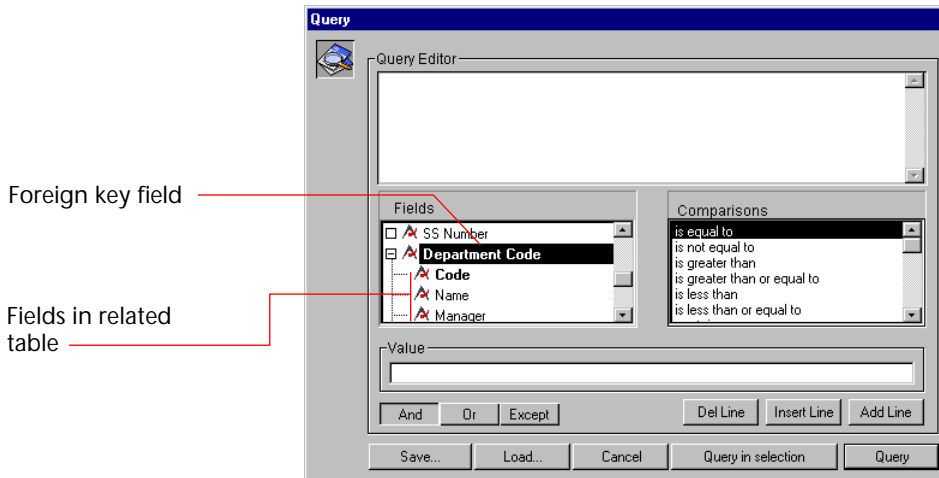
2 Click the desired field in the related table.

3 Follow steps 3 through 7 at the beginning of this section for directions on creating the rest of the query.

Using the "Begins With" Operator

If you want to search for records that begin with a specified string, use the "is equal to" operator and enter the wildcard character ("@") at the end of the value to search for. For example, if you want to search for companies whose names begin with the string "Frame", you would use the following query:
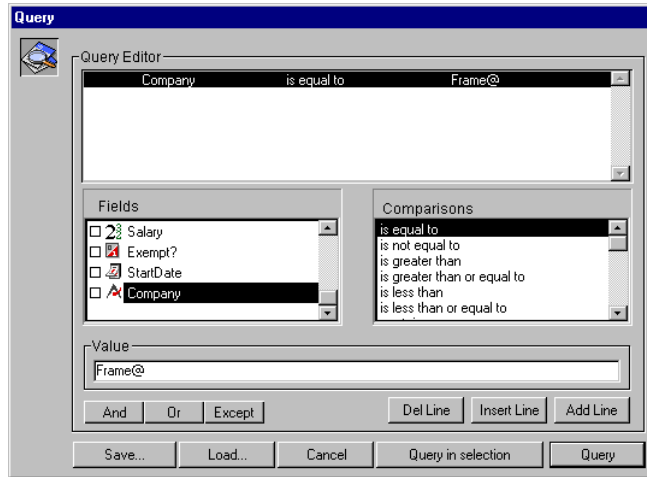
Saving a Query to Disk   If you perform a query often, you may want to save the query to disk. When you save queries to disk, you need to create it only once. In subsequent uses of the Query editor, you simply load the query from disk and click **Query** or **Query in Selection** to perform the query.

▶ To save a query to disk:

1 Click the Save button.

4th Dimension displays a save-file dialog box where you can enter a filename.

2 Click OK.

The query is saved to disk. The next time that you want to perform this query, you need only load the query into the Query editor.

Loading a Saved Query   You can reuse a saved query at any time.

▶ To load a saved query:

1 Click the Load button.

4th Dimension displays an open-file dialog box.

2 Open the desired file.

4th Dimension loads your query into the Query editor. When you load a file, it replaces the query that previously appeared in the Query editor.

Query by Example The Query by Example option is a convenient way to perform many queries. In this type of query, you use the current input form to enter values on which to search. You can search only on fields in the current table. Query by Example performs both indexed and sequential queries.

You can enter a value in a single field or you can specify a compound query by entering values into more than one field. If you do a compound query, Query by Example uses the *And* conjunction operator.
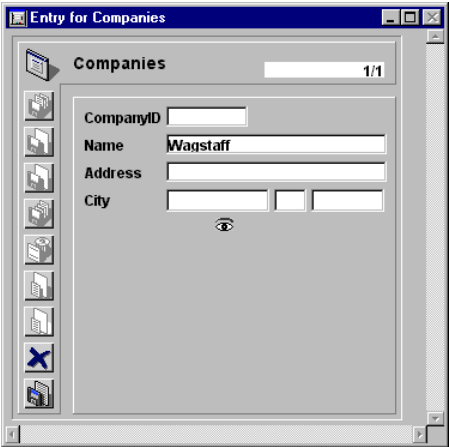
The Query by Example window shown is just an example. Your current input form is always used as the Query by Example window. You can control the appearance of the Query by Example window by changing the current input form using either of the methods described in Chapter 3.

You can use comparison operators in Query by Example. For example, to use the "is equal to" comparison operator, enter the value to be searched on in the appropriate field. If you need a different comparison operator, precede the value with one of the following signs:

Comparison	Operator Sign	Example
is not equal to	#	#Marketing
is greater than	>	>30000
is greater than or equal to	>=	>=30000
is less than	<	<30000
is less than or equal to	<=	<=30000

You can request a "Begins with" query by placing the wildcard character (@) after the value to be searched for. The following figure shows the Query by Example window being used to search for all companies whose names begin with "S".
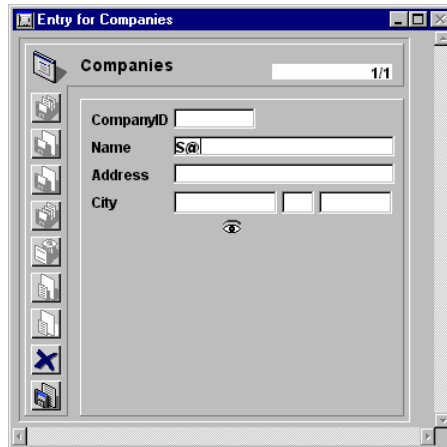
You can create a compound query by typing values into more than one field. If you enter a compound query, the *And* conjunction is assumed (e.g., "Name starts with "S" *and* is in California"). The following Query by Example window illustrates a compound query.

▶ To use Query by Example:

1 **Choose Query by Example from the Queries menu.**

   4th Dimension displays the input form for the current table as a query-by-example window.

2   Enter a value to search for in a field.

For example, to find records for everyone with the last name "Smith," you would enter "Smith" in the Last Name field.

To use a comparison operator, precede the value by the comparison operator. To do a "begins with" search, follow the value by the "@" symbol.

3   To perform a compound query, enter values in additional fields.

4th Dimension uses the *And* conjunction if you enter values for more than one field.

4   Click the Accept button or press the Enter key on the numeric keypad to do the query.

To cancel the query, click the Cancel button or press Ctrl+Period (⌘–Period on Macintosh).

Query and Modify

The Query and Modify command is intended for quickly finding and modifying records. Like Query by Example, it uses the current input form as a query window. You specify the query in exactly the same manner as with Query by Example.

When a record or selection of records is found, 4th Dimension displays the first record in the input form for modification.When you accept the record, you are returned to the output form.

▶   To use Query and Modify:

1   Choose Query and Modify from the Queries menu.

4th Dimension displays the current input form as a query window.

2   Click the entry area for the first field on which you want to search.

3   Enter a value in the criteria entry area.

For example, to find records for everyone with the last name "Smith," you would enter "Smith" in the Last Name field.

To use a comparison operator, precede the value by the comparison operator. To do a "begins with" query, follow the value by the "@" symbol.

4   To perform a compound query, enter values in additional fields.

4th Dimension uses the *And* conjunction if you enter values for more than one field.

For Alpha fields, you can also use the wildcard character (@) to perform a "Begins with" search. For example, entering "ACME@" in the

Company area requests a search of all companies whose name begins with ACME.

5   Click the Accept button or press the Enter key on the numeric keypad to begin the search.

To cancel the query, click the Cancel button or press Ctrl+Period (⌘–Period on Macintosh).

4th Dimension performs the query, sets the current selection, and displays the first record that meets the search criteria in the input form.

6   Modify the records using standard text editing methods.

7   Click the navigation icons to move to other records in the current selection.
OR
Click the Accept button or press the Enter key on the numeric keypad to accept the modified record and return to the output form.

4th Dimension saves each record as you move to another record.

Click the Cancel button to end the editing session — you do not have to modify every record in the current selection.

4th Dimension displays the output form.

Query by Formula

Use the Query by Formula editor to find records based on the results of a calculation or data manipulation. You use the Formula editor to write the expression on which the query will be performed. The expression you write must equal either TRUE or FALSE for each record. You can use any function in the language or any user-written function in a formula.

The Query by Formula command is useful for writing queries that involve operations such as the following:

■ Performing operations or evaluations on alphanumeric strings

■ Searching on the results of date computations

■ Searching on the results of arithmetic computations

Here are some examples of the uses of the Query by Formula editor.

▼ The following formula is used to search for records in which the last seven characters of the Phone number field is equal to "2524444."

Substring (Phone number;4;7) ="2524444"

▼ The following formula finds people born on the current date regardless of year:

(**Day of** (**Current date**) = **Day of** (Birthdate)) &
(**Month of** (**Current date**) = **Month of** (Birthdate))

▼ The following formula divides annual sales by the cost of living and finds records whose calculated value is greater than 1,000:

(Annual Sales / CostOfLiving) > 1000

However, the formula

Annual Sales / CostOfLiving

is incorrect because it returns a numeric value, not TRUE or FALSE.

Formula Length

You can only write formulas that are one logical line long. That is, you cannot press the **Enter** key on the keyboard (**Return** key on Macintosh) and write a second line. The editing area, however, will wrap to the next line if the statement is too long.

If you need to use a formula that is more than one line, write it as a project method and use the project method in the formula.

Using the Char Function

If you are searching for a character using the Char function, you must use Macintosh ASCII codes. For a detailed discussion of the Char function, and a list of Macintosh and Windows ASCII codes, refer to the *4th Dimension Language Reference.*

Saving Formulas

You can save formulas to disk and load saved formulas into the Formula editor.

Using the Query by Formula Editor

The Query by Formula editor enables you to create and use formulas to retrieve records. The following figure shows a query (search) formula in the Formula editor.
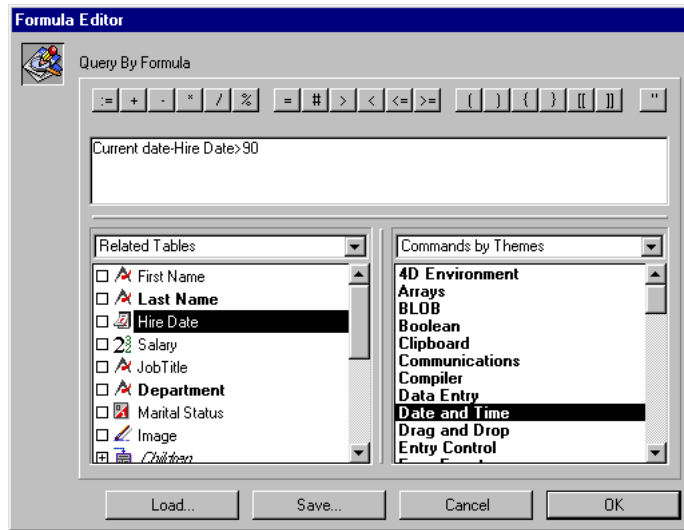
For a detailed description of the Formula editor, see the section "Global Updates" on page 92.

► To use the Query by Formula editor:

1 **Choose Query by Formula from the Queries menu.**

2 **Use the Formula editor to build a formula.**
   OR
   Select the name of a user-written function from the Routines area.
   OR
   Click the Load button to retrieve an existing formula from disk.

   If you build a formula in the Formula editor, you can either type your function or select operators, fields, and functions from the panels at the bottom of the editor. You can drag and drop fields, commands, and keywords from their lists into the Formula editing area.

3 If you click the **Load** button, 4th Dimension displays an open-file dialog box where you can select a file. When you load a file, it replaces any formula that appears in the Formula editor.

► To save a new formula to disk:

1 **Click the Save button.**
   4th Dimension displays a dialog box and asks you to enter a filename for the new formula.

2 **Click OK to save the formula.**

5 Working with Records

This chapter discusses the major operations you perform when working with data. This includes the following:

- Adding records
- Modifying records
- Updating records
- Deleting records

After you create a database in the Design environment, you can switch to the User environment and begin adding records. To add records to the database, you need only to create a table and one or more fields. You can then switch to the User environment, begin entering data, and return to the Design environment to add tables, fields, forms, methods, or make any other changes you like.

After adding records to your database, you usually will need to modify the information. If you need to modify one or more records, you can use one of the record selection methods described in Chapter 4 to display the records. You can then modify the records using either the input or output form.

Sometimes you need to make exactly the same change to a group of records in a table. This is called a *global update.* In 4th Dimension, you can update the current selection of a table automatically — without having to make the change to each record individually.

You may also find that you need to delete one or more records. You can delete a record if you discover the record is outdated or irrelevant. If the record is needed but the values stored in the record are no longer correct, you should modify the record rather than deleting it.

You can delete the current record from an input form or you can delete a subset of records in the current selection using the output form.

Adding New Records

You can add records using either an input or an output form. For a description of the basic operations you use to work with input and output forms, see Chapter 3.

Input Forms

To add a new record using an input form:

1 Choose New Record from the Enter menu.

You can choose **New Record** while you are using either an input or an output form.

4th Dimension displays a blank input form and places the insertion point in the first enterable area in the form.

2 Enter data into the first enterable area.

3 Press Tab.

4th Dimension moves the insertion point to the next enterable area.

4 Enter data into this area.

5 Press Tab.

Repeat the process of entering data into each enterable area until all data for that record has been entered.

When you have finished entering data and are satisfied with the values you have entered, you can accept the record.

6 **Press the Enter key on the numeric keypad or click the Enter button on the input form to accept the record.**

By accepting the record, you are requesting that 4$^{\text{th}}$ Dimension add the record to the database stored on disk.

After you press enter, a new blank input form is displayed.

7 **Repeat the data entry process until you want to stop.**

8 **When you finish entering data, click the Cancel button on the form or press Ctrl+Period (⌘–Period on Macintosh) when the next blank record is displayed.**

Either of these actions displays the output form.

Output Forms

You can also add records from the Output form using Enter in List mode.

▶ To add a new record using an output form:

1 **Choose Enter in List from the Enter menu.**

The fields in the current table become enterable. You cannot enter into variables, fields from other tables, or subforms.

2 **Choose New Record from the Enter menu or press the Enter key on the numeric keypad.**

An insertion point appears in the first field below the last record displayed in the output form.

3 **Type in the field and use the Tab key to move through the fields for that record.**

Souse's address being
entered in Enter in List
mode

Any data validation controls that are attached to the fields on the
output form will be used when you select those fields. For example, a
field with a choice list will display the choice list when you tab into
the field.

Note If the designer of the database has placed the data validation controls
only on the input form, use of Enter in List will bypass these controls.

4 Press the Enter key on the numeric keypad to save the new record and
create a new blank record.
OR
Click a field in another record.
4th Dimension accepts the entries in the record you added.

5 Choose Enter in List from the Enter menu to leave the Enter in List
mode.

Modifying Records

You modify records when you need to update information or when
you discover that the information originally entered is incorrect.
Before modifying a group of records, select the records to modify as the
current selection. You can search to select records for modification or
select the records after highlighting them in the output form. For
information about selecting records and searching the contents of a
database, refer to Chapter 4.

You can modify records using either the input or output form. The output form is convenient for modifying a group of records because several records are displayed at the same time. However, the output form typically does not include all the fields on the input form and may not duplicate the input form's data entry controls.

If a record is being modified in another process, the record is said to be *locked.* Locked records can be viewed, but they cannot be modified. If you open a locked record, you will be able to view the entries in the fields, but you will not be able to change any data. For a general description of processes, see the section "Multi-tasking in 4th Dimension" on page 7. For a more detailed discussion of what processes are and how to create them, refer to the *4th Dimension Design Reference.*

4D Server In 4D Server, record locking also occurs when a record is being modified by another user. If you open a record that is being used by another user or by another process, you will be able to view the contents of the record, but will be unable to modify it.

Input Forms

You ordinarily enter and modify data using input forms.

▶ To modify records using an input form:

1 **Double-click the record on the output form.**
OR
Highlight a record in the output form and choose Modify Record from the Enter menu.

4th Dimension displays the record in the default input form.

2 Select certain fields and edit, replace, or delete the values.

See Chapter 3 for more information about editing data.

Middle initial is
added to First
Name field ——————

3 Click the Enter button or press the Enter key on the numeric keypad to accept the modified record and return to the output form.
OR
Click a navigation button (Previous Record, First Record, Next Record, Last Record) to accept the record and move to another record in the current selection.

Clicking a navigation button moves between records in the current selection.

You can cancel your changes and return to the output form at any time by clicking the **Cancel** button or pressing **Ctrl+Period** (**Command–Period** on Macintosh).

Output Forms

You can modify the fields displayed on the output form using Enter in List.

▶ To modify records using an output form:

1 Choose Enter in List from the Enter menu.

The fields in the output form become enterable. A check mark appears next to Enter in List to indicate that the Enter in List mode is active.

2 Select a field and edit, replace, or delete the value.

When the Enter in List mode is active, double-clicking selects a field in a record rather than displaying the record in the input form.

Address field
selected

Note When you are in Enter in List mode, you can choose **Modify Record** from the **Enter** menu to modify the record in the input form.

3 **Type the new text and press Tab or the Enter key on the keyboard.**

In the example shown above, typing will replace the address with a new value. 4th Dimension saves your changes to a field when you press **Tab** or **Enter** (**Return** on Macintosh) and selects the next field.

4 **Continue modifying fields as needed.**

5 **Click a field in another record in the output form to modify another record.**
OR
Press the Enter key on the numeric keypad to accept the modified record and create a new blank record.

4th Dimension saves your modifications.

6 **Choose Enter in List from the Enter menu to leave the Enter in List mode.**

Global Updates

You do a global update when you want to make a specific change to a group of records. You perform a global update to automate changes to a group of records that would otherwise be tedious and time-consuming. For example, you would perform a global update if you wanted to do the following:

- Change all prices in an Inventory table by a certain percentage,

- Format a numeric or Alpha field.

  The global update is done by "applying" a formula to the current selection of records. That is, the formula is used to make the change to each record in the current selection.

  Here are some example formulas and explanations of the functions they perform.

▼ The following formula multiplies the Salary field by 1.05. It could be used when a salary increase goes into effect.

Salary := Salary * 1.05

▼ The following uses a built-in function to make the contents of the State field uppercase. It ensures uniformity in the way State appears in labels and reports.

State := **Uppercase** (State)

▼ This formula includes a user-written function that formats the Last Name field. It sets the initial letter of the Last Name field to uppercase and all the remaining letters to lowercase.

Last Name := *Capitalize* (Last Name)

The ability to include user-written functions when doing global updates is a powerful feature of 4th Dimension.

To perform a global update, you use the Formula editor to write a formula that is applied to each record in the current selection.

You can use 4th Dimension's built-in routines, user-written project methods, or plug-in functions to create formulas. For more information about creating functions, see the *4th Dimension Design Reference.* See the *4th Dimension Language Reference* for detailed information about programming syntax and functions.

The Formula Editor   The Formula editor provides many shortcuts for writing formulas. You can click field names, operators, and routines to add them to the formula.

Operators toolbar

Editing area

Tables drop-down list

Fields list

Routines list
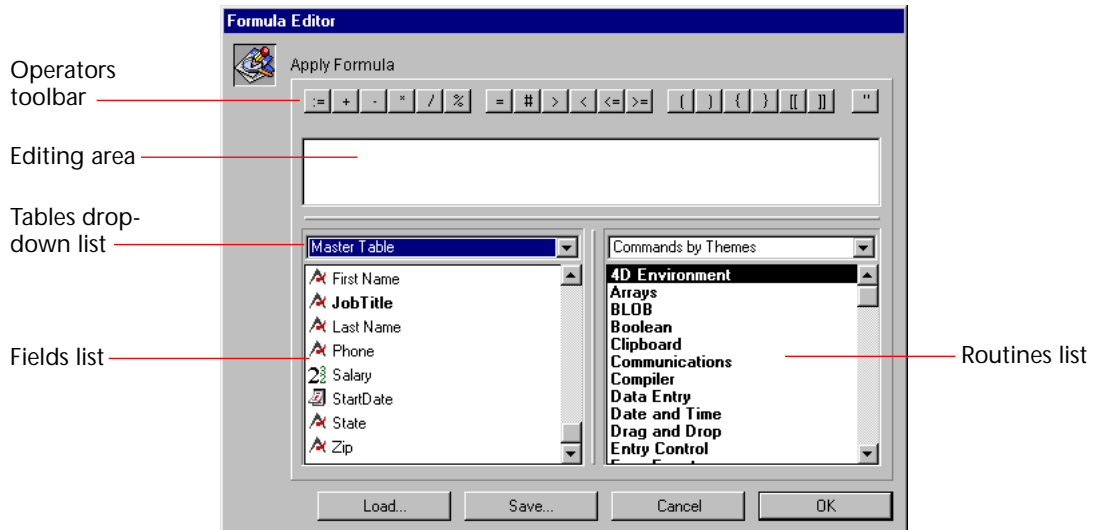
The Formula editor contains the following areas:

- **Editing area** This area displays the formula as you build and edit it. You create the formula in this area by either typing your function or selecting operators, fields, and functions from the toolbar or panels at the bottom of the editor. You can add a field to the Editing area by double-clicking or using drag and drop.

- **Operators toolbar** The toolbar contains a row of buttons that you can use to insert operators into a formula. See the *4th Dimension Language Reference* for a detailed discussion of operators. The operators are shown in the following illustration.

Keywords   Comparison operators   Braces   Quotes

Assignment	Equals	Parentheses
Addition	Not Equal To	Curved Brackets (Array elements)
Subtraction	Greater Than	Double Brackets (Char. Ref.)
Multiplication	Less Than	
Division	Less Than or Equal To	
Modulo	Greater Than or Equal To	
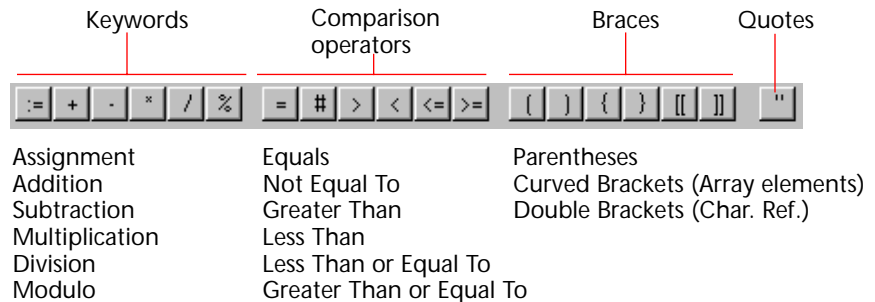
- **Tables drop-down list** This list controls the fields displayed in the Fields list. You can choose to display fields from:
  - **The Master table** Fields from the current table are displayed.
  - **Related tables** Fields from the current table are displayed in a hierarchical list. You can expand a foreign key field to display related fields.
  - **All tables** All tables and fields are displayed in a hierarchical list. You can expand any table to display the list of fields in that table.

- **Fields list** This area displays the names of tables and fields or fields in the master table. The information in the Fields list depends on the Tables drop-down list setting. The three options are shown in the following illustration:

Master table:
The fields in the master table are listed.
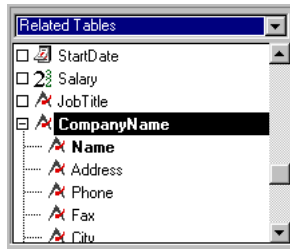
Related tables:
The fields in the master table are listed in a hierarchical list. A foreign key field can be expanded to show fields in a related table (as shown).

All tables:
All tables are shown in a hierarchical list. You can expand a table to display fields in that table (as shown).

Click the plus sign (on Windows) or arrow (on Macintosh) to expand a foreign key field to show the list of related fields.

Note Only visible fields appear in the Fields list. For information about making fields invisible, refer to the *4th Dimension Design Reference.*

- **Routines list** This area contains a list of drop-down menus or an alphabetical list of commands and user-written methods. Each drop-down menu lists a group of 4th Dimension functions and commands. The Routines list also displays the names of project methods and plug-in commands. These methods appear at the end of the list of drop-down menus.

  The pop-up menu above the Routines list controls whether the commands are grouped by theme or listed alphabetically. Use this menu to control the display in the Routines area. See the *4th Dimension*

Language Reference for a detailed discussion of 4th Dimension commands and functions.

- **Buttons area** This area contains buttons for saving your formula, loading a saved formula from disk, canceling an editing session, and applying the formula.

You can build a formula by clicking operators and commands. You double-click field names or add them to the editing area using drag and drop. When you click an item, it automatically appears in the Editing area, where you can modify it with standard cut, copy, and paste techniques. You can also type directly into the Editing area.

A formula can be only one logical line long. You cannot press **Enter** and type another line. But the formula can accept any user-written method. Your methods can be many lines long.

As you write the formula, the Formula editor performs basic syntax checking. If it finds an error, it displays the error message above the Editing area, as shown in the following illustration.

Error message ———
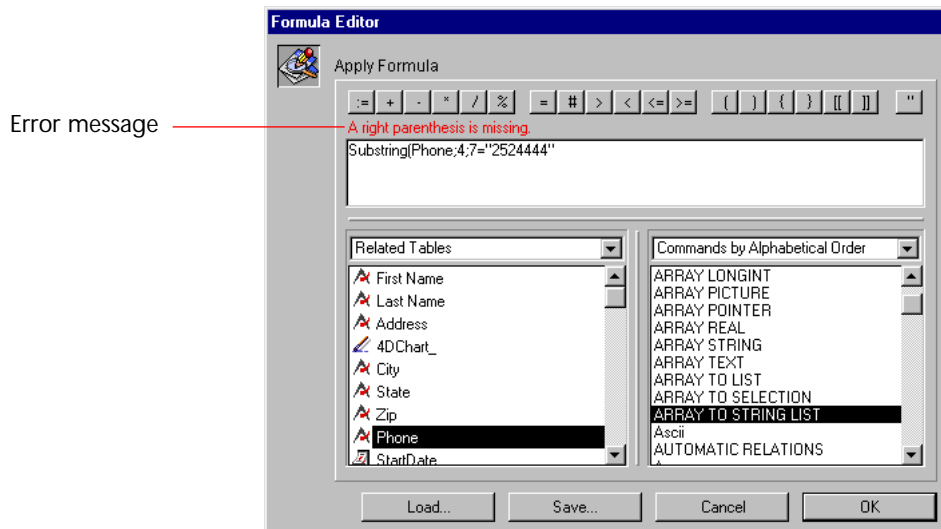
Correct the error before attempting to apply the formula to the current selection.

▶ To perform a global update:

1 **Set the current selection to the records to be updated.**

For more information about setting the current selection, refer to Chapter 4.

2 Choose Apply Formula from the Enter menu.

3 Use the Formula editor to build the formula.
   OR
   Click the Load button to retrieve an existing formula from disk.

   ■ To add a field to the formula, double-click a field name or drag the field name from the Fields list to the editing area. If the field is in a related table, first expand the foreign key field to display the list of related fields. A foreign key field has a plus sign (on Windows) or arrow (on Macintosh) indicating that it can be expanded.

   ■ To add an operator to the formula, click an operator button.

   ■ To add a command or project method to the formula, click the command or method.

   If you click the Load button, 4th Dimension displays an open-file dialog box and so that you can select a file. When you load a file, it replaces any formula that currently appears in the Formula editor.

   After you load a formula, you can modify it in the editing area.

4 If you want to save a new formula to disk, click the Save button.
   4th Dimension displays a create-file dialog box and asks you to name the file to store the new formula.

5 Click OK to apply the formula to the current selection.
   4th Dimension closes the editor and applies the formula to the records in the current selection.

   Click the Cancel button to close the editor and return to the output form without applying the formula.

Deleting Records

You may want to delete a record that is outdated or no longer necessary. If the record is needed but the values stored in the record are incorrect, you should modify the record rather than delete it.

You can delete records in two ways:

■ Delete records individually from the input form,

■ Delete a subset of records from the output form.

Deleting records is permanent and cannot be undone. When you delete records, 4th Dimension displays a dialog box asking you to confirm the deletion.

Deleting Records Using the Input Form
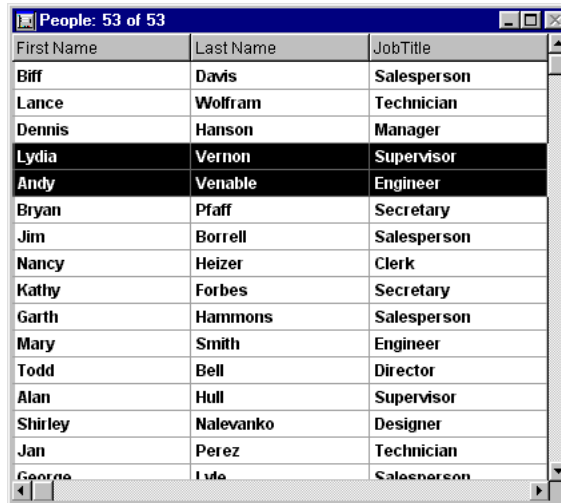
Deleting records from the input form lets you verify the contents of each record before you delete it.

▶ To delete records using the input form:

1 Use a query or a navigation button to display the record you want to delete.

2 Click the Delete button to delete the record.

Depending on the design of the input form, the Delete button may be represented in different ways.

When you click the Delete button, 4th Dimension asks you to confirm the deletion. You cannot undo the deletion after 4th Dimension removes the record.

3 Click the Yes button to complete the deletion.

4th Dimension removes the current record from the database and returns to the output form.

Deleting Records Using the Output Form

Using the output form, you can delete several records in one operation. If necessary, use one of the methods to select records that you want to delete. You can select records by clicking or by doing a query.

▶ To delete records using the output form:

1 Highlight the record or records that you want to delete.

First Name	Last Name	JobTitle
Biff	Davis	Salesperson
Lance	Wolfram	Technician
Dennis	Hanson	Manager
Lydia	Vernon	Supervisor
Andy	Venable	Engineer
Bryan	Pfaff	Secretary
Jim	Borrell	Salesperson
Nancy	Heizer	Clerk
Kathy	Forbes	Secretary
Garth	Hammons	Salesperson
Mary	Smith	Engineer
Todd	Bell	Director
Alan	Hull	Supervisor
Shirley	Nalevanko	Designer
Jan	Perez	Technician
George	Lyle	Salesperson

Note If you want to delete all the records in the table, choose **Show All** from the **Queries** menu and **Select All** from the **Edit** menu.

Highlighting records is described in the section "Highlighting" on page 30.

2 **Choose Clear from the Edit menu**.

4th Dimension displays a dialog box asking you to confirm the deletion. You cannot undo a deletion.

3 **Click the Yes button to complete the deletion**.

4th Dimension removes the highlighted record or records from the database.

To cancel the deletion, click the **No** button.

Deleting Locked Records

You cannot delete locked records. Records are locked when they are being used by another process. For instance, if a process opens a record for modification, 4th Dimension locks that record so that other processes cannot modify it.

4D Server Records are also locked when they are being used by another user.

Before deleting records, you create a selection of the records you want to delete. If your selection includes any locked records, the deletion will proceed but the locked records will not be deleted and will remain in the current selection after the deletion. You must wait until these records are unlocked (i.e., no longer being used) to delete them.

Records Deleted in Another Process

The current selection may be altered by records deleted in another process. For example, while you are working in your database, you might start another process that deletes certain records from a table. The records deleted in that process are permanently removed from the table. However, the records you see while working with the database in the User environment may not reflect those changes to the table until a new selection of records is created.

To illustrate this point, suppose that a table contains fifty records and that all of the records are in the current selection. At this point, the title bar of the output form says that "50 of 50" records are selected. If one of the records is deleted in another process, the title bar changes to say that "50 of 49" records are selected. There now appear to be more records in the current selection than in the table! The title bar will be updated when you change your current selection.

If you attempt to modify or delete the deleted record, a dialog box will appear saying that the record has been deleted.

4D Server Records deleted by another user have the same effect on the current selection. The records are deleted from the table, but not from the current selection. Thus, the current selection may appear to contain more records than actually exist in the table.

6   Sorting Records

A *sort* reorders records according to the values in the table. It is common to sort records:

■ To view records on screen in a particular order

■ Before printing a report or labels

■ Before graphing data

As you enter data into a new database, 4th Dimension stores the records in the order in which they are entered or imported. When you list records in an output form or print records, they appear in this order. Often, you want to view records in another order. For example, you might want to alphabetize a list of names in a report — a sort on the Last Name field reorders the records alphabetically by Last Name.

A sort can be done while you are using an input or an output form. If you sort from an input form, the first record in the new sort order is displayed in the input form. Otherwise, the sorted records are displayed in the output form.

4th Dimension conducts indexed sorts very quickly. If you are sorting on only one field and that field is indexed, 4th Dimension uses the index.

Sort Levels

You can sort records on up to 30 different fields or formulas. Each field or formula you sort on is referred to as a *sort level*. For example, the results of a two-level ascending sort on the last name and first name fields would produce a list such as this:

Aardvark, Anthony
Aardvark, Artemis
Aardvark, Arthur
.
.
.
Zygote, Elena
Zymosian, Elmer

When sorting the contents of fields, 4th Dimension is not case sensitive (i.e., "Smith" = "smith") or diacritical sensitive (i.e., "Aá" = "Aa").

Note If you are using an international version of 4th Dimension and your operating system is diacritical sensitive (e.g., "Aá" ≠ "Aa"), sorting operations will also take diacritical marks into account.

Ascending and Descending Order

You can specify either an ascending or descending order for each field or formula that you are sorting on. Sorting from A to Z or smallest to largest is known as an *ascending sort*. Sorting in the reverse order is called a *descending sort* — largest to smallest, latest to earliest, and Z to A.

If you are sorting on more than one level, you can freely mix ascending and descending sort orders. A multiple-level sort can mix fields and formulas and ascending and descending sort orders.

The Order By Editor

You use the **Order By** command in the **Queries** menu to sort the records in the current selection. Sorting the current selection changes the order in which records are displayed or printed. This is a temporary sort; it does not affect the order in which the records are stored on disk.

When you choose **Order By**, the Order By editor enables you to specify the sort you want to perform.

Fields list ———

Indexed fields shown in bold ———

Subfield ———
Foreign key field ———

Sort area ———
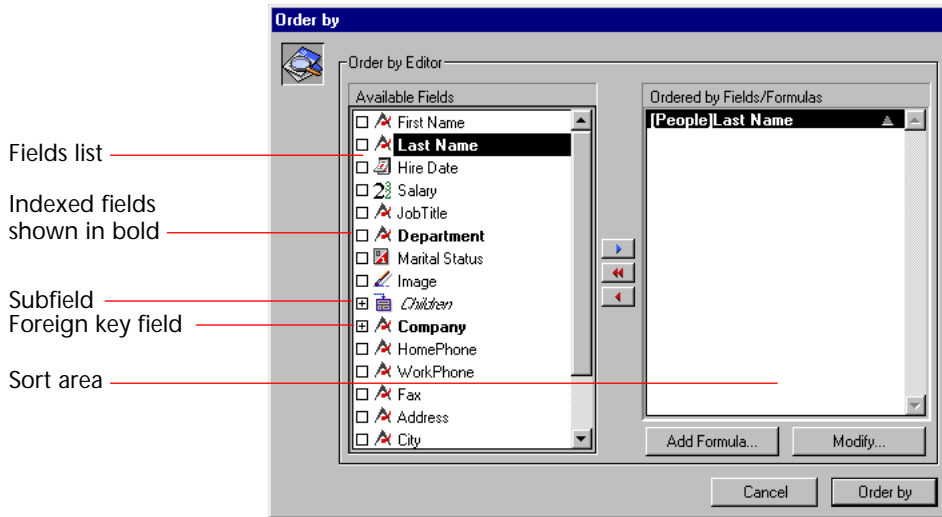
The Order By editor contains the following areas:

■ **Fields list** This area displays a hierarchical list of fields in the current table. Indexed fields are shown in boldface. You can sort on fields from subtables and related tables (provided the relation is automatic). To use a field from a related table or subtable, expand a foreign key field by clicking on the plus sign (on Windows) or arrow (on Macintosh) to display the fields from the related table.

Note   Only tables and fields that are visible appear in the Order By editor. For information about making tables or fields invisible, refer to the *4th Dimension Design Reference*.

■ **Sort area** This area displays the sort fields or sort formulas and the direction of each sort. The arrows on the right of this area are used to specify an ascending or descending sort.

■ **Add Formula button** You use the **Add Formula** button to write a formula as one of the sort criteria. You use a formula when you want to sort on something that is not a field — such as a calculated value or a portion of a field. For instance, you might sort on a calculated failure rate for parts or on the last four digits of a Part Number field.

■ **Button panel** The Button panel has buttons for adding or removing fields from the Sort list.

Adds selected field to Sort list

Removes all fields from Sort list

Removes selected field from Sort list

■ **Modify button** When you click the **Modify** button, it displays the selected sort criterion in the Formula editor. If the selected criterion is a formula, the formula is presented for editing. If the criterion is a field, the field name appears in the editing window of the Formula editor.

■ **Cancel button** You use this button to cancel the sort and return to the form you were using.

■ **Order By button** You use this button to perform the sort.

Note The Quick Report editor can sort records that appear in a quick report. For more information about the Quick Report editor, see Chapter 8.

Sorting a Selection

Use the **Order By** menu command to sort the current selection of records. This sort is temporary and applies only to the current selection; it does not affect the order in which records are stored in the database. The **Order By** command is commonly used immediately after a query and before printing a report or labels.

▶ To sort the current selection:

1 Choose Order by from the Queries menu.
   4th Dimension displays the Order By editor.

2 Double-click the name of a field on which you want to sort.
   OR
   Drag the field name from the Fields list to the Sort area.

OR

To sort on a formula, click the Add Formula button.

When you open the Order By editor, the Fields list displays the fields from the master table. You can choose fields from related tables or sub-tables by expanding a foreign key field or subtable field.

If you clicked the **Add Formula** button, 4th Dimension displays the Formula editor. For information on writing a formula, see the section "Sorting on a Formula" on page 106.

The field name or formula appears with a sort direction arrow in the Criteria area.

3 **If necessary, click the sort direction arrow in the Sort area to switch between ascending and descending sort order.**

Up is ascending; down is descending.

4 **If necessary, repeat steps 2 and 3 to add secondary sort levels to the list.**

For each sort level, you can specify ascending or descending order.
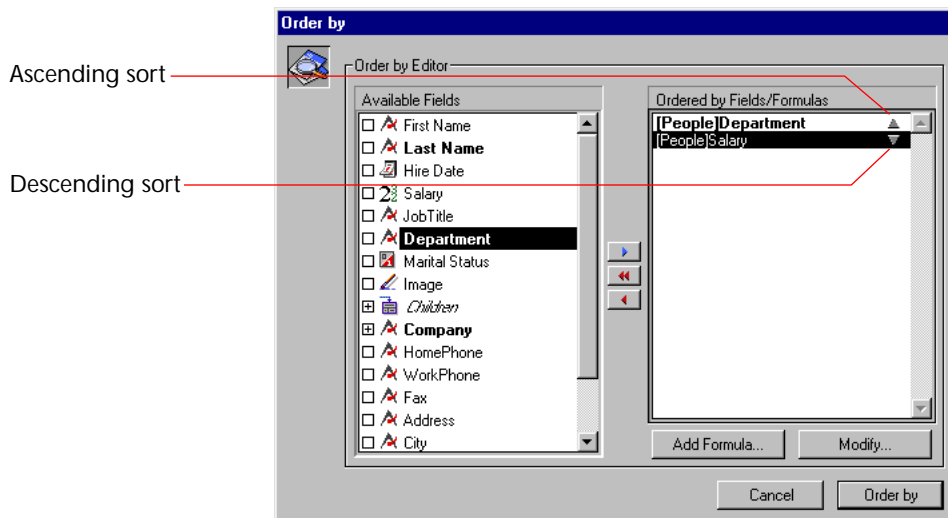
For example, the sort order shown requests a listing of employees sorted by department. Within each department, the employees are sorted by salary, with the highest salary first.

5 **Click the Order By button.**

4th Dimension sorts the current selection. If you are using an input form, the first record in the sorted current selection is displayed.

Sorting on a Formula

You can sort on a field or on a formula. For example, the following formula sorts on the month of a birth date field.

Month of (Birth Date)

▶ To create a sort formula:

1 **In the Order By editor, click the Add Formula button.**

4th Dimension displays the Formula editor.

You use the Formula editor to create a formula that returns the values to sort on. The formula can return values of any data type. For more information about how to use the Formula editor, see the section "Global Updates" on page 92.

2 **Click OK when you are finished writing the formula.**

4th Dimension displays the formula in the Sort area.

The formula appears with a sort direction arrow in the Sort area.

Modifying a Sort Order

You can remove or reorder fields or formulas in the Sort area.

■ **Removing a field or formula** To remove a field or formula, highlight the field or formula in the Sort area and click the **Remove** button or press **Backspace** (Delete on Macintosh). To remove all fields or formulas, click the **Remove All** button .

■ **Reordering the sort criteria** To reorder fields or formulas in the Sort area, drag the field or formula up or down.

Sorting While a Record Is Being Modified

If a record in the current selection is being modified in another process at the same time that you are performing a sort, 4th Dimension uses the last saved value of the field in the sort.

For example, if an employee's job title is in the process of being changed from "Engineer" to "Staff Engineer" while you are sorting on Job Title, the employee record will still be listed as "Engineer" and sorted with the engineer records. If you were to perform the sort again, after the record has been modified and saved, the new job title would be used and the employee record would be sorted as a staff engineer.

4D Server The last saved value of a field is also used if a record in the current selection is being modified by another user. If the sort is performed again, after the other user has finished modifying the record, the newly saved value of the field is used.

Sorting While an Index Is Being Built

Sorting on an indexed field is extremely rapid, as the values for the field have already been organized by 4th Dimension. However, if the index for a field is being built or rebuilt at the same time that you are performing a sort on the field, 4th Dimension will be unable to use the index and the sort will be sequential.

7　Form Reports

One of the major functions of a database is to produce reports. In 4th Dimension, you can produce a report using either a form or using the Quick Report editor. This chapter explains how to print a report using a form.

There are several advantages to using a form for a report: you can use graphic elements on the form, you can control the placement of report elements precisely, you can use methods to perform calculations, and you can use headers to identify each subsection of a break report.

You can use a form to create reports that:

■ Require a non-columnar format

■ Display subforms

■ Include picture fields

■ Contain embedded graphics

■ Require special graphic elements, such as hairlines

Chapter 8 discusses designing and printing reports using the Quick Report editor. The Quick Report editor is excellent for printing tabular reports that use a standard columnar format.

This chapter assumes that you have already created a form for the report. For information about designing output forms for reports, see the *4th Dimension Design Reference.*

Standard Reports and Reports with Breaks

There are two kinds of reports that can be printed using output forms, standard reports and reports with breaks. When you create a standard report, you simply print the current selection using a form. Reports with breaks separate records into groups. To create a report with breaks, you must sort the current selection before printing.

Printing Standard Reports

4th Dimension prints the records in the current selection. Set the current selection to the subset of records you want to print. If you want the report to list the records in a particular order, sort the current selection before printing the report.

▶ To print a standard report:

1 **Select the records to be included in the report. If desired, sort the records.**

Selecting records is discussed in Chapter 4 and sorting records is discussed in Chapter 6.

2 **Choose Print from the File menu.**

The Print Form dialog box appears.
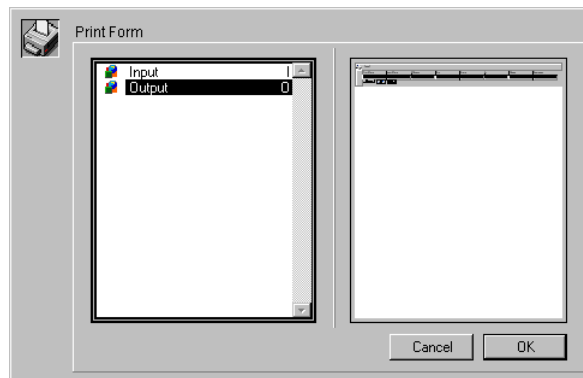
3 **Choose the form you want to use.**

You can choose a form by clicking on it, using the arrow keys, or by typing the first letter of a form name.

When you click on a form, a preview appears in the preview area.

4 **Click OK or press Enter (Return on Macintosh).**

4th Dimension displays the Page Setup dialog box for your selected printer. Choose any desired options and click OK.

4th Dimension displays the Print dialog box for the printer you selected in the Print Manager. To preview the report on the screen, check the Preview on Screen check box.

If you checked the Preview on Screen check box, the report will be displayed on screen, one page at a time. The figure below shows a report previewed on screen.

Print button —
Stop button —
Next and previous page buttons —
Zoom button —
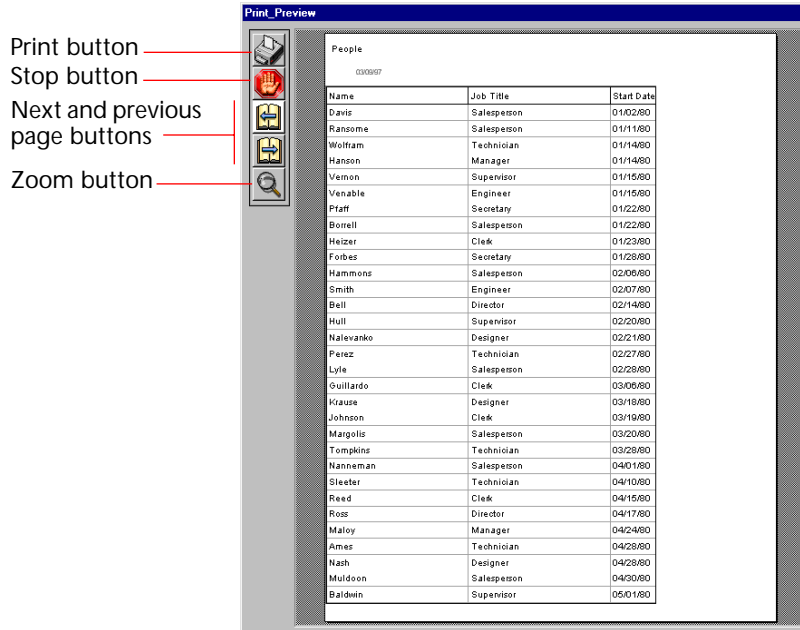
When a page of the report is being previewed, you can do the following:

■ View a close up of the report by clicking the Zoom button. When you use Zoom, you can move around the page by dragging the hand pointer.

■ View the next page of the report by clicking the Next Page button.

■ Print the page being previewed by clicking the Print button.

If you did not check the Preview on Screen check box, the report will be sent to the printer you selected in the Print Manager (Chooser on Macintosh).

Printing Reports with Break Levels

Break levels are used to separate records into groups and print summary calculations for each group. The output form used to print a report with break levels must contain at least one break area. For information about designing output forms with break levels, see the *4th Dimension Design Reference.*

If your report includes break levels, you must sort the current selection before printing. When sorting records for a report with break levels, you normally sort on at least one more sort level than the number of break levels in your output form. If your report has one break level, use at least two sort levels. For example, if your report lists employees by department, the report has one break level (Departments).

You can sort on your break field (Department Name) and one more field — Last Name. Employees will be listed alphabetically by last name within each department.

Header area ——————

Break Header area ——

Detail area ———————

Break area ——————

Total area ——————

Footer area ——————

Consumer Products Employees
Date: 6/8/89   Time: 5:43 PM

Accounting

Name	Title	Salary
Baldwin, Steve	Supervisor	$43,990
Johnson, John	Clerk	$18,250

Total Salaries for Accounting $62,240

Transportation

Name	Title	Salary
Bentley, Alice	Engineer	$28,000
Garbando, Smeldorf	Clerk	$19,610

Total Salaries for Transportation $47,610

Total Salaries for Company $109,850

Salaries by Department   Page: 1

When you print a report with break levels, you must turn on break processing. Break processing causes 4th Dimension to break the records into groups and compute summary calculations.

There are two ways to turn on break processing. If an object on the form uses the Subtotal function, break processing is turned on automatically. Break processing can also be turned on by executing a method when the report is printed. The method must contain two commands, ACCUMULATE and BREAK LEVEL. For more information about using these commands in a method, refer to those commands in the *4th Dimension Language Reference.*

For information about how to use the Subtotal function in output forms, see the *4th Dimension Design Reference.*

▶ To print a report with breaks:

1 Select the records to be included in the report.

Selecting records is discussed in Chapter 4.

2 Sort the records by at least one more level than the number of breaks in the report.

Sorting records is discussed in Chapter 6.

3 Execute the method that turns on break processing.

Note This step can be skipped if the output form turns on break processing automatically by using the Subtotal function.

4 Choose Print from the File menu.

The Print Form dialog box appears.

5 Choose the form you want to use.

6 Click OK.

4th Dimension displays the Page Setup dialog box for your selected printer. Choose any desired options and click OK.

4th Dimension displays the Print dialog box for your selected printer. To preview the report on the screen, check the Preview on Screen check box.

If you checked the Preview on Screen check box, the report will be displayed on screen, one page at a time. See the description of the options available for previewing a report in the section "Printing Standard Reports" on page 110.

If you did not check the Preview on Screen check box, the report will be sent to the printer you selected in the Print Manager (Chooser on Macintosh). A dialog box keeps you informed of the progress of the operation.

8   Quick Reports

One of the most important tasks in data management is report generation. The Quick Report editor is one of two tools used to design reports. You use the Quick Report editor to create ad-hoc reports in the User environment. The other tool is the Form editor, which you can use to design reports in the Design environment. You should use an output form to design reports that require complex designs, programmatic processing, or graphics.

With the Quick Report editor, you can:

- Produce lists of records
- Create break areas
- Compute summary calculations
- Use fonts and styles in the report
- Save quick report designs to disk

The Quick Report editor produces reports from the current selection of records. Before you print a report, set the current selection to the records you want to include in your report, using one of the methods described in Chapter 4. The following is a typical quick report.

First Name	Last Name	Department Name	Salary
Biff	Davis	Accounting	43780
Smeldorf	Garbando		19610
Alan	Hull		41460
Bryan	Pfaff		26440
Shirley	Ransome		36040
Marlys	Wilson		36500
		Sum for Department : Accounting	203830
Kathy	Forbes	Engineering	18840
Dennis	Hanson		40520
Mary	Smith		55000
Andy	Venable		43520
Lance	Wolfram		27300
		Sum for Department : Engineering	185180

Quick Report Basics

This section describes basic operations used when working with the Quick Report editor to design a report.

Creating a New Quick Report

The Quick Report editor lets you create reports in the User environment.

▶ To design a quick report:

■ Choose Quick from the Report menu.

4th Dimension displays the Quick Report editor. If an existing report design is displayed, choose New from the File menu to begin a new Quick Report design.

Loading and Saving a Quick Report Design

You can save a quick report design as a file that you can open from the Quick Report editor. The quick report design includes all of your specifications for the report, but not the data. By saving report designs, you can maintain a library of quick report designs that you can use depending on your needs.

Note If you do not save your design, it is displayed the next time you open the Quick Report editor in that worksession only.

▶ To save a quick report design:

1 Choose Save from the File menu.

4th Dimension displays a create-file dialog box in which you can name the quick report design.

Note Quick report files in 4th Dimension for Windows are denoted by the file extension .4QR.

2 Enter a filename for the quick report and click OK.

4th Dimension saves the report as a file that you can open with the Quick Report editor. You can save the file on any available hard disk.

Saving a previously saved or loaded report replaces the old report.

Loading a Quick Report Design

When the Quick Report editor is open, you can load a saved design and use it to print a new report. You can use the same quick report design repeatedly to print different selections of records.

▶ To load a report design:

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

4th Dimension displays an open-file dialog box displaying a list of available quick report designs.

2 **Double-click a filename or select a filename from the list and click OK.**

4th Dimension replaces the current report design with the design you opened.

The Quick Report Editor

When you create a quick report, you can specify the following:

■ Columns that display fields or formulas, either from the current table or from related tables

■ Sort levels and order

■ Break levels

■ Summary calculations

■ Text for labels

■ Formats for numeric and Boolean data

■ Font, font size, style, and justification for labels, summary calculations, and data

■ Page headers and footers

The following illustration shows the major elements of the Quick Report editor.
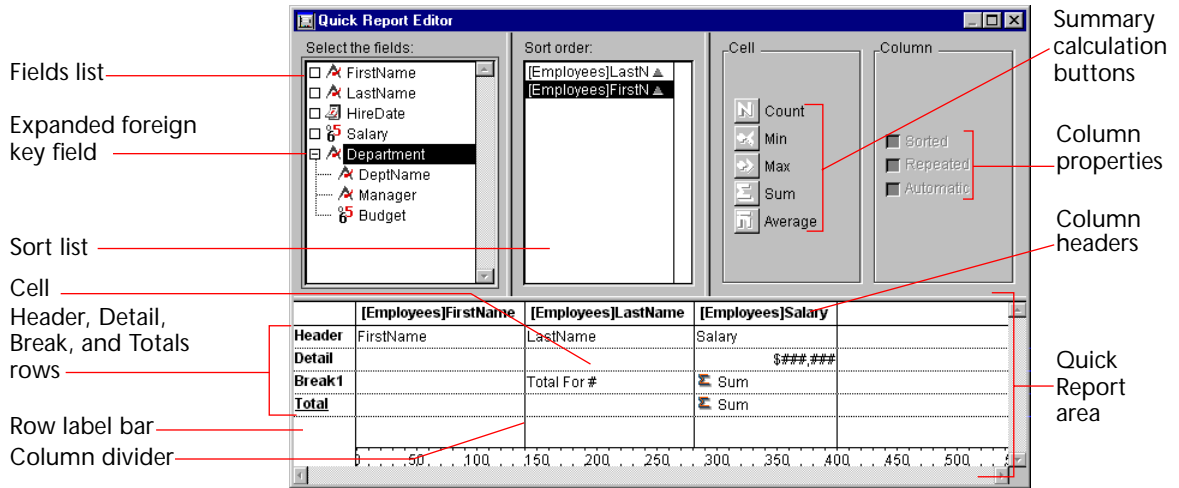
The Quick Report editor contains the following elements:

- **Fields list** This list displays fields in the current table. You can view the names of fields in related tables by expanding the foreign key fields. A foreign key field has a plus sign (on Windows) or an arrow (on Macintosh) to its left.

Note Only tables and fields which are visible appear in the Quick Report editor. For information about making tables and fields invisible, refer to the *4th Dimension Design Reference*.

- **Sort list** This list displays the sort order assigned to the report and indicates whether each sort level is ascending or descending. If your report will contain summary calculations from groups of records, you must sort the current selection on one or more fields.

Note You can change the order of fields in the Sort list by dragging the field name vertically to the desired position in the list.

- **Quick Report area** You use this area to design the report by dragging fields, adding formulas, adjusting column widths, and adding or deleting breaks.

- **Summary calculation buttons** You use these buttons to place summary calculations in the Break and Total areas of the report.

- **Column properties** You use these check boxes to set the following characteristics for each column in the report:
  - **Sorted** Click this check box if you want the records to be sorted on the selected column.
  - **Repeated Values** You use this check box to tell the Quick Report editor to repeat the values in a Break column. If you do not select the Repeated Values check box, each Break value is displayed only once.
  - **Automatic Width** Click this check box to request that the Quick Report editor compute the width of the selected column based on the maximum length of the contents of the column. The sizing is done only at the time the report is printed. You can check this option for each column individually. The check box does not refer to the entire report. If the Automatic Width check box is not checked for a column, you can modify that column's width by dragging column dividers.

- **Column dividers** These lines indicate the boundaries between columns of the report.

- **Right margin marker** This marker indicates the right margin of the report. The right margin marker is meaningful only when no columns have the Automatic Width check box selected. You may have to scroll horizontally to view the right margin marker.

- **Column header** The column header displays the names of fields or formulas added to the report.

- **Row label bar** This bar shows the different areas of the report: the Header, Detail, Break, and Total rows.

- **Header row** This row contains information that appears in the printed report above the records. The Quick Report editor automatically places field names in the Header row, but you can modify its contents.

- **Detail row** This row prints information from individual records and will be repeated in the printed report for each break.

- **Break and Totals rows** These rows display summary calculations and any associated labeling. The Break row displays summary calculations for each subgroup in the report and the Totals row displays summary calculations obtained from all records in the current selection.

- **Cells** A cell is the intersection of a row and a column.

- **Scroll bars** You use the scroll bars to view parts of the quick report design that extend beyond the area of the quick report form.

The following figure shows a completed quick report design and the relationship between the specifications in the design and the printed output.

	Department Name	C2	Title	Salary
H	**Department Name**	**Name**	**Title**	**Salary**
D				**$ ###,###**
B1		**Statistics for Department: #**	**Average Count**	$\bar{n}$ **Average** N **count**
T		**Statistics for all Departments**	**Average Count**	$\bar{n}$ **Average** N **Count**

Department Name	Name		Title	Salary
Accounts Payable	Flake, Peggy		Accountant	$26,650
	Fredrickson, Anna		Manager	$28,324
	Garbondo, Smeldorf		Accountant	$23,500
	Lindsay, Susy		Secretary	$18,750
	Swenson, Marcy		Accountant	$31,200
	Statistics for Department: Accounts Payable		**Average Count**	**$27,987** **5**
Accounts Receivable	Irving, Samuel C.		Accountant	$35,567
	Kane, Karyn		Manager	$38,550
	Base, Jud		Accountant	$27,000
	Rosner, Alice		Secretary	$17,500
	Statistics for Department: Accounts Receivable		**Average Count**	**$29,261** **4**
	Statistics for all Departments		**Average Count**	**$30,616** **77**

Resizing Areas in the Editor

You can resize the various list and display areas in the Quick Report editor. Areas that can be resized are bordered by a raised line.

▶ To resize an area in the editor:

1 Move the pointer over the area border to change the pointer into a resizing pointer ↔ or ↕ .

2 Drag the border up or down, or left or right to resize the area.

The Quick Report Pop-up Menus

The Quick Report editor has "hidden" pop-up menus that make it easy to access certain row, column, and cell operations. Instead of making menu selections or working with the Cell or Column properties areas, you can perform certain operations by displaying a Quick Report pop-up menu.

There are separate pop-up menus for row, column, and cell operations.

► To use a pop-up menu:

1 Position the pointer in a cell, a row label, or a column heading and hold down the mouse button.

A pop-up menu appears. The commands in the pop-up menu depend on where your pointer is (i.e., a row label, column heading, or cell). Also, menu commands that are inappropriate for the particular row, column, or cell are disabled.

The following illustration shows the three Quick Report pop-up menus.

Cells

| Count |
| Min |
| Max |
| Sum |
| Average |
| Format |
| Font ▶ |
| Size ▶ |
| Style ▶ |
| Alignment ▶ |

Summary calculations
valid only in Break and Total rows

Format
valid only if a display format can be applied

Text Attributes

Rows

| Duplicate Break |
| Delete Break |
| Hide |
| Font ▶ |
| Size ▶ |
| Style ▶ |
| Alignment ▶ |

Break row operations

Hide row

Text Attributes

Columns

| Insert Column |
| Delete Column |
| Hide |
| Edit Column... |
| Sorted |
| Repeated Values |
| ✓ Automatic Width |
| Alpha ▶ |
| Font ▶ |
| Size ▶ |
| Style ▶ |
| Alignment ▶ |

Column operations

Column Properties
Format
valid if a display format can be applied

Text Attributes

2 Choose the desired menu command.

Working with the Quick Report Editor

This section describes the basic operations that you can perform in the Quick Report editor.

Selecting Rows, Columns, and Cells

When designing a quick report, you need to select rows, columns, and cells in the quick report form. A cell is the intersection of a row and a column.

▶ To select a row:

■ Click on the Header, Detail, Break, or Total markers on the row label bar to the left of the Quick Report form.
OR
Click in a row to the right of all columns in the Quick Report form.

▶ To select a column:

■ Click above the Header row of a column.

▶ To select a cell:

■ Click the cell.

Adding and Modifying Text

You can add or modify text in the quick report form to label parts of the report. For example, if you requested summary calculations, you can label them by adding text to other cells in the Break and Total rows.

You can add and modify text as follows:

■ Edit the text that 4th Dimension automatically adds to the Header row of the report

■ Insert text in empty cells of the Break and Totals rows

■ Insert the value of a Break field in the Break rows

■ Specify the font, font size, justification, and style for any text that appears in the report

Adding Text

To add text in a report cell:

1 Click twice on an empty cell in the quick report form.
A text insertion point appears in the cell.

If you are entering a label for a summary calculation, select a cell in the same row as the cell containing the calculation icons. You cannot enter text into the same cell that contains summary calculations.

2 Type the text in the cell.

Modifying Text

To modify text in a cell:

1 Double-click in a cell to get an insertion point and drag across the text in the cell you want to modify.
4th Dimension highlights the selected text.

2 Type the new text in the cell.

Specifying Font Attributes

While designing your quick report, you can specify different fonts, font sizes, justification, and styles. You can then apply these specifications to text, data, and summary calculations within rows, columns, or cells in the quick report.

If you assign specifications to the Detail row of the report, you will not see the results until you preview or print the report.

You can specify font attributes using either the Quick Report menu commands or the Quick Report pop-up menu.

▶ To specify font attributes using the Quick Report menus:

1 Select the column, row, or cell where you want to apply the font.

2 Choose a font from the Font menu or choose a font size, style, or justification from the Style menu.
4th Dimension applies the font to any text, data, or summary calculations that appear in the selected area.

▶ To specify font attributes using the Quick Report pop-up menu:

1 Hold down the mouse button on the row label, column header, or cell to which you want to apply the font attributes.
A pop-up menu appears.
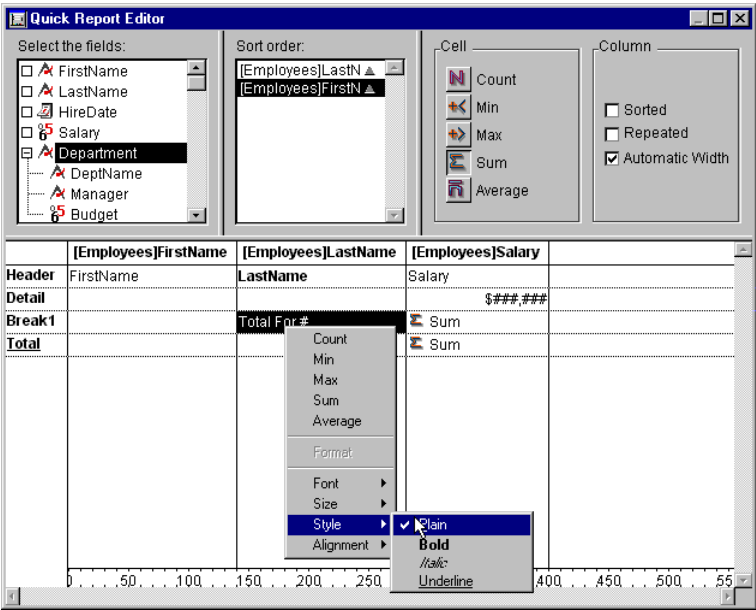
2 **Use the Font, Size, Style, or Alignment hierarchical menus to change the font attributes as desired.**

Adding Columns to the Report

You create columns by dragging field names from the Fields list in the to the quick report area. If you want to add a field from a related table, expand the foreign key field in the hierarchical list of fields to display the fields in the related table. You can add fields from related tables, provided that the relationship is automatic.

▶ To add a field:

■ **Drag the name of a field to the right of existing columns in the Quick Report area and release the mouse button.**
4th Dimension creates a column for the field and places the field name in both the column header and the cell in the Header row.

The following figure shows the Last Name field being added as a column to the Quick Report area.
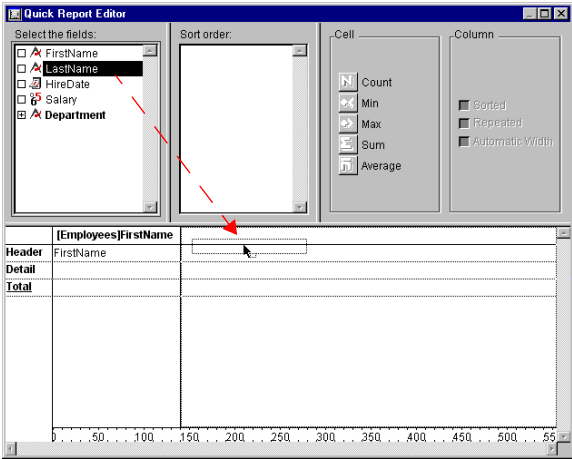
By default, 4th Dimension prints the field names as column heads at the top of each page in the quick report.

Note If you use a subfield in a quick report design, the report will list all values of the subfield for each parent record. You cannot sort on a subfield.

Inserting Columns   You can insert an empty column in a quick report. After you insert the column you can assign a field or a formula to the column.

► To insert a column:

1 Select a column.

2 Choose Insert Column from the Edit menu.
   OR
   Hold down the mouse button to display the Quick Report pop-up menu and choose Insert Column.
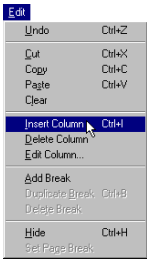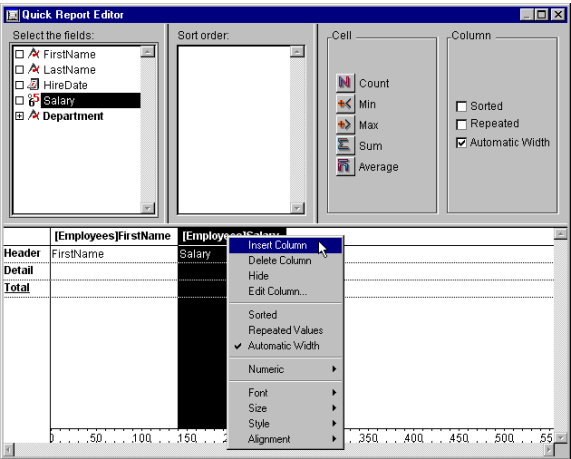
4th Dimension inserts a blank column to the left of the column you selected. To assign a field to the empty column, drag a field name to it. To assign a formula to the column, see the section "Adding Formulas to a Quick Report" on page 128.

Deleting Columns   As you specify fields for your quick report, you may want to remove some columns to place them elsewhere. Or, you might want to delete the column from the report.

▶ To delete a column using the Quick Report menu bar:

1 **Select the column you want to delete.**

2 **Choose Delete Column from the Edit menu.**
   4th Dimension removes the selected column from the quick report form.

▶ To delete a column using the Quick Report pop-up menu:

1 **Hold down the mouse button on the column header.**
   The Quick Report pop-up menu appears.

2 **Choose Delete Column from the pop-up menu.**
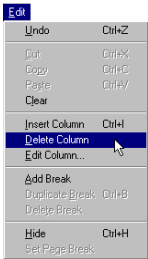
Replacing Columns
You can replace a column in the quick report by dragging another field over it. You can also replace a field with a formula.

▶ To replace a column:

1 **Drag a field from the Fields list to the column you want to replace.**
   OR
   Select the column you want to replace and choose Edit Column from the Edit menu.
   OR
   Hold down the mouse button on the column header to display the Quick Report pop-up menu and choose Edit Column.

   The Formula editor appears.

2 **If you displayed the Formula editor, enter a formula for the column.**

   If you want to assign a field to the column, you can simply use the field name as the formula.

   When you print the quick report, 4th Dimension prints the results of the formula for each record that appears in the Detail row.

   See the section "Adding Formulas to a Quick Report" on page 128 for information about adding a formula to a quick report.
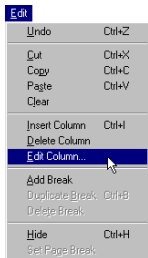
Sizing Columns
By default, the Quick Report editor sizes columns automatically (as reflected in the **Automatic Width** check box). It sizes each column based on the maximum length of data displayed in the column and any labels typed into the column. The Quick Report editor sizes columns at the time the report is printed.

To view the widths of each column, preview the report to the screen. See "Printing a Quick Report" on page 142 for more information about previewing the report.

Because selecting the **Automatic Width** check box changes the width of a column based on the maximum width of data in the records being printed, selecting different records can change the size of the columns.

You can resize a column manually after deselecting the **Automatic Width** check box. When a column is set manually, text in the column wraps within the specified area.

▶ To manually resize a column:

1 **Select the column you want to resize.**

2 Deselect Automatic Width[1].

3 Move the pointer over the column divider in the quick report to change the pointer into a column width cursor.

4 Drag the column divider to the left or right to resize the column.

Adding Formulas to a Quick Report

You can add a formula to a column in a quick report. For example, you can add a formula that computes employees' monthly salaries from an Annual Salary field.

▶ To add a formula:

1 Insert an empty column or click an existing column and choose Edit Column from the Edit menu.
OR
Double-click an existing column.
OR
Hold down the mouse button on an existing column header to display the Quick Report pop-up menu and choose Edit Column.

4th Dimension displays the Formula editor, in which you can build a formula. If you selected an existing column, the formula you create will replace the previous contents of the column.
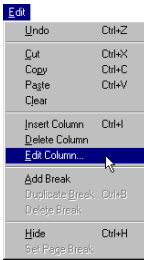
Note Make sure that the formula you create does not change the current selection. Changing the current selection will cause problems when you print the quick report since the report is based on the current selection. For information about commands and functions that change the current selection, refer to the *4th Dimension Language Reference*.

2 Build the formula.
OR
Click the Load button to retrieve an existing formula from disk.

For information about using the Formula editor, refer to "The Formula Editor" on page 93.

To save the formula as a file that you can retrieve and use in another column or in another report, click the Save button and enter a filename in the dialog box.

If you click the Load button, 4th Dimension displays an open-file dialog box and asks you to select a file. When you load a file, it replaces

---

1. You can deselect Automatic Width using either the check box in the Column Properties area or the Quick Report pop-up menu for that column.

any formula that currently appears in the Formula editor. After you load a formula, you can modify it in the editing area.

3 Click OK to assign the formula to the column.

4th Dimension adds a new label to the column that identifies it as a formula. You can relabel the column by typing a label into the header cell for that column.

Formulas are labeled *C1* through *Cn*. The labels are the names of variables that contain the column's value. You can use these variables in other formulas.

Click the Cancel button to close the editor and return to the Quick Report editor without adding the formula.

Sorting Records and Creating Breaks

An important feature of the Quick Report editor is the ability to sort the records in your report. You sort records for two reasons:

■ To view records in a particular order,

■ To create groups of records and Break areas in the report for the purpose of reporting summary calculations for groups.

See the section "Setting Break Levels" on page 131 for information about summary calculations.

Specifying a Sort Order

You can specify a sort order at any time. For example, if you wanted to sort the records of salespeople by the Sales Region field, you would select the Sales Region column, and then set the Sorted property.

You can also sort on a formula by selecting the column that contains the formula and then clicking the Sorted check box or choosing Sorted from the Quick Report pop-up menu for that column. See the section "Adding Formulas to a Quick Report" on page 128 for more information about adding formulas to quick reports.

▶ To specify the sort order using the Sorted check box:

1 Select the column that contains the field or formula you want to specify as the first sort level.

2 Click the Sorted check box.

▶ To specify the sort order by dragging:

■ **Drag a field from the Fields list to the Sort order list.**
If the field is not already in the quick report design, 4th Dimension adds it as the last field in the design.

▶ To specify a sort order using the Quick Report pop-up menu:

1 Hold down the mouse button on the column header belonging to the column you want to sort.
The Quick Report pop-up menu appears.

2 Choose Sorted from the pop-up menu.
4th Dimension displays the name of the field in the Sort list. To the right of the name is an arrow, indicating an ascending sort order. By default, all sorts are performed in ascending sort order.

3 If necessary, click the sort direction arrow ▲ to sort the column in descending order.
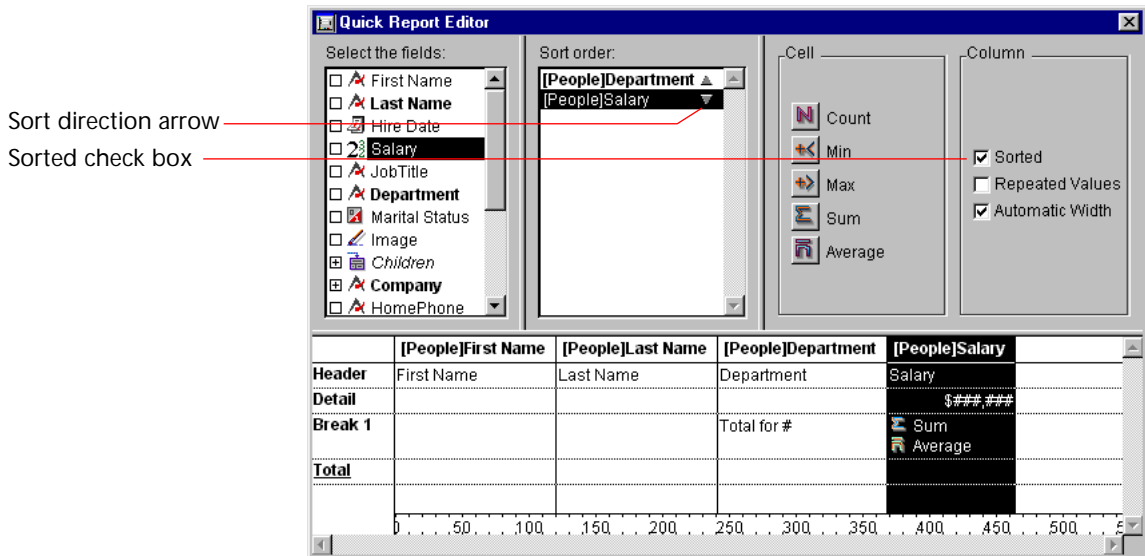
4 If desired, select additional fields or formula columns and add the Sorted property using either the Sorted check box or pop-up menu command.

You can specify ascending or descending sort order for any additional fields or formulas you specify.

When you specify multiple sort levels, 4th Dimension sorts the records on the first field in the Sort field list, then on other fields in the order

that they appear in the list. For example, if you specify the Department Name field as the first sort level and Last Name as the second sort level, your design might look like the quick report design shown in step 3.

▶ To change the level of a Sort field:

■ **Drag the name of a field or formula up or down within the Sort list to the desired sort level.**

Deleting a Field or Formula from the Sort List

You can delete the any field or formula from the Sort list.

▶ To delete a field or formula from the sort order:

■ **Select the column and deselect the Sorted check box.**
OR
Hold down the mouse button on the column header to display the Quick Report pop-up menu and deselect the Sorted menu command.
4th Dimension removes the field or formula in the Sort field list. It does not delete the column itself from the report. When you print the report, 4th Dimension will no longer use that field or formula to sort the records.

Setting Break Levels

In a quick report, you set break levels to separate or "break" records into groups according to values in one or more sort fields. A Break area is printed at each break level. You can print summary calculations in the Break area. The summary calculations — sum, average, minimum, maximum, and count — are calculated for each group of records.

Break levels are determined by the sort levels and Break rows. For example, if you sort records by Sales Region and create a Break row, 4th Dimension inserts a break between each group of records that have the same sales region.

After you add a Break row to the quick report, you can request summary calculations on each break. For example, you can insert a summary calculation in a Break row to display subtotals for sales from each state in a marketing region. Refer to the section "Adding Summary Calculations" on page 133 for more information about adding summary calculations to Break and Total rows.

▶ To insert a Break row:

1 Choose Add Break from the Edit menu.
OR
Hold down the mouse button on the Total row label in the Row label bar and choose the Duplicate Break menu command.

4th Dimension adds a Break row. The figure shows a Break row in a quick report design.
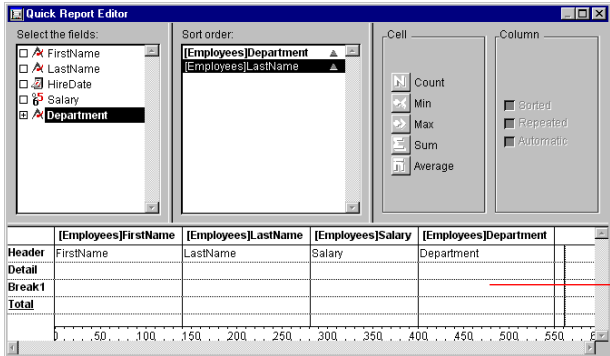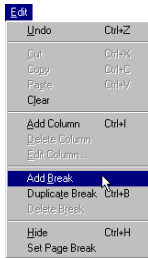
Break row

2 If desired, add additional Break rows by repeating step 1[1].

There should be at least as many sort levels as break levels.

4th Dimension adds a sequential number to each new break label in the row label bar, for example, Break1, Break2, Break3, and so forth.

Using the Values of Break Fields in Labels

You can improve the appearance and comprehensibility of your reports by labeling each Break row using the value of the Break field.

To request that the value of a Break field be printed in a label placed in the Break area, use the number sign (#) in the label. For example, the text "Total salaries for department #" will insert the department name (in this case, the value of the Department field) in place of the number sign when the report is printed.

The number sign does not need to be placed in the same column as the Break field. It will display the value of the Break field in any cell in the Break row.

The following figure illustrates the use of the number sign in a label in the Break row.

---

1. After you have created a Break row, you can also display the Quick Report pop-up menu by holding down the mouse button on the new Break row label.

Number sign used in label
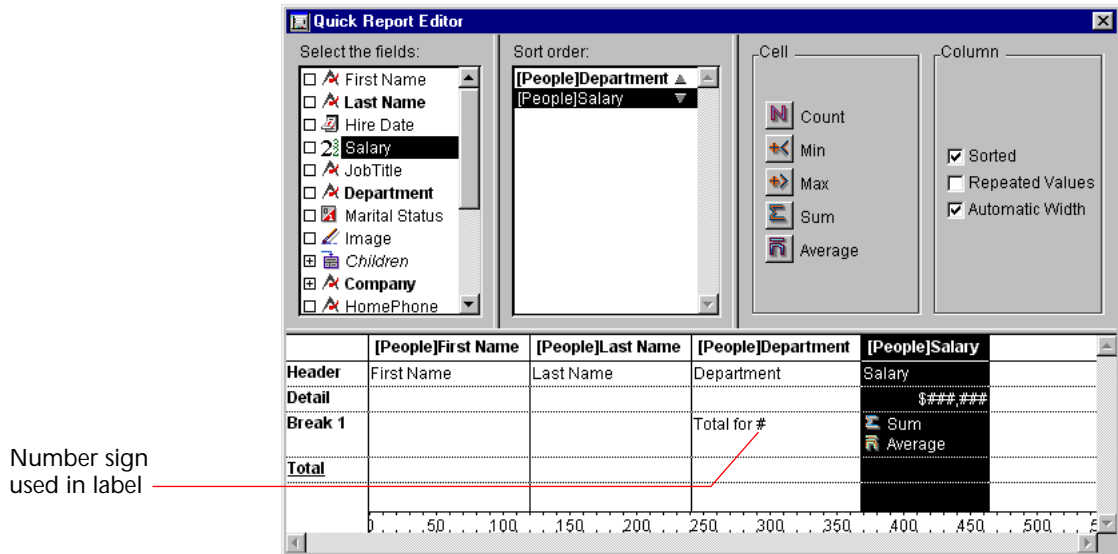
Adding Summary Calculations

You can add summary calculations on the contents of fields and formulas to each Break row and to the Totals row.

The check boxes in the Cell area of the Quick Report editor identify the summary calculation options available for quick reports. The following summary calculations are available.

■ **Sum** totals the values in the report or break.

■ **Minimum** displays the lowest value in the report or break.

■ **Maximum** displays the highest value in the report or break.

■ **Average** calculates the average of the values in the report or break.

■ **Count** calculates the number of records in the report or break.

These options also appear in the Quick Report pop-up menu for cells in the Break and Total rows.

When you place a summary calculation in the Totals row, the calculation is done for all records in the report. If you place the summary calculation in a Break row, separate calculations are done for the records in each break.

▶ To add a summary calculation:

1 Select a cell in a Break row or in the Totals row where you want to insert the summary calculation.

The Sum, Minimum, Maximum, and Average calculations work only on a numeric field or formula.

2 Click as many summary calculation check boxes as you like.
Or
Hold down the mouse button and choose the desired summary calculations from the Quick Report pop-up menu for cells.

4th Dimension displays a calculation icon in the selected cell for each type of summary calculation you request. The following figure shows calculation icons in the Break and Total rows.

Calculation icons in Break and Totals rows
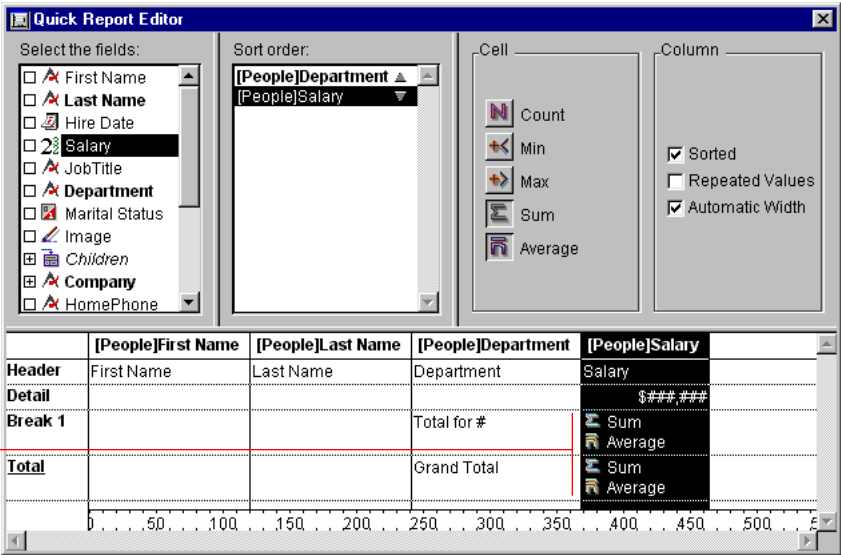
If you add more than one summary calculation to a cell, 4th Dimension stacks the calculation icons on top of each other, as shown above.

Displaying Repeated Values for Break Columns

In a report with breaks, the columns which are used to group records so that summary calculations can be done are called *Break columns*. In the report shown above, the Department field is a Break column since the records in the report are grouped by department.

When a report like this is printed, the values for the Break column are printed only once per break. In other words, a department name is

printed only for the first record in the group and is not repeated until the department changes.

First Name	Last Name	Department Name	Salary
Biff	Davis	Accounting	43780
Smeldorf	Garbando		19610
Alan	Hull		41460
Bryan	Pfaff		26440
Shirley	Ransome		36040
Marlys	Wilson		36500
		Sum for Department : Accounting	203830
Kathy	Forbes	Engineering	18840
Dennis	Hanson		40520
Mary	Smith		55000
Andy	Venable		43520
Lance	Wolfram		27300
		Sum for Department : Engineering	185180

Nonrepeating break values

In some cases, you may want to repeat the values for the Break columns so that they appear for every record in the Break area. You do so by selecting the Repeated Values column property. You can do so either by clicking the Repeated Values check box in the Column Properties area or by choosing the Repeated Values menu command in the Quick Reports pop-up menu for that column.

► To display repeated values for fields in Break columns:

1 Select the Break column by clicking above the Header row for that column and click the Repeated Values check box.
OR
Hold down the mouse button on the Header row of the Break column and choose Repeated Values from the Quick Reports pop-up menu.

The following figure shows the report at the top of this page after the Repeated Values check box has been checked for the Department Name column.

First Name	Last Name	Department Name	Salary
Biff	Davis	Accounting	43780
Smeldorf	Garbando	Accounting	19610
Alan	Hull	Accounting	41460
Bryan	Pfaff	Accounting	26440
Shirley	Ransome	Accounting	36040
Marlys	Wilson	Accounting	36500
		Sum for Department : Accounting	203830
Kathy	Forbes	Engineering	18840
Dennis	Hanson	Engineering	40520
Mary	Smith	Engineering	55000
Andy	Venable	Engineering	43520
Lance	Wolfram	Engineering	27300
		Sum for Department : Engineering	185180

Setting Display Formats

You can specify display formats for columns that contain numeric or alphanumeric (Alpha) data. For example, if you are displaying salaries in a column, you can add a numeric format to the Detail cell for the Salary field. If your report includes Alpha fields such as a telephone number or Social Security number, you can use an Alpha format.

Numeric Formats

The following format places a dollar sign to the left of the number and allows up to 6 digits:

$###,###

This format can display dollar amounts up to $999,999.
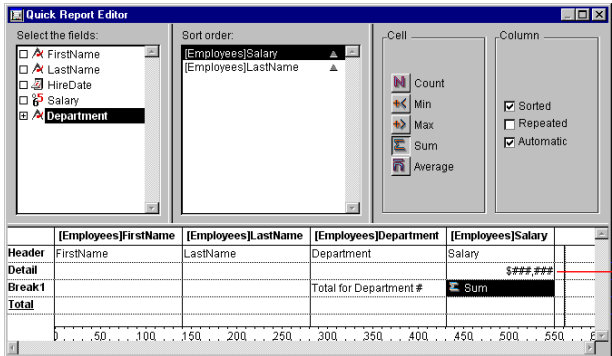
Numeric format

You can also create custom display formats in the Database Properties dialog box and use them in Quick Report designs. For more information about creating custom formats, refer to the *4th Dimension Design Reference.*

Alpha Formats

You can use an Alpha format for fields that contain string information. For example, Social Security number or telephone number fields can be formatted with an Alpha format.

For example, the following format would be used to format Social Security numbers:

###-##-####

Entering the Display Format for a Field

You enter a display format or custom format by choosing it from the Quick Report pop-up menu for the cell or by typing it into a cell.

▶ To enter a display format for a numeric or Alpha field:

1 Click twice in the Detail cell for a numeric or Alpha column.

2 Type a display format or the name of a style that you want to use as the display format.

The names of styles are preceded by a vertical bar (|).

▶ To choose a display format from the Quick Report pop-up menu:

1 Position the pointer over the Detail cell for a column and hold down the mouse button and choose a display format from the hierarchical menu.

Menu command indicates field type

Display formats for Alpha fields
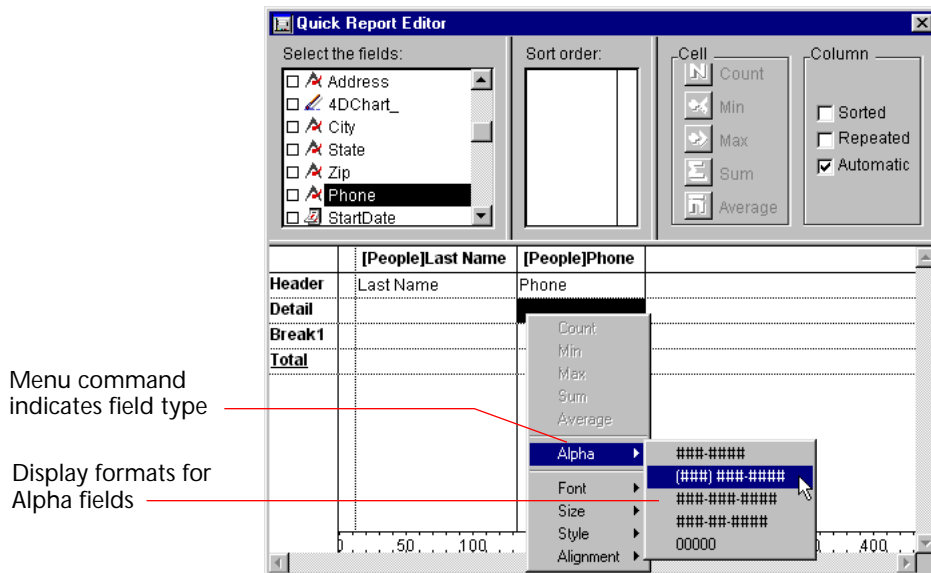
The hierarchical menu will show display formats that are appropriate for the data type of the column. For example, if the field was a numeric format, the menu command would be "Numeric" instead of "Alpha" and the submenu would list only numeric formats.

After you make your selection, you can edit the format normally.

If you have also requested summary calculations for that column, the format specified in the Detail cell will automatically be applied to the summary calculations. Regardless of the display format, the count is

always displayed as an integer without formatting symbols such as the dollar sign.

Different formats can be applied to different columns in the report.

Hiding and Showing Rows and Columns

4th Dimension lets you hide rows or columns when printing a quick report. If desired, you can show a hidden column or row.

Hiding rows is useful when you want the report to include only summary calculations. For example, hide the Detail row if you want to display only the summary calculations that appear in the Totals and Break rows. You can also use this feature to hide a Break row or the Totals row.

You can hide a column if you need to use the column as a sort column, but do not want the report to display the column.

You can hide a row using either a Quick Report menu command or the Quick Reports pop-up menu.

▶ To hide a row using the menu command:

1 Select the row you want to hide.

2 Choose Hide from the Edit menu.

▶ To hide a row using the pop-up menu:

1 Hold down the mouse button over the row label in the Row label bar. The Quick Reports pop-up menu appears.
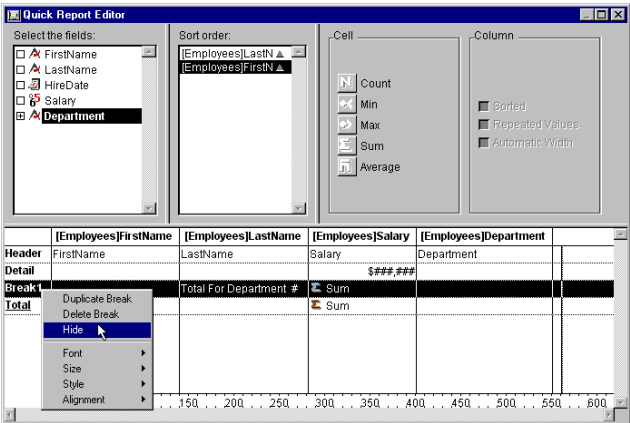
2 **Choose Hide from the pop-up menu.**

4th Dimension displays the column in gray to remind you that the row will not appear when you print or preview the quick report.

Hidden row
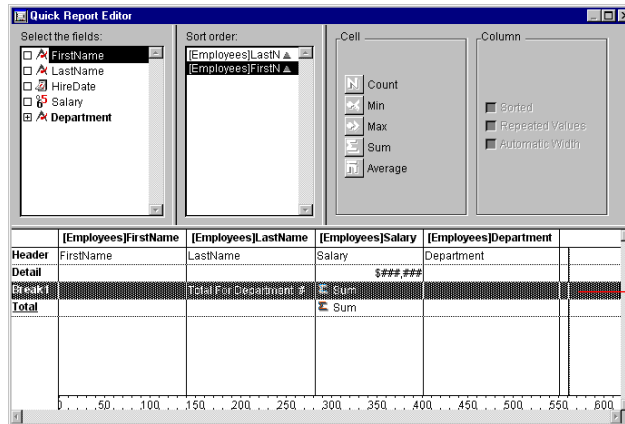
You can also use a menu command or the Quick Reports pop-up menu to hide a column.

▶ **To hide a column using the menu command:**

1 **Select the column you want to hide.**

2 **Choose Hide from the Edit menu.**

▶ **To hide a column using the Quick Reports pop-up menu:**

1 **Hold down the mouse button over the column header.**

The Quick Reports pop-up menu appears.

2 **Choose Hide from the pop-up menu.**

4th Dimension displays the column in gray to remind you that it will not appear in the printed report.
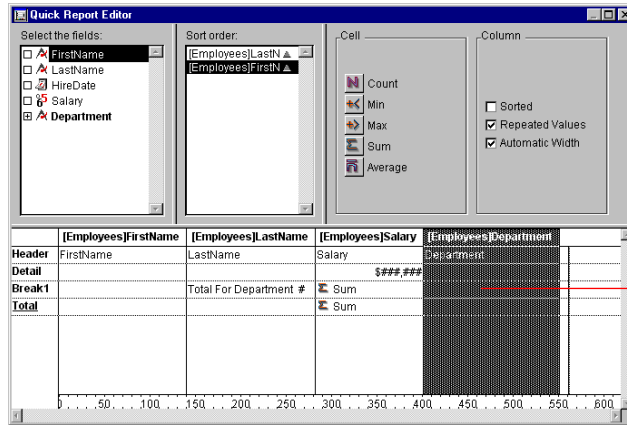
Hidden column

Showing a Hidden Row or Column

When a row or column is hidden, the **Hide** menu command in the **Edit** menu and Quick Report pop-up menu becomes **Show**. You can display a hidden row or column choosing **Show** from either the **Edit** or pop-up menu. When you do so, the row or column is displayed normally in the Quick Report area.

Adding Page Headers and Footers

Before printing a quick report, you can add page headers and footers. You specify page headers and footers in the Headers and Footers dialog box. Use this dialog box to do the following:

■ Add page header and footer text,

■ Specify the size of the page header and footer areas,

■ Specify fonts, font sizes, and font styles for page header and footer text,

■ Insert codes that add page numbers and the date and time to your reports.

You can only specify page headers when printing to a printer. See the section "Printing a Quick Report" on page 142 for more information about alternate output devices.

▶ To add page headers and footers:

1 **Choose Headers and Footers from the File menu.**
The Headers and Footers dialog box appears.

Edit drop-down list

Measurement scale
drop-down list

Height

Header and Footer
entry areas

Page preview
area
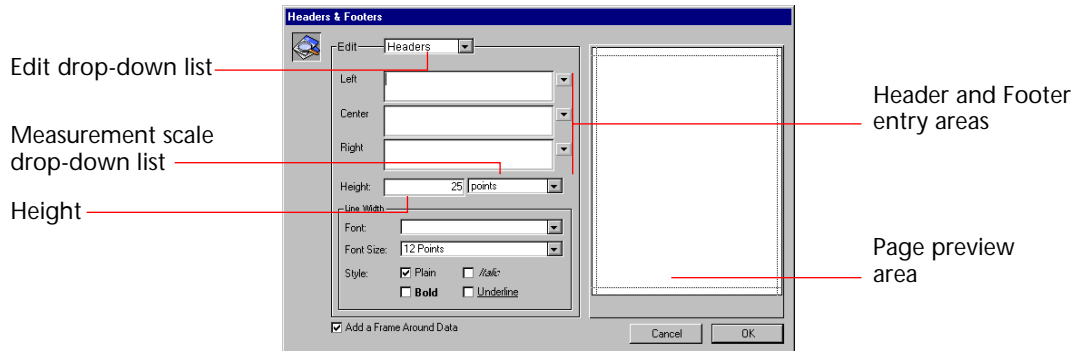
The Header and Footers dialog box lets you specify both headers and
footers from the same screen. You use the **Edit** drop-down list to
specify either the header or footer.

2 Choose Header or Footer from the Edit menu.

3 Enter the header or footer height in the Height area.

When you first enter the dialog box, the header and footer heights are
set to 25 points each. You can change values for the height and can
change measurement scale to enter values in inches or centimeters.

As you enter the header and footer height, the dotted lines on the page
preview area change to indicate the size of the header and footer as
they will appear on the printed report.

4 Select an entry area and type the header or footer text.

To the right of each entry area is a pop-up menu that lets you insert
variables into the entry area.

Header and footer
variables
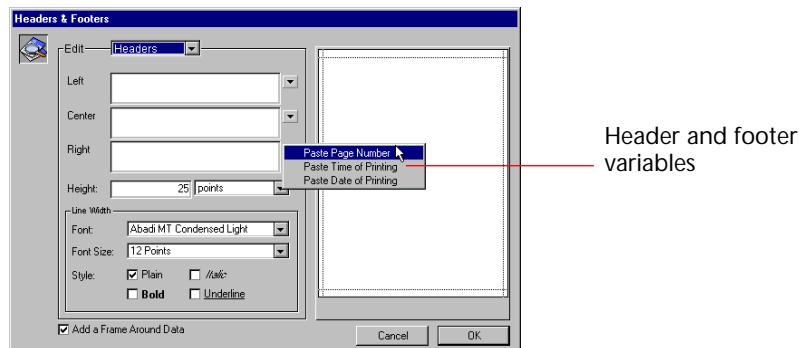
You can insert the current page number, time of printing, or date of
printing.

To insert a variable, choose it from the pop-up menu. 4th Dimension inserts the variable in the entry area at the insertion point. You can combine variables with text.

Specifying Font, Attributes

You can specify different fonts, font sizes, justification, and styles for page headers and footers.

▶ To specify font attributes:

■ **Choose a font and font size from the drop-down lists and click one or more Style check boxes.**

Your specifications are applied to all three entry areas. You cannot apply different font attributes to different areas of the header or footer.

Some Style combinations are not valid. For example, you can choose Bold and Italic, but you cannot choose both Plain and Bold.

Printing a Quick Report

After you have completed your report design, you can print the quick report. You can print a quick report to a variety of output devices:

■ On the standard printer selected in the Print Manager (the Chooser on Macintosh)

■ To disk

■ To a graph

▶ To select an output device:

■ **Choose Print Destination from the File menu.**

The Print Destination hierarchical menu contains three items.
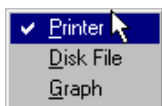
Printer

This option uses the printer you have chosen in the Print Manager (Chooser on Macintosh). You can print to a printer without using the Print Destination item by choosing **Print** from the **File** menu. If you are printing to a printer, you can preview the report before printing it.

▶ To print to a printer:

1 Choose Print from the File menu.

2 Click the OK button and follow the standard 4th Dimension procedure for previewing and printing your report.

For more information about printing, see the section "Printing Standard Reports" on page 110.

3 Choose the settings that are appropriate for your report and click the OK button.

Disk File

This option sends your quick report to a disk file that you can open and modify with other applications, including text editors and spread-sheets. This option exports the records in the quick report to a text file.

When you use this option, 4th Dimension automatically uses the column headings as the first "record" that is exported.

▶ To print to a disk file:

1 Choose Disk File from the Print Destination hierarchical menu.

1 Choose Print from the File menu.

4th Dimension displays a standard create-file dialog box and asks you to enter a filename.

2 Enter a filename and click the OK button.

4th Dimension displays a dialog box that keeps you informed of the progress of the operation. Click the Stop Printing button to cancel the operation.

After the report is printed to a file, 4th Dimension returns you to the Quick Report editor. Remember to change the output device if you want to resume sending a quick report to a standard printer.

Print to Graph

This option directs the report to 4D Chart, 4th Dimension's plug-in for plotting data. When you choose the Graph item in the Print Destination hierarchical menu, your report is presented as a graph rather than in tabular form. 4D Chart uses only the summary calculations and labels in the Break row. It uses the leftmost non-numeric column for the Values axis (the horizontal axis).

To use the Graph feature, your report should:

■ Include from one to five numeric fields or formulas. These columns will be assigned to the values axis in the graph.

■ Use one type of summary calculation per numeric field.

For example, if you want to graph average salary by department, you should create a quick report with two columns, Department Name and Salary. Use the Average summary calculation for Salary.

Value to be graphed
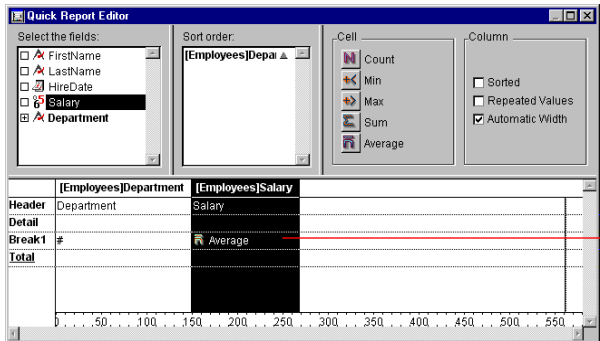
▶ To print to a graph:

1 Choose Graph from the Print Destination hierarchical menu.

2 Choose Print from the File menu.

4th Dimension graphs your data as a column graph.

The following figure shows the graph produced from the quick report design shown above.
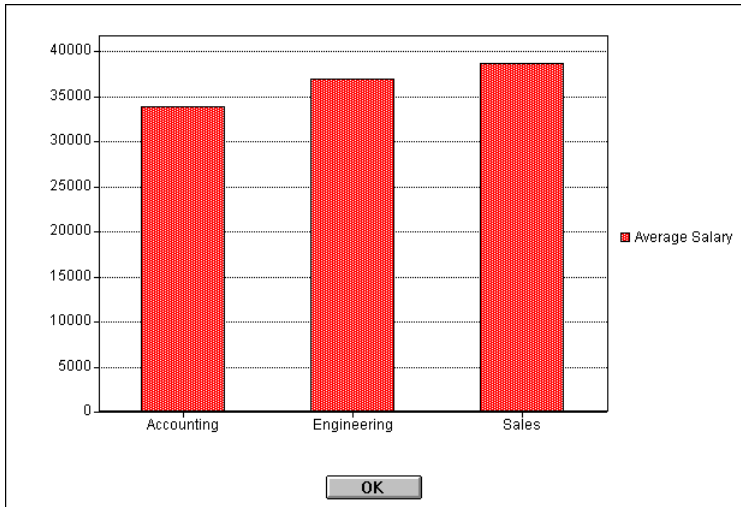
You can use 4D Chart to select another graph type or print the graph. For more information about the options available in 4D Chart, see the section "Creating a Graph" on page 172.

9 Labels

4th Dimension's Label editor provides a convenient way to print a wide variety of labels.

With the Label editor, you can do the following:

- Design labels for mailings, file folders and file cards, and for many other needs
- Specify the font, font size, and style to be used for the labels
- Specify the number of labels across and down on each page
- Specify the label page margins
- Load and save label designs
- Print labels

Labels can also be created using the Form editor in the Design environment. Use the Form editor to design specialized labels that include variables or take advantage of the drawing tools available in the Form editor. For more information about using the Form editor to create labels, refer to the *4th Dimension Design Reference.*

The Label Wizard

You use the Label Wizard to create, format, and print labels in the User environment. The Label Wizard contains settings for designing labels and positioning the labels on label paper. For example, when producing mailing labels, you might want a label design that includes the person's first and last name on the first line, the street address on the second line, and so on.

As part of the design, the Label Wizard enables you to specify the number of labels on the page and the margins of the label paper so that the label text is centered within the labels.

The Label Wizard consists of two pages, the Label page and the Layout page, each identified by a tab at the top of the dialog box. You use the Label page to specify the content of the label and the Layout page to define the size and position of the labels on the page. When you create a satisfactory label design, you can save it to disk so that you can reuse it.

Opening the Label Wizard

To open the Label Wizard:

■ **Choose Labels from the Report menu.**
4th Dimension displays the Label page of the Label Wizard.
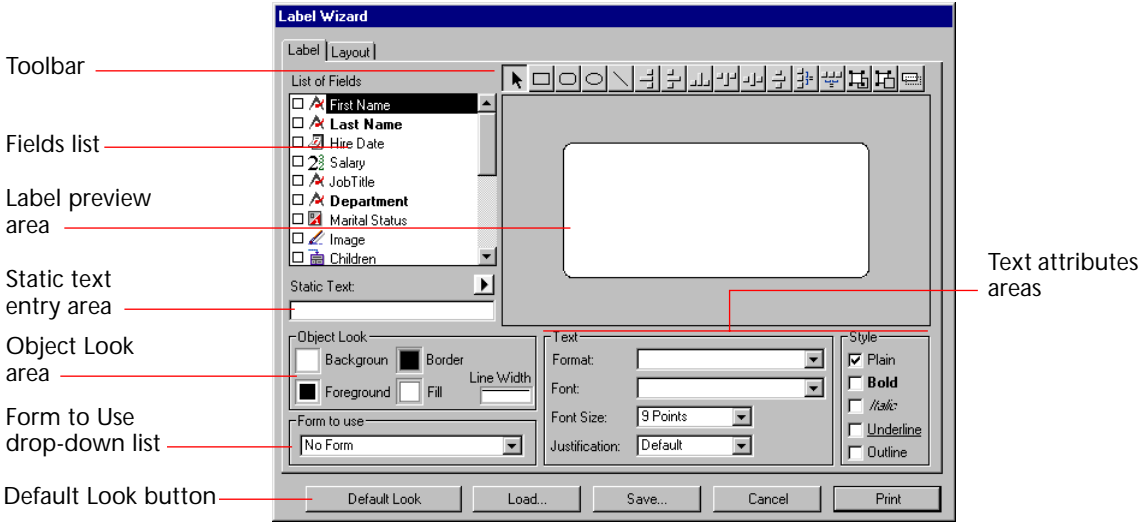
Label Page

The Label page contains settings for designing and formatting labels.

The Label page contains the following elements:

- **Fields list** This area displays the names of the fields in the current table in a hierarchical list. If this table is related to other tables, the foreign key fields have a plus sign (on Windows) or an arrow (on Macintosh). You can display fields from the related table by expanding the relating fields. The fields in the related table are indented.

Note Only tables and fields which are visible appear in the Label Wizard. For information about making tables and fields invisible, refer to the *4th Dimension Design Reference*.

- **Label preview area** You use this area to design your label.

- **Toolbar** The Label Wizard toolbar contains tools for drawing, selecting, aligning, distributing, layering, and duplicating objects. For complete information on the toolbar, see the section "The Label Wizard Toolbar" on page 150.

- **Object Look area** These controls let you specify foreground and background colors, fill patterns, and borders for individual objects on the label.

- **Default Look button** This button applies the default set of Object Look attributes to the selected object.

- **Static Text entry area** This area allows you to add static text objects to the label.

- **Text attributes areas** These controls allow you to specify the font, font size, display format, and style of the text.

- **Form to Use drop-down list** This drop-down list lets you bypass the Label Wizard and use a form to print the labels. If you are using the Label Wizard to create the label, choose No Form (the default) from this list. If you want to use a form, choose it from this list. 4th Dimension will then ignore any other label specifications in the Label Wizard and print the labels according to the design or the specified form. As with any print job, it executes any form or object methods associated with the form. See the *4th Dimension Design Reference* for more information about designing forms for labels.

Layout Page   The Layout page contains controls for printing labels based on the requirements of the printer you selected in the Print Manager (Chooser on Macintosh), so that it can format the page accurately.

For complete information on the Layout page, see the section .

The Label Wizard Toolbar   The Label Wizard toolbar contains the following tools.

Arrow tool   Drawing tools   Alignment Tools   Duplicate

Rectangle   Align Right
Rounded Rectangle   Align Left   Move to Front
Oval   Align Bottom   Move to Back
LIne   Align Top
                    Align Horizontal Center   Distribute Vertically
                    Align Vertical Center   Distribute Horizontally
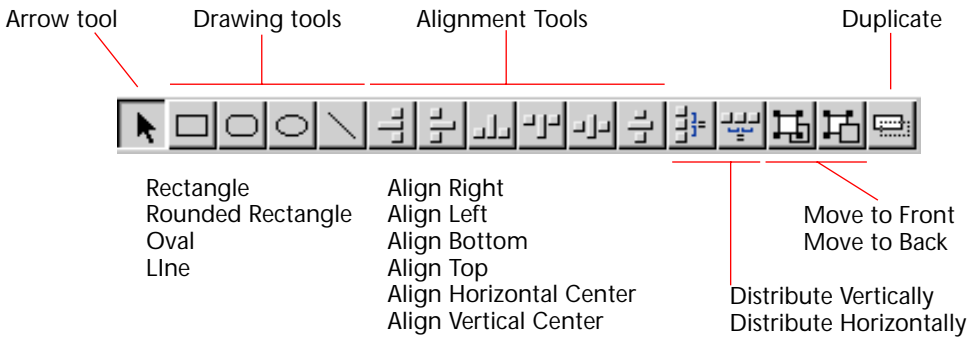
Creating a Label Design

You create a label by dragging field names to the Label Preview area, adding static text, drawing graphic objects using the graphics tools in the toolbar, and pasting graphics from the Clipboard. You can edit the label by distributing, moving, resizing, layering, and aligning objects. With the Object Look and Text attribute areas, you can control the font attributes, foreground and background colors, fill patterns, and borders of individual objects.

The Label Preview area shows the approximate size and shape of the selected label. Before adding elements to the label, you may want to specify your label paper and label dimensions using the Layout page. For information, see the section .

Note   You cannot add a formula (a variable) to a label with the Label Wizard. If you need to use a variable on a label, use the Form editor.

► To create a label:

1 Drag the first field you want to display in the label from the Fields list to the Label Preview area.

If the field is in a related table, expand the relating field to display the fields in the related table.

Your field is added to the Label Preview area. Selection handles indicate that it is selected.
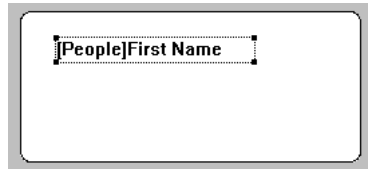
2 If you want to concatenate a field to this field, drag the new field from the Field list to the existing field.
Otherwise, continue dragging fields to the Label Preview area.

A "+" between field names in a field object indicates that the fields are concatenated on a single line. When 4th Dimension prints the label, it will insert a space between the fields on the same line. The following illustration shows the concatenation of the First Name and Last Name fields.
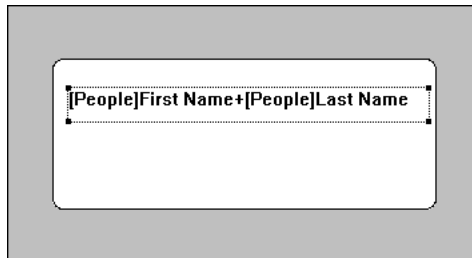
As you add fields, you can reposition them by dragging or using the alignment tools in the toolbar.

3 To add a text element to the label, enter the text in the Static Text area and click the arrow ▶.

The static text object is added to the Label Preview area. The following illustration shows a static text element being added to the label.

After you add the element to the label, you can reposition it by dragging and aligning it with other objects.

4 **(Optional) Using a drawing tool, draw any graphic objects that you want to add to the label.**

For example, you could add different backgrounds to the "TO:" and "FROM:" sections of the label.

5 **(Optional) Paste a graphic from the Clipboard into the Label Preview area.**

For information on adding a graphic to the label, see the section "Adding a Graphic to the Label" on page 161.

After you add all required elements to the Label Preview area, you can use any of the editing tools to modify the label design. For complete information, see the section "Working with Label Wizard Objects" on page 153.

The following figure below shows a completed mailing label.
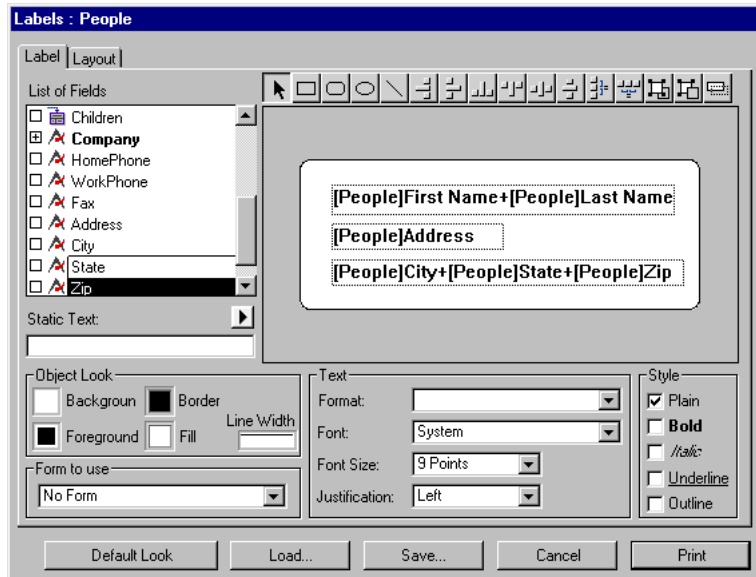
How the Label Wizard Handles Blank Fields
Some records in your database may not contain entries for every field. When printing labels, the Label Wizard handles blank fields intelligently. Instead of leaving gaps where the data should be, the Label Wizard concatenates the data.

If a field in a line contains no data for a particular record, 4th Dimension concatenates the remaining fields in the line without leaving a blank space for the missing data.

If an entire line contains no data for a particular record, 4th Dimension vertically concatenates the remaining lines in the label without leaving a blank line.

4th Dimension automatically centers the text of the label inside the label area.

Clearing Fields   If you make a mistake, you can remove one or more fields from the label.

▶ To remove an object:

■ Select the object and press Backspace (Delete on Macintosh).

The selected object is removed. If the object is a row of concatenated fields, pressing Backspace removes only the last field in the row. Continue pressing Backspace to remove more fields from the row.

Working with Label Wizard Objects

This section discusses the techniques for editing objects placed on the label. It includes:

■ Creating graphic objects,

■ Aligning objects,

■ Distributing objects,

■ Layering objects,

■ Duplicating objects,

■ Moving objects,

■ Resizing objects,

■ Adding a border to an object,

■ Adding foreground or background fill colors, patterns, and borders,

■ Pasting a graphic into the label,

■ Deleting objects.

Creating Graphic Objects

You can create a graphic object by drawing.

▶ To create an object:

1 Select the type of object you want to draw by clicking its tool in the toolbar.

The pointer becomes a crosshair when it is over the Label Preview area.

2 Drag to create an area for the object.

For two-dimensional objects (ovals, rectangles, and rounded rectangles), drag diagonally.

❶ Select the drawing tool you want to use

❷ Drag to draw the object
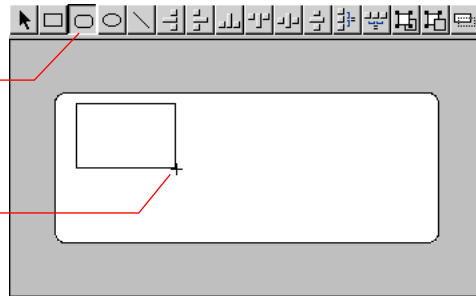
Note Hold down the **Shift** key as you draw to constrain the object to a regular shape. Lines are constrained to horizontal or vertical, rectangles are constrained to squares, and ovals are constrained to circles.

3 When you have finished drawing the object, release the mouse button.

4th Dimension creates the object and makes it the currently selected object. The Arrow tool is automatically selected and the pointer becomes an arrow.

Aligning Objects

The alignment tools let you align objects to each other. When you align one object to another, you can align it to the top, bottom, side, or horizontal or vertical center of the other object.

The following illustration shows the Label Wizard's alignment tools.

Align Right ————— Align Center Vertical

Align Left ————— Align Center Horizontal

Align Bottom   Align Top
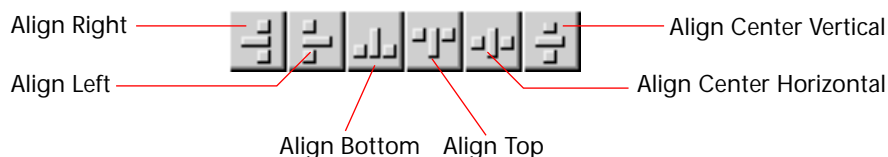
The arrangement of lines represents the function of each tool. For example, the Align Right icon shows the lines aligned vertically on the right side of the box. The Align Center Vertical icon shows the lines aligned vertically in the middle.

▶ To align a set of objects:

1 Select the objects that you want to align.

Shift-click to select several objects.

2 Click the alignment tool that corresponds to the alignment you want.

4th Dimension aligns the selected objects according to the alignment you selected.
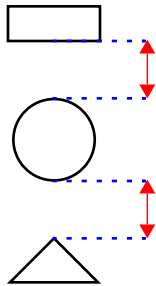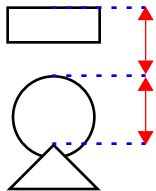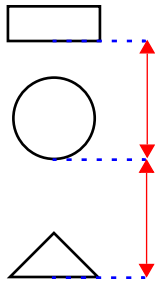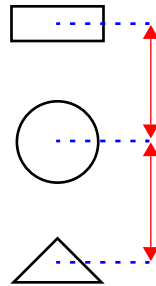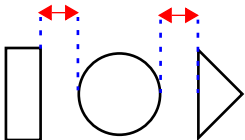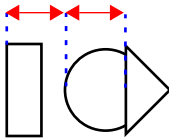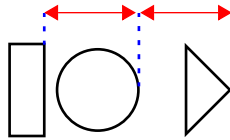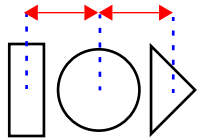
Distributing Objects

The toolbar includes two tools that let you distribute three or more objects evenly.

Distribute vertically ———— ———— Distribute horizontally

When you use either tool, you can modify its action by holding down the Shift or Alt keys when you click either tool.

■ Clicking Distributes the objects from their adjacent sides,

■ Shift+Clicking Distributes the objects from their left sides (horizontal) or tops (vertical),

■ Alt+Clicking Distributes the objects from their right sides (horizontal) or bottoms (vertical),

■ Shift+Alt Clicking Distributes the objects from their centers.

These rules are illustrated in the following diagram.

Action	Click	Shift+Click	Alt+Click (Windows) Option+Click (MacOS)	Shift+Alt+Click (Windows) Shift+Option+Click (MacOS)
Distribute Vertically	Standard	Tops	Bottoms	Centers
Distribute Horizontally	Standard	Left Sides	Right Sides	Centers

▶ **To distribute a set of objects:**

1 **Select the objects that you want to distribute**.

You must select at least three objects. Hold down **Shift** and click to select several objects.

2 **If desired, hold down a modification key or key combination and click the Distribute Horizontally or Distribute Vertically tool.**

4th Dimension distributes the selected objects according to the rules you selected.

Layering Objects   You may want to create a design that uses objects in different layers. For example, you may want to place a shaded rectangle behind the fields on a label. The Label Wizard provides the **Move to Back** and **Move to Front**, tools that let you layer objects on the label. The following illustration shows objects in front of other objects.

Fields in front of
shaded rectangle

[People]Last Name
[People]Phone
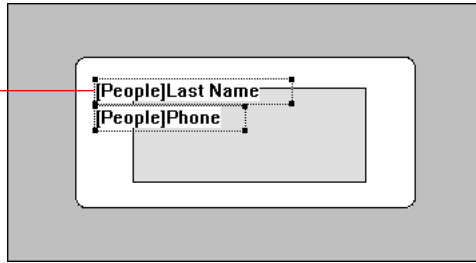
Clicking the **Move to Front** or **Move to Back** tools moves the selected objects to the top or bottom layer. If you want to move the object only one layer toward the front or back, hold down the **Shift** key when you click **Move to Front** or **Move to Back**.

▶ To move an object to the front or back:

1 **Select the object or objects that you want to move to the back.**
Hold down **Shift** and click to select several objects.

2 **Click the Move to Front or Move to Back tool in the toolbar.**
4th Dimension moves the selected object or objects to the front of or behind all the other objects.

Note When you move an object to the back, it may be hidden by objects in front of it. To see the object, select the object in front and send it to the back.

Duplicating Objects

You can duplicate any object in the label. Copies of active objects retain all the properties of the original, including foreground and background colors and fill patterns, text attributes, and display format.

▶ To duplicate an object:

1 **Select one or more objects.**
Hold down **Shift** and click to select several objects.

2 **Click the Duplicate tool in the toolbar.**
4th Dimension duplicates the selected object or objects.

Moving Objects

You can move objects by selecting them and dragging with the mouse. You can also use the arrow keys to move the object one or ten pixels at a time.

- To move an object one pixel at a time, select the object and press an arrow key.

- To move an object ten pixels at a time, select the object, hold down the Ctrl key (on Windows) or Command key (on Macintosh), and press an arrow key.

Resizing Objects

You can resize any object on the label by selecting it and dragging a selection handle.

▶ To resize an object by dragging:

1 Select the object you want to resize.

2 Move the pointer over one of the four handles that appear on the selected object.

   The pointer changes into a multi-directional arrow ✛ and the handles disappear.

3 Drag the handle toward the center of the object to shrink it.
   OR
   Drag the handle away from the object's center to enlarge it.

   4$^{\text{th}}$ Dimension resizes the object.

Adding a Border to an Object

You can add a one-pixel border to an object. The border can be from one to nine pixels from the object.

▶ To add a border:

1 Select the object.

   The selected object is indicated by selection handles.
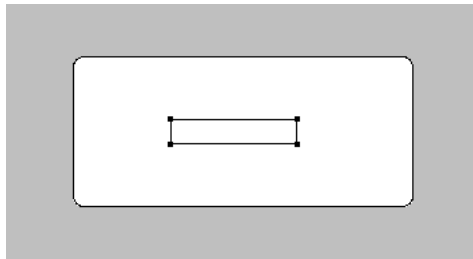
2 Hold down the Ctrl key (Command key on Macintosh) and press a number from 1 to 9.

A border is added to the object. The distance from the object (in pixels) is controlled by the number you pressed. The following illustration shows the results of pressing Ctrl+1.
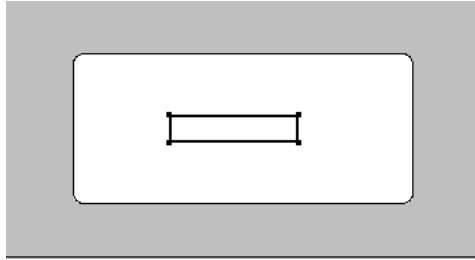
Adding Foreground or Background Colors

4th Dimension lets you add colors to objects for display on a color monitor or (if your printer supports color) for color printing. By combining selected colors with fill patterns, you can display thousands of different color shadings.

Note Colors appear black and white on a black and white monitor. They appear as shades of gray on a gray-scale monitor. The color palettes display shades on a gray scale monitor.

You can specify different colors for foreground pixels (pixels that appear black on a black-and-white monitor) and background pixels (pixels that appear white on a black-and-white monitor). If the object is a field or static text, the foreground color controls the color of the text and the background color controls the color of the object's rectangle.

You set foreground and background colors using the Background and Foreground picture menus in the Object Look area of the Label Wizard.

If your monitor supports 16 colors, choose the colors from the first 16 colors on each palette. If your monitor supports 256 colors (or more), any colors you choose will display properly.

Setting Fill Patterns   You can apply a fill pattern to any two-dimensional graphic object in the form such as an oval, a rectangle, a line, the enclosed area of a field or static text object, and a two-dimensional object's border.

The Fill picture menu controls the fill pattern for the selected object. The Border picture menu controls the fill pattern for the border.

Setting Border Patterns   You can set patterns for the borders of any object in the form that has a border such as an oval, a rectangle, and a grid object. The border patterns available are the same as the fill patterns. The appearance of the border also depends on the line width you have specified for the border.

The following illustration shows a fill pattern applied to the upper rectangle and a border fill pattern applied to the bottom rectangle.
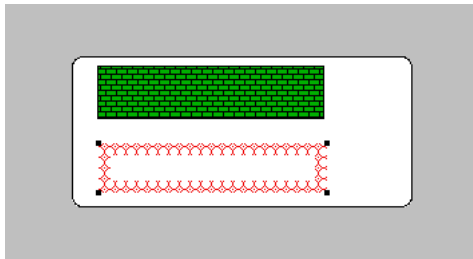
Setting Line Width   The Line Width pop-up menu controls the width of a line or the width of the border of a two-dimensional object.

To set a line width, select the object and choose a line width from the Line Width pop-up menu.

Restoring the Default Look   When you add an object to the label, it takes on the Object Look attributes of the most recently created object. If you want to assign the default Object Look attributes to this object (or any object), select the object and click Default Look. The foreground and background colors, fill patterns, and border width are reset to the default settings.

Adding a Graphic to the Label   In addition to the drawing tools in the toolbar, you can paste a graphic from the Clipboard into the label.

▶ To paste a graphic into the label:

1 Place the graphic on the Clipboard.

2 Choose Paste from the 4th Dimension Edit menu or press Ctrl+V (Command–V on Macintosh).

The graphic appears in the Label Preview area with selection handles.

You can then move, align, distribute, or resize the object like any other object.

Deleting Objects   You can delete the selected object by pressing the Backspace key (Delete key on Macintosh). If the selected object contains concatenated fields, the last field is removed is removed from the object. If you want to delete the entire object, continue pressing the Backspace or Delete key.
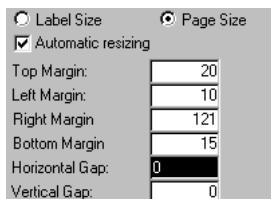
Specifying the Label Layout

You specify the label layout with the Layout page of the Label Wizard. You can display the Layout page at any time by clicking its tab.
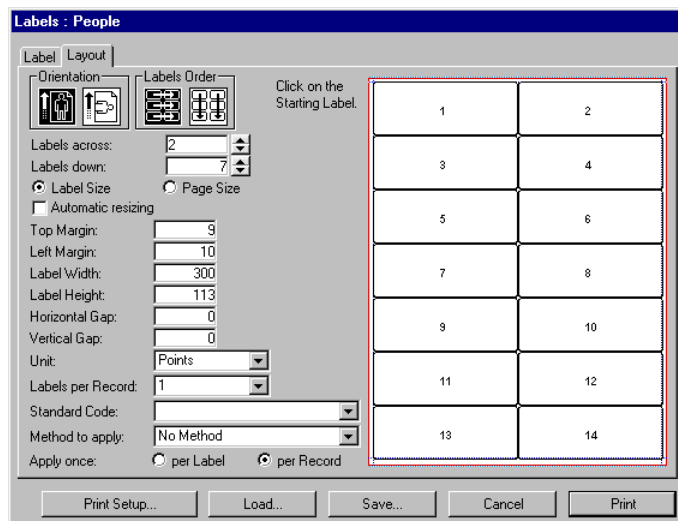
The Layout page contains the following elements:

- **Orientation and Labels Order buttons** These buttons enable you to specify the page orientation and the order in which information is assigned to labels.

- **Labels across and down boxes** These boxes are used to control the size of labels by specifying the number of labels that appear on your label paper.

- **Layout preview area** This area provides a reduced view of how an entire page of labels will look, based on the dimensions you enter in the Label Wizard. The page preview also reflects the paper size selected in the Print Setup dialog box. You can also select the first label on the page to be printed. The red border indicates the size of the physical page and the blue border indicates the size of the printable area.

- **Label Size and Page Size radio buttons** These buttons are used to select the label or the page for setting label and page dimensions. If you click Label Size, you can enter the label width and label height in the appropriate areas. If you click Page Size, you can enter values for right margin and bottom margin, as shown below.

- **Margin boxes** These boxes are used to specify the dimensions of the label and the page size, depending on the radio button you select. After you have entered the margins of your label paper, you may need to make some additional adjustments so that the label text is centered in the labels. You can use both positive and negative numbers in the Margin boxes to increase and decrease the margins.

- **Automatic Resizing** If **Automatic Resizing** is checked, the values in the Label Width and Label Height entry areas are set automatically.

- **Horizontal Gap** This area controls the amount of space between label columns.

- **Vertical Gap** This area controls the amount of space between label rows.

- **Unit drop-down list** This drop-down list allows you to change the units in which you specify your label and label page measurements. You can use pixels, millimeters, centimeters, or inches.

- **Labels per record drop-down list** This control lets you print more than one copy of each label. If you print more than one copy, 4th Dimension prints the copies consecutively rather than making copies of the label pages.

- **Standard Code drop-down list** This control lets you specify the label, page dimensions, and margins by choosing a standard commercial label paper from the drop-down list.

- **Method to apply** This control lets you choose a method that will be run at print time. For example, you can execute a method that posts the date and time that each label was printed.

- **Apply Once radio buttons** These radio buttons are used to specify whether to run the method once per label or once per record. this control has meaning only if you are printing more than one copy of each label and you are also executing a method at print time.

- **File buttons** These buttons provide options for page setup, printing, saving, and loading label designs.

▶ To specify the layout of the label paper you are using:

1 **Click the Layout page tab**.
The Layout page of the Label Wizard appears.
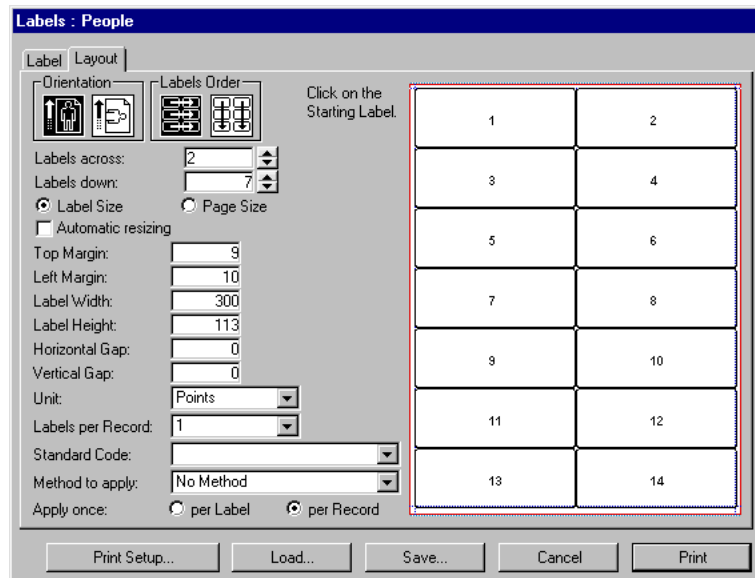
You can specify the design of the label paper using the entry areas on the Layout page or choose a standard design from the Standard Code drop-down list. This drop-down list contains specifications for a wide variety of standard commercial label sheets.

2 **Click the Print Setup button.**

The Print Setup dialog box for your operating system appears.

3 **Choose the desired printer and click OK.**

If necessary, the Label Preview area changes to reflect your selection.

4 **If appropriate, choose the type of label paper you are using from the Standard Code drop-down list.**

The remaining entry areas on the page change to reflect the selected label paper's characteristics. If necessary, you can modify these specifications.

5 **Click the appropriate Orientation and Labels Order radio pictures.**

You can choose between portrait and landscape orientation and horizontal or vertical order.

6 **Enter the number of labels in each row of your label sheet in the Labels Across box and the number of labels in each column in the Labels Down box.**

The Label Preview area adjusts to display the appearance of the labels on a printed page.

7 If the first sheet of label paper is partially used, click on the first blank label in the Label Preview area.

4th Dimension will begin printing labels on the label you indicated.

The following illustration shows the Preview area after clicking on the second label area.
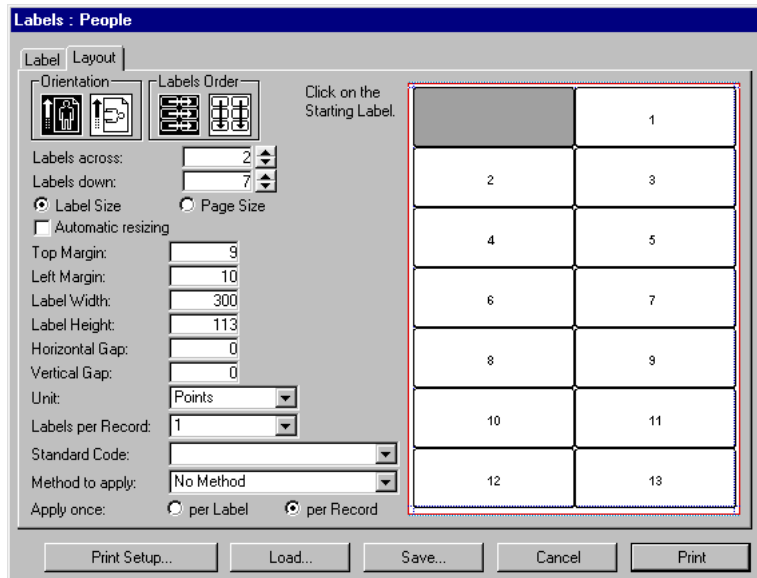
8 If desired, choose a unit of measurement from the Unit drop-down list to use for entering margin sizes.

9 Enter values to reflect the margins on your label paper.

Use the Label Size and Page Size radio buttons to control whether you use the entry area for the size of the label or the size of the page.

The size of the individual labels in the label page preview will adjust to accommodate the margins. For example, if you increase the size of your margins to two inches, top and bottom, the size of the individual labels will shrink to maintain the same number of labels that you specified earlier.

Because some printers use portions of the margin to hold the label sheet in place, the printer may not take the full margins into account when printing your labels. In this case, you may need to adjust the margin settings so the label text is properly centered in each label.

Since the printer uses part of the margins, the printer begins measuring the margins from a point that is not precisely at the edge of the label paper. When the labels are printed, the label text may appear skewed to the right or to the bottom of the label paper.

To compensate for this lost margin space, you can use negative numbers in some of the margin boxes. When placed in the Right margin box, negative numbers pull the label text to the right. When entered in the Top margin box, negative numbers pull the label text toward the top of the page.

Note As a rule, using a negative number in a margin box moves the label text toward the margin you are setting.

10 (Optional) If you want to print more than one copy of each label, use the Labels per Record drop-down list to choose the number of copies to print.

The copies are printed consecutively on the label paper. 4th Dimension does not duplicate the entire label page.

11 (Optional) If you want to run a method when the labels are printed, choose the method from the Method to Apply drop-down list.

12 (Optional) If you are running a method and printing more than one copy of each label, click either the Once Per Record or Once Per Label radio button in the Apply Once area.

This control has no meaning unless you are using both the multiple copies and method features.

Saving and Loading Label Designs

4th Dimension lets you save each label design as a file that you can open from the Label Wizard. By saving label designs, you can maintain a library of labels that you can use according to your needs.

Saving a Label Design   To save a label design:

1 **Click the Save button.**
4th Dimension displays a dialog box where you can enter a file name for the label design.

Note   Label files on Windows are denoted by the file extension .4LB.

2 **Enter a filename for the label design and click OK (on Macintosh, click the Save button).**

Loading a Label Design   You can load the label design whenever the Label Wizard is active.

▶ To load a label design:

■ **Click the Load button.**
4th Dimension displays an open-file dialog box where you can select the filename of a label design. Double-click the filename or select the filename and click OK. (On Macintosh, choose a filename and click Open).

4th Dimension replaces the current label design with the design you selected.

Printing Labels

After you have completed your label design, you can preview or print the labels. You may want to print first on regular paper so that you can check the placement of text before you use the more expensive label paper.

▶ To print your labels:

1 **Click the Print button.**
The Print dialog box appears for the printer you selected in the Print Manager. If you check the Print Preview check box before clicking OK, the labels are previewed to screen.

If you are printing using a form, 4th Dimension will use the selected form to print the labels. 4th Dimension assumes that the form was designed to print labels.

After the labels are printed, 4th Dimension closes the Label Wizard and returns you to the form you were using when you opened the Label Wizard.

10 Graphs

4th Dimension allows you to create a wide variety of two- and three-dimensional plots without having to export the data to a graphics package. You can create graphs from the data in your database or from data that has been copied to the Clipboard from another application. You can graph data directly from fields or you can graph the results of calculations on data.

You create graphs in 4th Dimension using the 4D Chart plug-in. You can access 4D Chart from the User environment from two menu commands:

- The Charts menu command in the Reports menu,

- The 4D Chart menu command in the Plug-ins menu.

When you access 4D Chart from the Reports menu, you open 4D Chart's Chart Wizard where you can create a new plot. When you access 4D Chart from the Plug-ins menu, it opens a blank 4D Chart document window.

You can print your graphs or copy them to the Clipboard and paste them into another application.

This chapter describes the basic procedure for creating a graph. Refer to chapters 11 to 16 for detailed information on installing 4D Chart in a form and working with advanced features of 4D Chart.

The Chart Wizard

The Chart Wizard is the dialog box in which you create graphs. You choose the graph type and specify the data to be graphed.

The Chart Wizard has three pages:

■ **Chart Type** Displays the types of charts supported by 4D Chart.
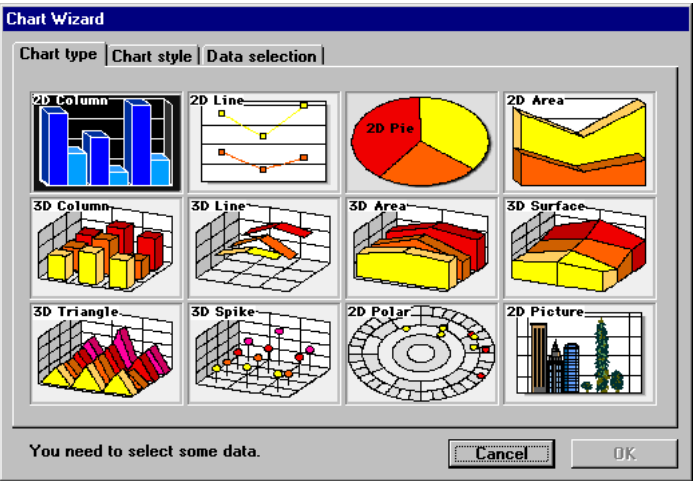
■ **Chart Styles** Displays the variations on the chart type selected in the Chart Type page. The following illustration shows the styles available for the 2D Column type.
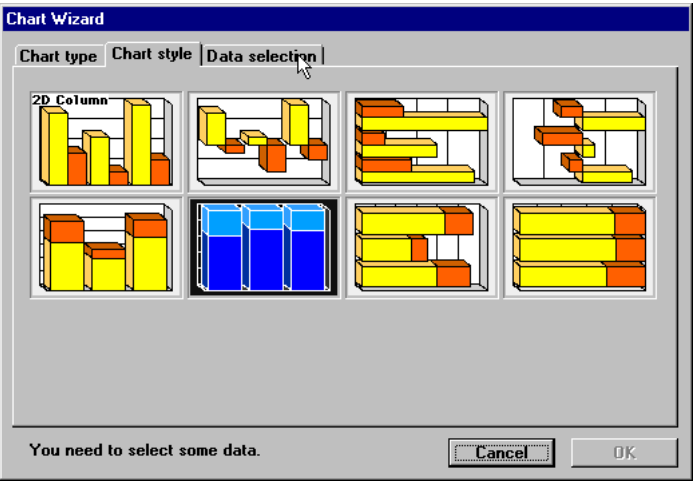
For complete information on the types and styles of charts available in 4D Chart, see Chapter 12, "Choosing a Graph Type", on page 195.

■ **Data Selection** Allows you to assign data to the chart axes. It displays the appropriate options for the selected chart type. The following illustration shows the Data Selection page for 2D Column charts.

Table drop-down list —————

Fields list —————
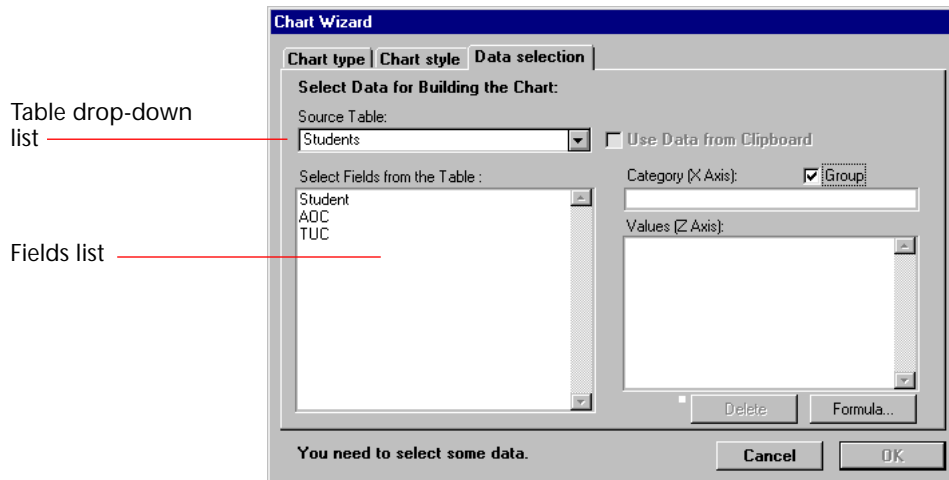
You create a chart by choosing a chart type in the Chart Type page and assigning data to the axes with the Data Selection page. Optionally, you may choose a chart style. If you do not make a selection from the Chart Style page, a default style for the selected chart type will be used.

4D Chart Terminology

4D Chart can create either two-dimensional or three-dimensional plots. For either type of plot, it refers to the horizontal (category) axis in the plot as the *X-axis* and the vertical (values) axis as the *Z-Axis*. If a third-dimension is included in the plot, it is a second category axis and is referred to as the *Y-axis*. The second category axis is sometimes called the *series* axis.

If you specify a two-dimensional chart type, the Data Selection page will have two entry areas — for the X- and Z-axis fields. If you specify a three-dimensional chart type, the Data Selection page will also have a Y-axis entry area in which you specify the series.

Creating a Graph

4D Chart graphs the records in the current selection. Before graphing data, select the records you want to graph. Methods of selecting records are discussed in Chapter 4.

▶ To create a graph:

1 Choose Charts from the Report menu.

The Chart Type page of the Chart Wizard appears. Complete descriptions of each chart type are in Chapter 12, "Choosing a Graph Type", on page 195.

2 Click a chart type.

When you chart type, the Chart Style and Data Selection pages change to match the requirements of the select type.

3 (Optional) Click the Chart Style tab.

The styles for the selected chart type appear.

4 (Optional) Click the desired chart style.

5 Click the Data Selection tab.

The Data Selection page appears, displaying the appropriate options for the selected chart type. The following illustration shows the Data Selection page for the 2D Column chart.
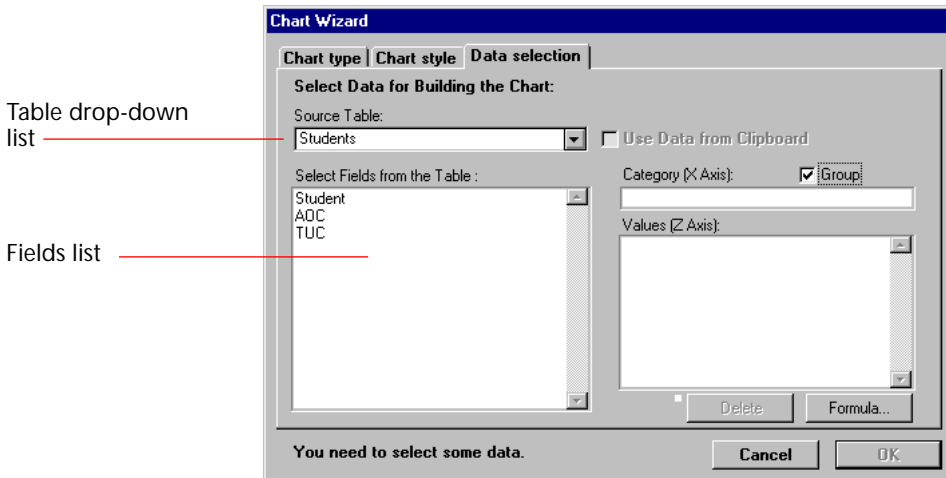
The Table drop-down list shows the current table and the Fields list shows the fields from the current table.

6   Drag the field that you want to assign to the Category axis to the Category box or double-click it.

7   (Optional) Drag the Series field to the Y-axis (Series) box or double-click it[1].

    The name of the field appears in the Y-axis (Series) box.

Note   If you make a mistake when choosing the X-axis or Y-axis fields, replace the field by dragging the desired to field to Category or Series box.

8   Drag one or more fields or formulas to the Z-axis area or double-click it.

    For instructions on creating a formula, see the section "The Formula Editor" on page 93.

Note   If you make a mistake when choosing a Z-axis field, click Delete to remove it.

9   If you want to have the Z-axis values summed for each X-axis category, click the Group check box.

    This option is used when the X-axis categories are not unique and you want each category to appear only once, with the values for each instance summed. For more information about this option, see the section "Grouping Non-unique Categories and Series" on page 229.

10 When you have finished designing your graph, click OK.

    4D Chart creates the graph and displays it in a 4D Chart window. The window includes the standard 4D Chart menus and tool palette. With these menu commands and tools, you can modify the chart.

Modifying the Graph

After you have created a graph, you can change its type or attributes.

Changing the Graph Type   After you have created a graph, you can plot the selected data using a different chart type. Of course, you can only choose among the chart types that are valid for the type of data that you are plotting. For example, if you are plotting two-dimensional data, you cannot choose a three-dimensional graph type.

---

1. Required only if you chose a 3D graph type.

▶ To change graph types:

■ Choose another graph type from the Graph drop-down list in the Chart Tool palette.
OR
Choose another graph type from Chart Type item in the Chart menu.
OR
On Macintosh only, hold down the Control key and press the mouse button to display a pop-up menu of graph types.
The graph is redrawn using the new graph type.

If you switch to a pie chart from a type of graph that displays more than one Z-axis field, 4th Dimension graphs only the first field assigned to the Z-axis.

Changing the Graph's Attributes

You can modify a graph using any of the tools available in 4D Chart.

For example, you can:

■ Resize a graph,

■ Customize graph axes,

■ Show and hide grid lines,

■ Display the series values,

■ Customize legends,

■ Modify or remove depth in a two-dimensional graph,

■ Change the perspective of a three-dimensional graph,

■ Change the graphic attributes of chart objects,

■ "Explode" a wedge from a pie chart,

■ Add a picture to a picture chart.

For complete information on modifying a graph, see Chapter 14, "Modifying Graph Features", on page 235.

Printing a Graph

After you are satisfied with your graph, you can print it. The procedure for printing a graph is the same as the procedure for printing a graph from a 4D Chart window.

For complete information on printing from 4D Chart, see the section "Printing 4D Chart Documents" on page 190.

Copying a Graph

You can copy a graph to the Clipboard and paste it into a Picture field in 4th Dimension or into another application.

▶ To copy a graph:

■ When the graph is displayed, choose Copy from the Edit menu.
  4th Dimension places the graph on the Clipboard.

11 Managing 4D Chart

4D Chart enables you to create custom graphs in 4th Dimension. You can include graphs as objects on forms or open 4D Chart in a separate window. When used on a form, a 4D Chart area appears as part of your data, just like any other piece of information.

4D Chart is available within 4th Dimension, through the Plug-ins menu of the User environment, and as a plug-in area that can be added to forms.

Because graphing capability is fully integrated into 4th Dimension, you graph data in your database, update your graphs when the information in the database changes, and publish a graph as a hot link for use with other 4th Dimension plug-ins. You can print your graphs or copy them to the Clipboard and paste them into other applications.

Finally, 4D Chart adds over 100 commands to the 4th Dimension language which enable you to control tasks that you normally perform manually. For example, you can use 4D Chart commands to create new graphs, modify graph features, open and save documents, execute any 4D Chart menu command, and work with hot links. For information on these commands, please refer to the *4D Chart Language Reference* manual.

4D Chart documents can be created in plug-in areas on forms or in separate plug-in windows. This chapter explains how to create, open, and save 4D Chart documents in both types of areas.

This chapter explains the basics of managing 4D Chart documents, including:

- Using 4D Chart in a plug-in window

- Opening a plug-in window

- Using 4D Chart in a 4th Dimension form

- Creating a 4D Chart area in a form

- Hiding and showing 4D Chart features

- Creating a new document

- Opening an existing document

- Saving a document

- Setting the document size

- Printing 4D Chart documents

Using 4D Chart in a Plug-in Window

You can use 4D Chart in its own window. When used in its own window, 4D Chart operates as if it were a separate application.

When you open 4D Chart in a plug-in window, the window has its own menu bar. 4th Dimension's menu bar remains at the top of the screen.

Labels: Close box, 4D Chart menu bar, Graph Tool palette, Object Tool palette, 4th Dimension menu bar, Zoom box, Title bar, Document area, Size box
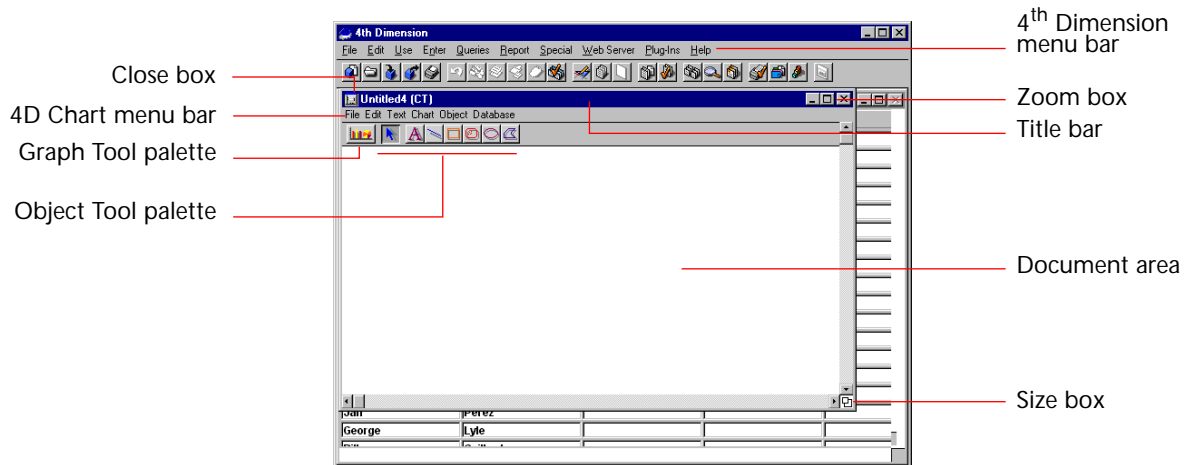
When you expand the window to full screen size by clicking the window's zoom box, 4th Dimension's menu bar remains at the top of the screen and 4D Chart's menu bar remains within the 4D Chart window.

Opening 4D Chart in a Plug-in Window

The 4D Chart command appears automatically as an item in the Plug-ins menu. If you have installed additional plug-ins that can be accessed in their own windows, they appear in the same menu.

► To open 4D Chart in its own window:

■ In the User environment, choose 4D Chart from the Plug-ins menu.

A new 4D Chart document opens in its own window.

You can open additional 4D Chart windows by choosing 4D Chart again from the Plug-ins menu. Opening several 4D Chart documents at the same time allows you to compare documents, copy and paste between documents, and move from one document to another simply by clicking in the appropriate window.

The titles of all 4D Chart windows appear at the bottom of the Plug-ins menu. You can bring any document to the front by choosing it from the Plug-ins menu.

When you save a document, its title bar displays the document name, plus the suffix "(CT)", which distinguishes 4D Chart documents from documents created by other plug-ins.

You can close a plug-in window at any time by clicking the window's control-menu box (on Windows) or the close box (on Macintosh).

Using 4D Chart in a Form

You can place a 4D Chart area in any form. When you use 4D Chart in an input form, you can display a graph for each record in the table. You can also use a 4D Chart area in an output form.

When 4D Chart is used in a form, the 4D Chart menu bar appears at the top of the 4D Chart area. You can choose menu commands from either the 4th Dimension menu bar or the 4D Chart menu bar.

▶ To expand a 4D Chart area:

■ **Choose Go to Full Window from the 4D Chart File menu.**
  OR
  Click the 4D Chart area's zoom box.

The document expands to fill the entire screen, and 4D Chart's menu bar temporarily replaces 4th Dimension's menu bar.
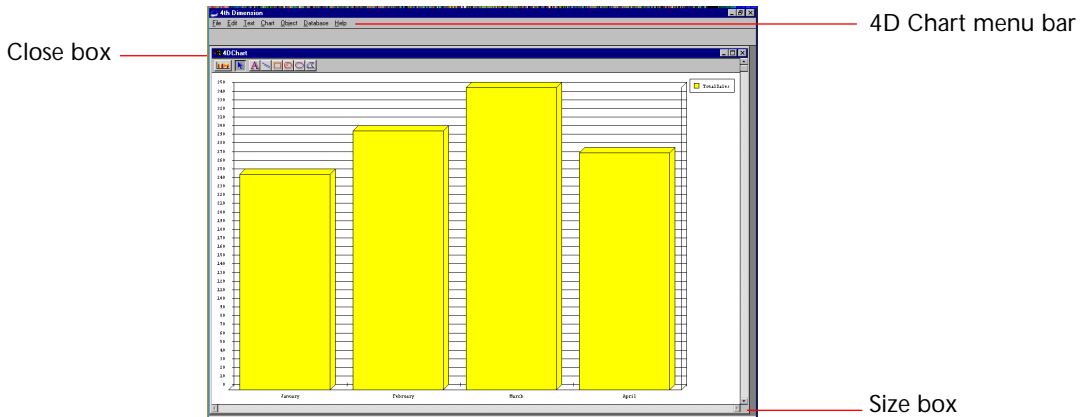
The expanded window has a size box and close box.

When the document window is expanded, the **Go to Full Window** menu item in the File menu changes to **Return to Form**.

▶ To reduce the window and return to the form:

■ **Choose Return to Form from the File menu.**
  OR
  Click the close box.

Creating a 4D Chart Area in a Form

You can add a chart area on an input form and save a chart with each record in the table.

▶ To create a 4D Chart area in a form:

1 **If you are not already in the Design environment, choose Design from the Use menu.**

The Structure editor window appears, showing the tables and fields for the database.

If you want the contents of the 4D Chart area to be saved with each record, you must create a Picture field for the area. The contents of a 4D Chart area are stored in a Picture field.

The next two steps assume that you wish to save the contents of the area with each record.

2 **Add a Picture field to the table whose form will contain the 4D Chart area.**

For information on creating a Picture field, refer to the *4th Dimension Design Reference*.

3 **Give the Picture field a name ending with an underscore (_).**

For example, you could name the field MyArea_.

New Picture field

Employees	
Name	A
Address	A
Salary	L
TimeStamp	H
MyArea_	P
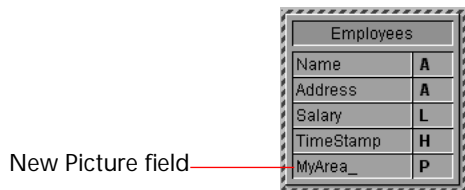
4 **Open the form to which you want to add the 4D Chart area.**

5 **In the Form editor, use the Active Object tool in the Tools palette or the Plug-in Object tool in the Objects palette to create an area for 4D Chart.**

4D Chart can use the entire form or it can share space with fields and other form elements.
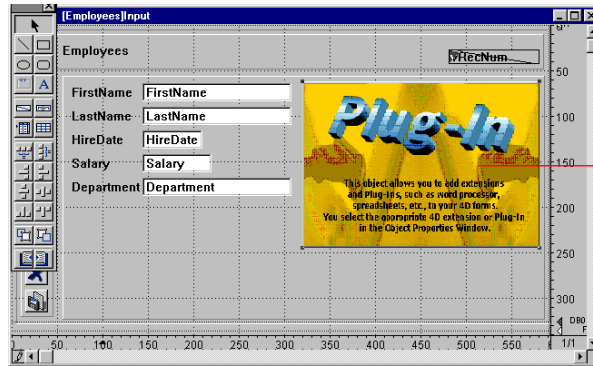
Plug-in area

6 If you used the Objects palette to create the plug-in area, double-click the object.

The Variable page of the Object Properties window for the object appears.

Name box

Object type drop-down list

Plug-In Area drop-down list
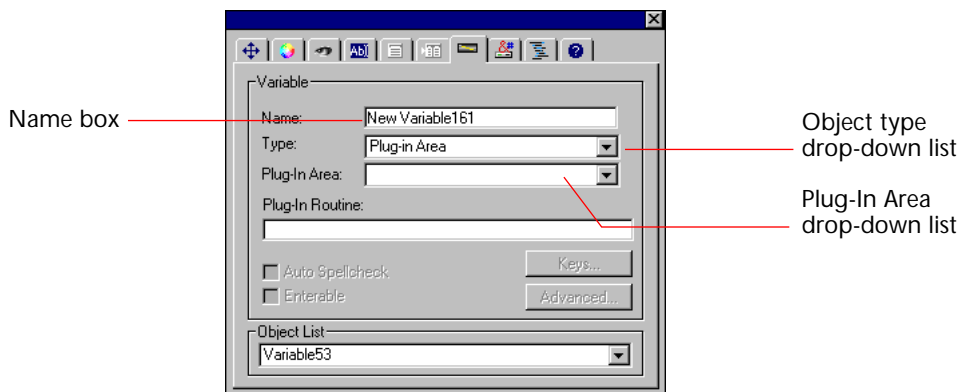
7 If Plug-in Area is not already selected from the Type drop-down list, select it.

If you created the area using the Objects palette, Plug-in Area is preselected.

8 In the Name area, name the 4D Chart area by entering the name of the Picture field, minus the underscore.

If you named the Picture field "MyArea_", you would name the 4D Chart area "MyArea".

Giving the 4D Chart area this name ensures that the contents of the area will be automatically saved with each record. If you do not have 4D Chart automatically save the contents of the area, 4D Chart will ask you if you would like to save the contents of the area when you accept

a record. If you click the Yes button, a save-file dialog box will appear, allowing you to save the 4D Chart document as a file on disk.

The Plug-In Area drop-down list lists the plug-ins you have installed in the database.

9 **Choose 4D Chart from the Plug-in Area drop-down list.**
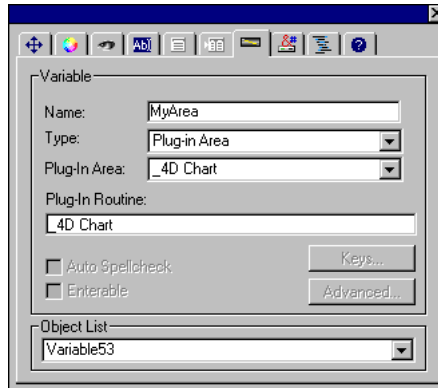
The area displays the 4D Chart document icon, the area name, and a message stating that the document will automatically be saved with the Picture field.
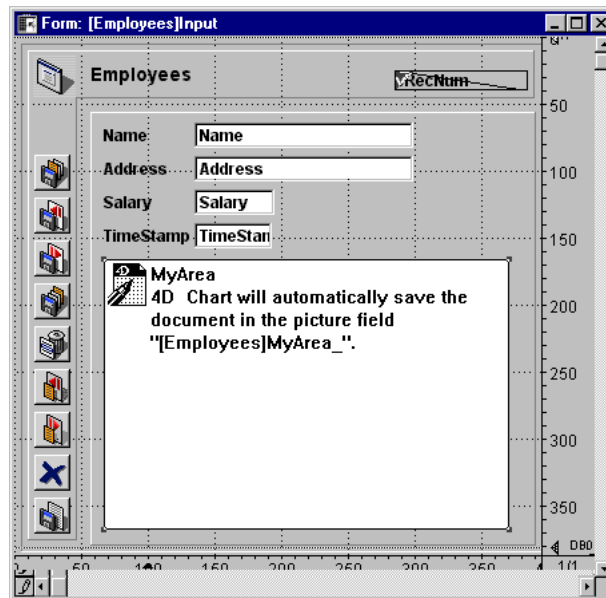
If the area name does not correspond to the Picture field name or if the Picture field does not exist, 4D Chart warns you that the document

will not automatically be saved with the record. The message states that the document *could* be saved *if* a Picture field with the appropriate name existed.
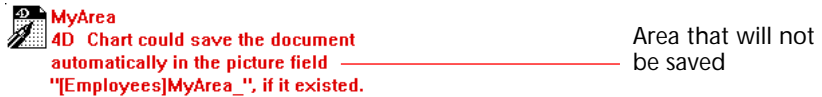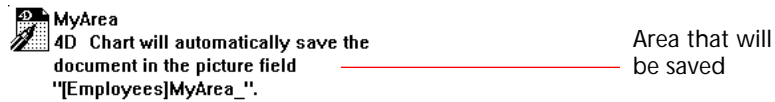
In some cases, you may not want the document to automatically be saved with the record. For instance, you might want to store your documents on disk and load them programmatically. In this case, you would not want to create a Picture field to store the documents.

If you have made a mistake and want the document to automatically be saved with the record, you can go back and correct the error. If the area name does not correspond with the Picture field name, you can correct the name by double-clicking the 4D Chart area in the form. The Variable page of the Object Properties window reappears, allowing you to type the correct name in the Name box.

If the Picture field does not yet exist, you can create the Picture field in the Structure editor. In fact, it does not matter which you create first — the Picture field or the 4D Chart area. If you wish, you can create the 4D Chart area on the form first and then go back and create the corresponding Picture field.

Hiding and Displaying 4D Chart Features

You can choose to hide or display several of 4D Chart's features, including:

■ The 4D Chart menu bar

■ The Object Tool palette

■ The Chart Tool palette

■ Scroll bars

■ Rulers

Use the **Display** submenu of the **Edit** menu of the plug-in area to hide or display these items. Items that are checked in the Display submenu are displayed in 4D Chart.
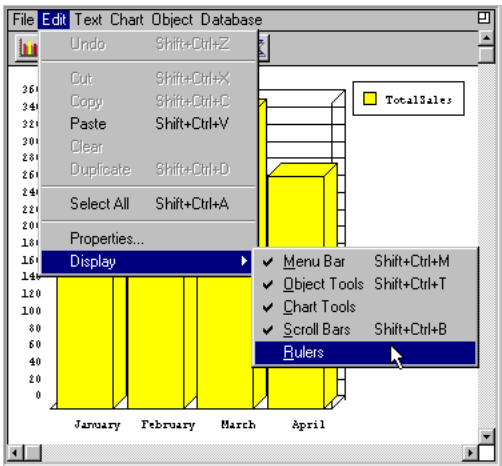
Note If you have hidden the 4D Chart menu bar, you can display it by pressing **Ctrl-Shift-M** on Windows or **Command-Shift-M** on Macintosh.

Creating a New 4D Chart Document

You can create a new, blank 4D Chart document at any time. The new document replaces the current document. If you have made changes to the current document, you will be prompted to save them before opening a new document.

▶ To create a new document:

■ **Choose New from the 4D Chart File menu.**

An empty document appears in which you can create a new graph.
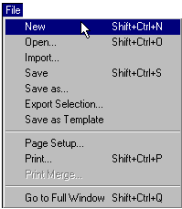
Opening a 4D Chart Document

You can open any previously saved 4D Chart document in a 4D Chart area. The newly opened document replaces any current document.
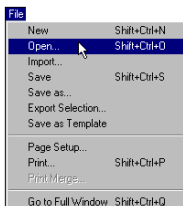
▶ To open a 4D Chart document:

1 Choose Open from the 4D Chart File menu.

A standard open-file dialog box appears.

2 Select a document.

3 Click Open.

The document opens in the current 4D Chart window.

Saving a 4D Chart Document

You can save the contents of a 4D Chart document regardless of whether the document was created in a plug-in window or in a form. 4D Chart offers several ways to save documents:

■ As a file

■ As part of a record

■ As a template for a 4D Chart area

Saving a 4D Chart Document as a File

Any document that you create using 4D Chart can be saved as a separate document for use in another place — either in the same database, in another database that uses 4D Chart, or in an entirely different application. You use the standard Save and Save As menu items in the 4D Chart File menu to save and update individual documents.

Documents you save can be opened with the Open menu item in the 4D Chart File menu. It makes no difference whether a document is created in a plug-in window or in a form; a document can be saved and opened in either place.

If you save a 4D Chart document as a file, when you reload the file, the document appears exactly as it was when you saved it. To update the information in any graphs in the document, you must use the Update menu item in the Chart menu, which is described in more detail in the section "Updating the Data in a Graph from the Database" on page 220.

▶ To save a 4D Chart document:

1 Choose Save As from the 4D Chart File menu.

Notice that you choose **Save As** from the 4D Chart **File** menu, not the 4th Dimension File menu. 4D Chart displays a save-file dialog box.
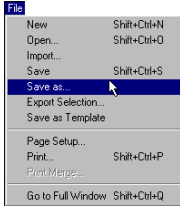
2 Enter a filename for the document.

3 Click Save.

4D Chart saves the document with the filename you entered.

Saving a 4D Chart Document as Part of a Record

If you have created a 4D Chart area on a form and have created a Picture field to store the contents of the area, the contents of the area are automatically saved with each record when the record is accepted.

For more information on creating 4D Chart areas on forms, see the section "Creating a 4D Chart Area in a Form" on page 181.

If you save a 4D Chart document as part of a record, when you reload the record, the document appears exactly as it was when you saved it. To update the information in any graphs in the document, you must use the **Update** menu item, which is described in more detail in the section "Updating the Data in a Graph from the Database" on page 220.

Saving a 4D Chart Document as a Template

You can create a standard document that is the same for every record by saving the document as a template. You can create templates for 4D Chart only on forms.

When you save a document as a template, the template is used for every new record that is opened in the form.

Each document starts with the same template, but any unique modifications you make to it are saved with the record. There can be only one template for each 4D Chart area on a form.

If there is a graph in the document that is saved as a template, the graph is updated automatically for each record, if possible. 4D Chart can update a graph only if it was created from data stored in records in the database.

▶ To save a document as a template:

■ **Choose Save as Template from the 4D Chart File menu.**

4D Chart saves the document with a special filename. The filename is the name of the 4D Chart area on the form, plus an underscore.

For example, an area named "Document" will have a template file named "Document_".

Because 4D Chart automatically names the file and places it in the database directory; no save-file dialog box is displayed.
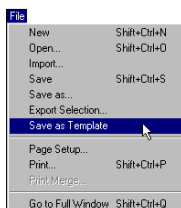
Note You can use Customizer Plus to specify where 4D Chart templates are read from and saved to with a 4D Server database: the server machine or the client machine. Customizer Plus is provided with 4th Dimension and 4D Server.

If you make changes to the document and want to incorporate those changes in the template, choose Save as Template again.

You can create a template for a 4D Chart area without using the Save as Template menu item simply by saving the document with a filename that is the same as the name of the 4D Chart area, plus an underscore, and placing the file in the database directory. This feature allows you, for example, to create a document in one database and use it as a template in another database. You can also create a document in one document area and use it as a template in another document area.

You can temporarily disable the use of a particular template file by changing the template filename or moving the file out of the database directory.

Setting the Document Size

You can change the document size by changing the number of pages in the document or by specifying a new document size in points. The maximum drawing size is 3500 x 3500 points. You can add pages to the right of the first page, below it, or both.

▶ To change the document size:

1 **Choose Properties from the 4D Chart Edit menu.**

The Properties dialog box appears. The default document size is one page.

Click here to add or remove pages ——————

Enter values here to set the drawing area to a specific size
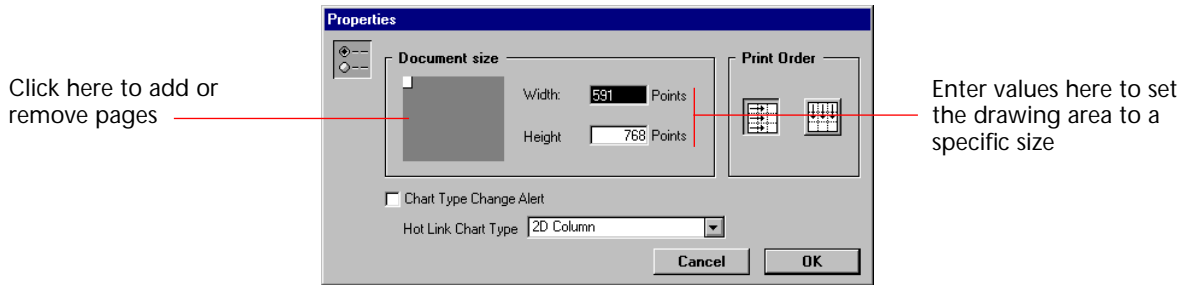
The document size is indicated by the point values to the right of the model document area and by the white rectangles in the model document area.

2 **Click in the model document area to adjust the number of pages in the drawing.**
OR
Enter the exact size of the document (in points) in the Width and Height text areas.

Printing 4D Chart Documents

You can print any 4D Chart document. This section discusses printing 4D Chart documents in the following ways:

■ As a single 4D Chart document

■ As part of a 4th Dimension form

■ As a part of a print merge, in which you print a 4D Chart document for each record in a selection of records

Setting the Print Order

The order in which a multi-page document is printed (either horizontally or vertically) is determined by the print order selected in the Properties dialog box. You can select printing by row ▦, or printing by column ▦. The print order affects only the order in which the document prints; it does not affect the page orientation. The default is to print pages by row.

▶ To set the order in which a multi-page document is printed:

1 Choose Properties from the 4D Chart Edit menu.

The Properties dialog box appears.
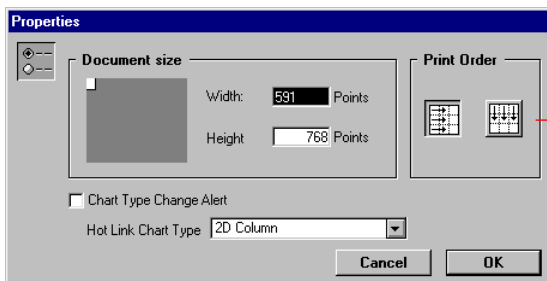
Print Order icons

2 Click the desired Print Order icon.

3 Click OK.

Printing the Document
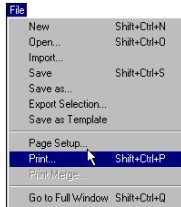
You can print 4D Chart documents from a plug-in window or from a 4D Chart area in a form. If the document is more than one page in length, you can select the pages you want to print.

```
File
  New                  Shift+Ctrl+N
  Open...              Shift+Ctrl+O
  Import...
  Save                 Shift+Ctrl+S
  Save as...
  Export Selection...
  Save as Template
  Page Setup...
  Print...             Shift+Ctrl+P
  Print Merge...
  Go to Full Window    Shift+Ctrl+Q
```

▶ To print a document:

1 **Choose Print from the 4D Chart File menu.**
The Print dialog box appears.

2 **Select options as necessary.**

3 **Click the Print button to begin printing.**

Printing a 4D Chart Area as Part of a Form

If a 4D Chart area is on a 4th Dimension form, you can print it with the record. In this case, you print from 4th Dimension, rather than from 4D Chart.

Before printing, be sure to select the records you want to print. For more information about selecting records in 4th Dimension, see

▶ To print a 4D Chart document as part of a record:

1 **Choose Print from the 4th Dimension File menu.**
A dialog box appears so that you can choose the print form.

2 **Choose the print form.**

3 **Click OK.**
The Page Setup dialog box appears.

4 **Select options from the Page Setup dialog box as necessary.**

5 **Click OK.**
The Print dialog box appears.

6 **Select options as necessary.**

7 **Click the Print button when you want to begin printing.**
The selected records are printed, including the 4D Chart documents.

Creating a Print Merge

You can perform a print merge of a 4D Chart document. Performing a print merge allows you to print a 4D Chart document for each record in a selection of records.

Note The values in any graphs in the document are not updated for each record.

Print merges are most useful when performed from 4D Chart plug-in windows.

You can perform print merges only for documents that contain references to 4th Dimension fields. The value in a field reference is determined by the current record being printed. The advantage to performing a print merge is that you can print a document for an entire selection of records without having to load and print for each record separately.

Note For information on adding field references, see the section "Inserting Field References" on page 265.

▶ To perform a print merge:

1 Choose Print Merge from the 4D Chart File menu.

The Create Merge Selection dialog box appears.

2 Choose the table whose records should be included in the print merge.

The dialog box displays the number of records currently selected for that table.
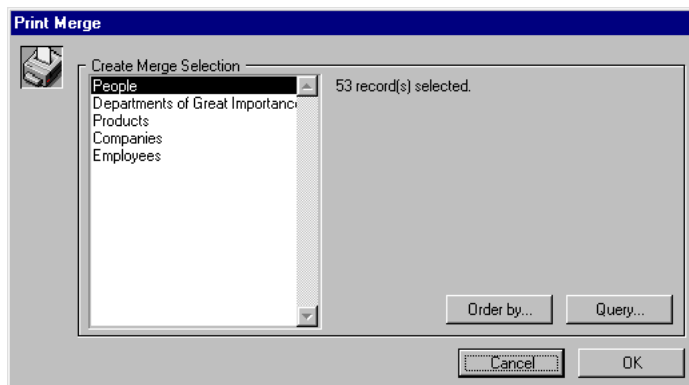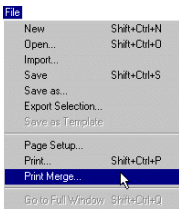
4D Chart will print the document only for the selected records.

3 If you want to change the selection of records, click the Query button.

The 4th Dimension Query editor appears. After you do the query in the Query editor, you will return to the Create Merge Selection dialog box. For more information about the 4th Dimension Query editor, see the section "Query Editor" on page 70.

4 **If you want the selected records to be sorted, click the Order By button.**

The 4th Dimension Order By editor appears. After you sort the records, you will return to the Create Merge Selection dialog box. For more information about the Order By editor, see the section "The Order By Editor" on page 103.

When you have selected the appropriate records, you can print the records.

5 **Click OK in the Create Merge Selection dialog box.**

The Print dialog box appears.

6 **Select the appropriate options and click OK.**

4D Chart prints the document for each record in the selection.

12 Choosing a Graph Type

4D Chart allows you to create two-dimensional and three-dimensional graphs from within your database. Once you decide what data you want to graph, you should think about what type of graph will best display that data.

The nature of the data that you are graphing will help indicate the type of graph you should choose. For example, a line graph is best suited for showing how values (such as "number of units sold") change over time.

Don't be afraid to experiment with different graph types. Once you have created a graph, you can easily convert it to another graph type. Creating graphs and changing their types are discussed in Chapter 13, "Creating a Graph" on page 211.

This chapter discusses the types of two- and three-dimensional graphs that you can create using 4D Chart. The features of each type of graph are described, along with the type of data that the graph is best suited to show.

Choosing a Two-dimensional Graph Type

This section briefly describes the parts of a two-dimensional graph and then presents each two-dimensional graph type.

The following diagram shows a two-dimensional (two-axis) graph:

Sales History: Widget Computers

Graph values on the Z-axis

Graph categories on the X-axis
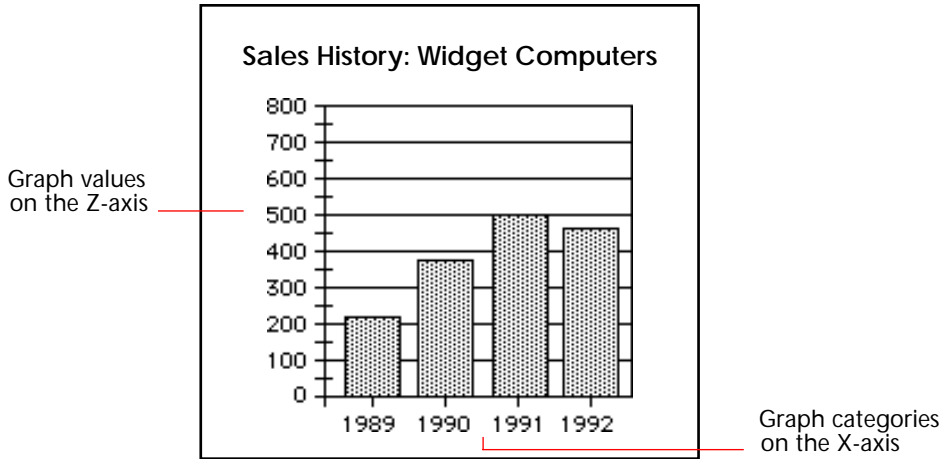
The X-axis is also called the *Category axis*. The X-axis displays the categories into which the information is divided. For instance, if you are graphing the number of computers sold per year, you would place the years on the X-axis.

The Z-axis is also called the *Values axis*. You use the Z-axis to display the values calculated for each category. In the computer sales example, the Z-axis would contain the values for the numbers of computers sold per year. For instance, if there were 500 computers sold in 1991, the Z-axis value corresponding to the X-axis category "1991" would be 500.

Another concept in graphing is the *data series* (or simply, *series*). Each category is composed of one or more series that further break down the information displayed in the graph. In this example, there was only one series, "computers sold." Therefore, the series is not represented by a separate field or formula.

However, suppose you want to compare the sales volumes from 1989 to 1992 for three models of computers. In this case, each computer model becomes a distinct series on the graph. All series share the same categories (in this case, the years 1989 through 1992), but have their own values.

Sales History: Widget Computers (by model)
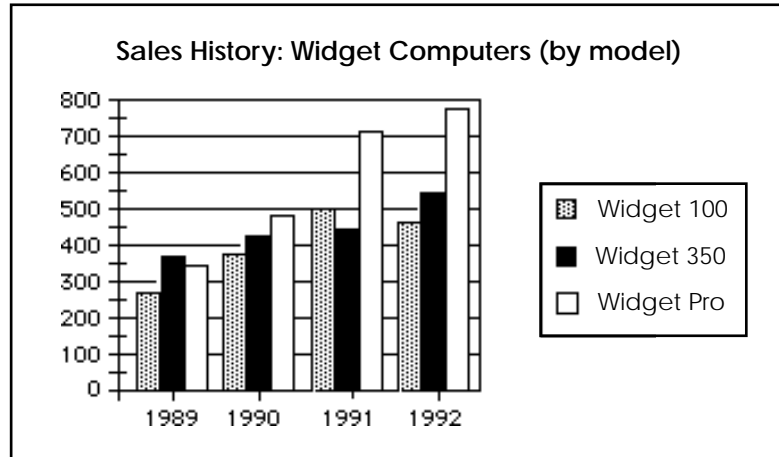
Another way to graph this data would be to create a three-dimensional graph of the data. This type of graph is discussed in the section "Choosing a Three-dimensional Graph Type" on page 204.

Area Graphs

Area graphs are commonly used to show the magnitude of values over time, but can show values over any continuous category.

Detection of Signal Tone as a Function of Decibels
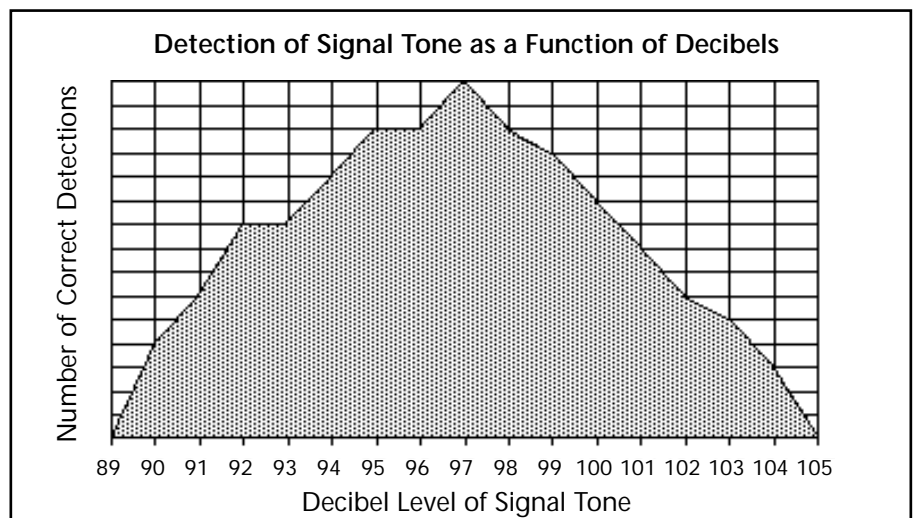
The categories on the X-axis should be continuous, such as times or temperatures. Discrete categories, such as salespeople or products, are better suited to column graphs.

Options

The following options are available for Area graphs:

- **Stacked** When graphing multiple series, stack the areas for the series.

- **Stacked, proportional** When graphing multiple, stacked series, show the series as proportions of a 100% whole.

- **Horizontal** Make the X-axis the vertical axis and the Z-axis the horizontal axis.
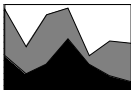
Stacked   Stacked, proportional   Horizontal

Column Graphs

Column and bar graphs are the most frequently used graph types for business data. They are most frequently used to compare one item to another, or one or more items over a period of time.

The following column graph uses the Depth feature, which makes each column look three-dimensional.

Ticket Sale Profits in 1993
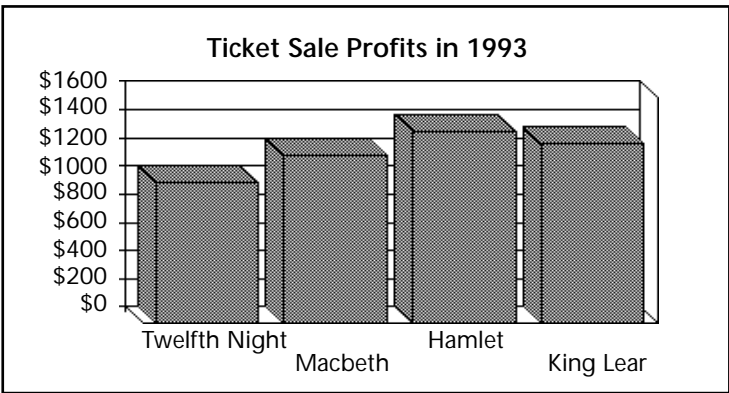
Note The Depth feature is discussed in more detail in the section "Modifying Depth in a Two-dimensional Graph" on page 251.

Options
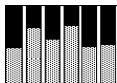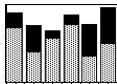
The following options are available for Column graphs:

- **Stacked** When graphing multiple series, stack the columns for the series in each category.

- **Stacked, proportional** When graphing multiple, stacked series, show the series as proportions of a 100% whole.

- **Horizontal** Make the X-axis the vertical axis and the Z-axis the horizontal axis. This option creates a bar graph. Bar graphs show the categories on the vertical axis, with the values expressed by the length of the bars. Bar graphs are often a useful alternative to column graphs, especially when the category labels are long.

- **Overlap** When graphing multiple series, use this option to specify the percentage by which the series columns within each category overlap each other.

- **Gap Width** Use this option to specify the spacial gap between the columns from one category to the next. The larger the gap, the narrower the columns for each category.

Line Graphs

Line graphs are often used to show the rate of change of values over time.
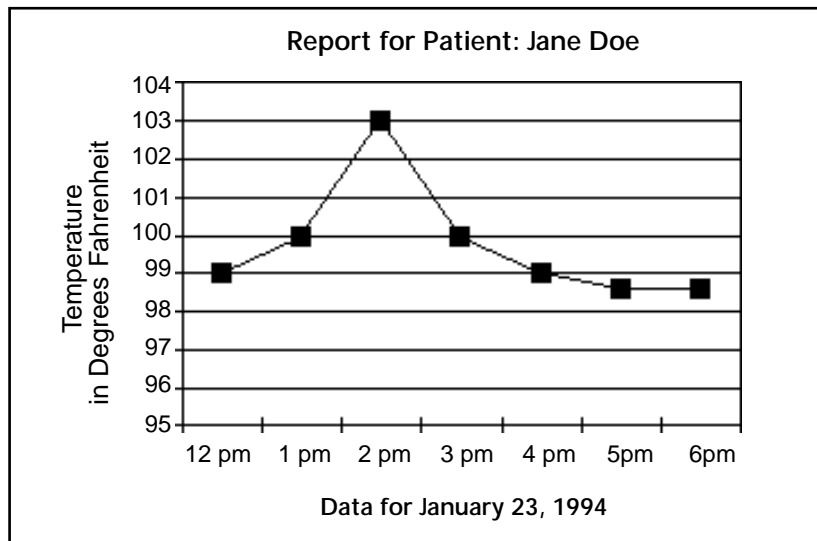
The values on the X-axis should be continuous or ordered, such as times or temperatures. Discrete categories or categories that do not have an order — such as salespeople or products — are better suited to column graphs.
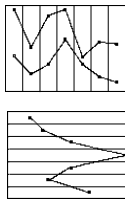
Options

The following options are available for Line graphs:

- **Stacked** When graphing multiple series, stack the lines for the series in each category.

- **Horizontal** Make the X-axis the vertical axis and the Z-axis the horizontal axis.

Scatter Graphs

Scatter graphs can show relationships and trends in your data.

Relationship of Weight to Height in Male Subjects
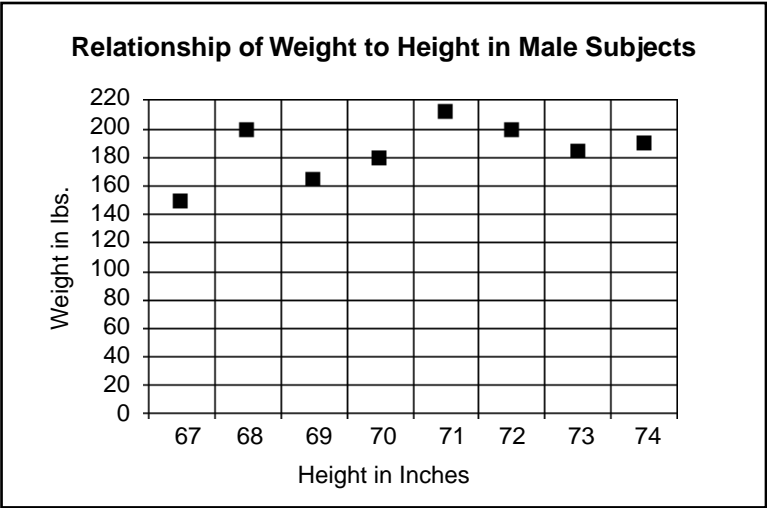
Each value appears as a dot in the graph. Scatter graphs are most often used when there are a large number of different values of the X-axis field, as in a scientific study.

Options
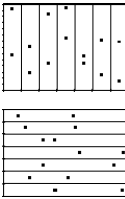
The following options are available for Line graphs:

- **Stacked** When graphing multiple series, stack the values for the series in each category.

- **Horizontal** Make the X-axis the vertical axis and the Z-axis the horizontal axis.

Pie Charts

Pie charts show data as a percentage of a whole. Your data does not need to be expressed as percentages; 4D Chart automatically converts the data into percentages when it creates the pie chart.

Each pie chart can have only one series. Categories are displayed in the legend.
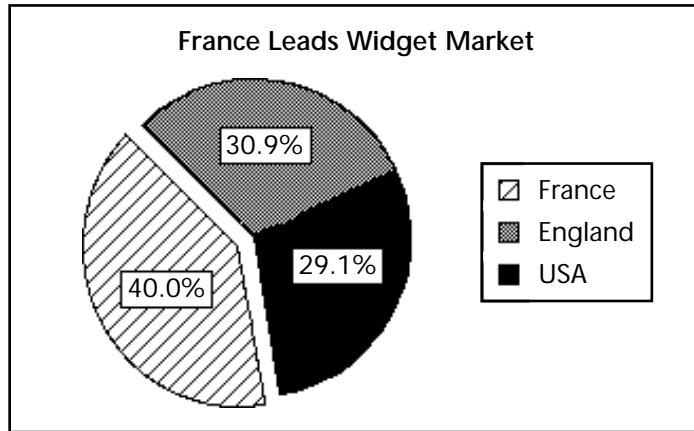
Options

The following option is available for pie charts:

- **Start Angle** Use this option to specify the rotation of the chart. The specified angle determines the placement of the first edge of the first category in the chart.
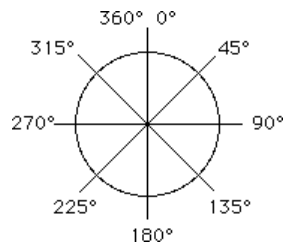
Picture Graphs

Picture graphs are similar to column graphs, except that you can substitute a picture for the column.

Ages of Feline Patients on 1/24/94
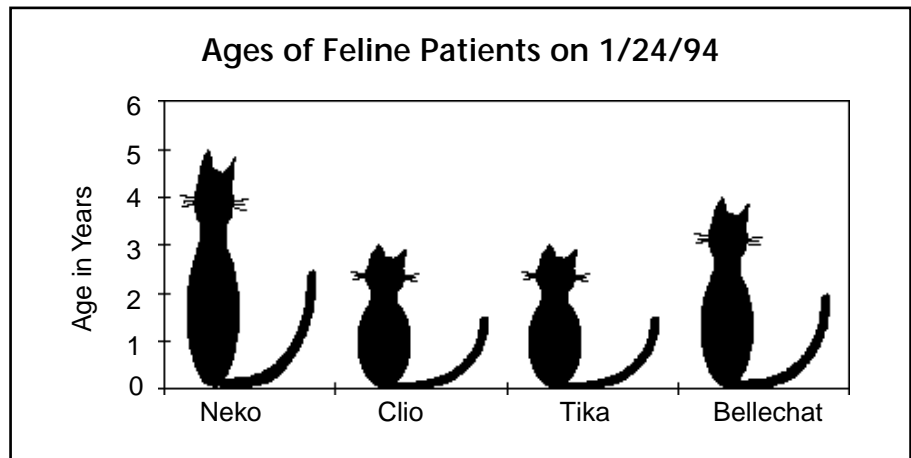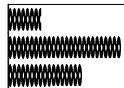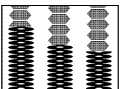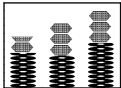
Options

The following options are available for Picture graphs in 4D Chart:

- **Stacked** When graphing multiple series, stack the pictures for the series in each category.

- **Stacked, proportional** When graphing multiple, stacked series, show the series as proportions of a 100% whole.

- **Horizontal** Make the X-axis the vertical axis and the Z-axis the horizontal axis. This option creates a bar picture graph.

- **Overlap** When graphing multiple series, use this option to specify the percentage by which the series within each category overlap.

- **Gap Width** Use this option to specify the spacial gap between the picture columns from one category to the next. The larger the gap, the narrower the picture columns.

Additional options for aligning and adjusting the pictures are discussed in the section "Adding Pictures to a Picture Chart" on page 257.

Polar Charts

Polar charts are used to show distribution of data around a central point. In a polar chart, each point is plotted in terms of degrees from the zero point and distance from the center.

Each data point on a polar chart is plotted using one Z-axis field to specify the angle in degrees and a second Z-axis field to specify the distance from the center.
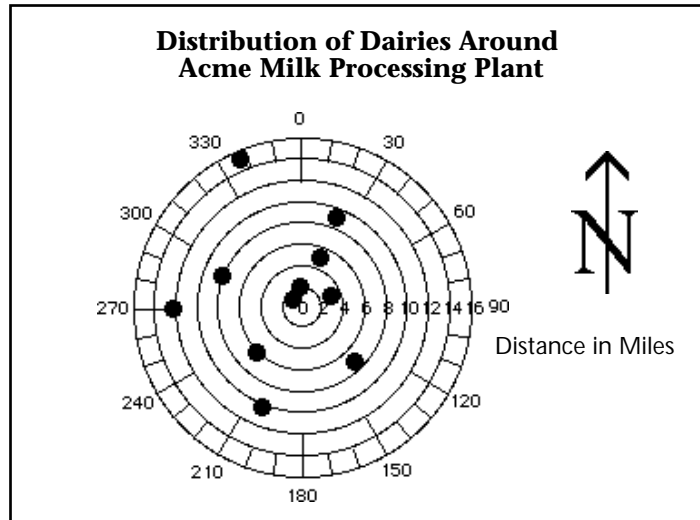
Options

There are no options available for polar charts.

Choosing a Three-dimensional Graph Type

This section briefly describes the parts of a three-dimensional graph and then presents each three-dimensional graph type.

The following diagram shows a three-dimensional (three-axis) graph:
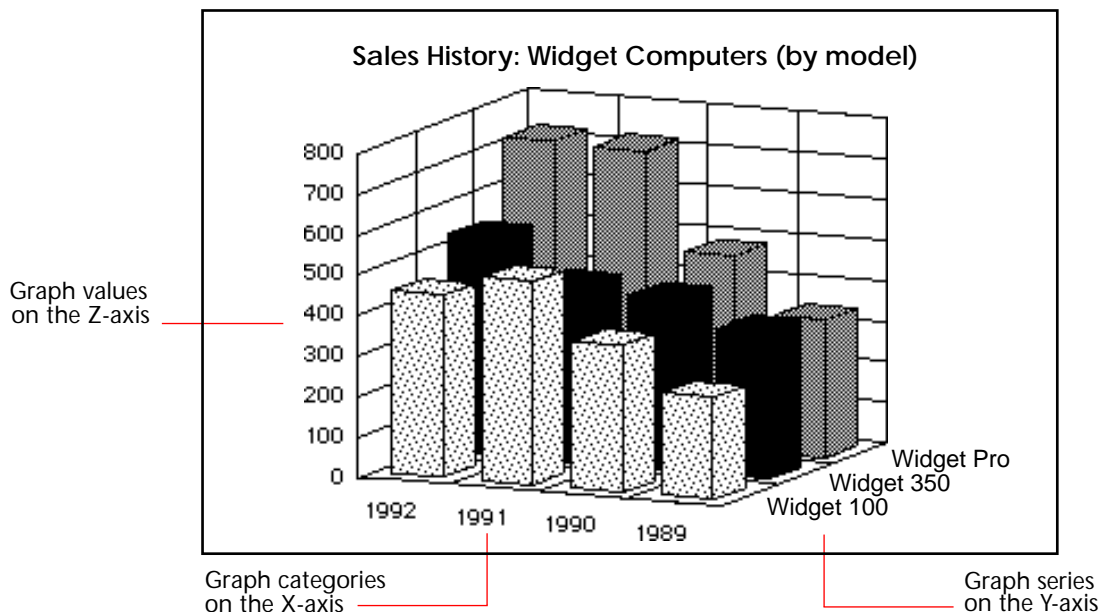
As with a two-dimensional graph, the X-axis (or, Category axis) displays the categories into which the information is divided. For instance, if you are graphing the number of computers sold per year, you would place the years on the X-axis.

In a three-dimensional graph, the Y-axis is also called the Series axis. Each category is composed of one or more series that further break down the information for each value of the X-axis field. Each data point in the graph is the intersection of one category and one series. In the example illustrated above, each computer model is a series.

In a two-dimensional graph, the series remain on the X-axis. The columns representing each series are distinguished by their patterns. In a three-dimensional graph, the series are displayed on their own axis. Each series still has its own pattern, but now the series are also separated from each other in space.

The Z-axis displays the values calculated for the intersection of each category and series. In the computer sales example, the Z-axis would contain the values for the numbers of each type of computer sold per year. For instance, if there were 725 Widget Pro computers sold in 1991, the Z-axis value corresponding to the X-axis category "1991" and the Y-axis series "Widget Pro" would be 725.

3D Column Graphs

3D Column graphs, like 2D Column graphs, compare one item to another, or one or more items over a period of time.
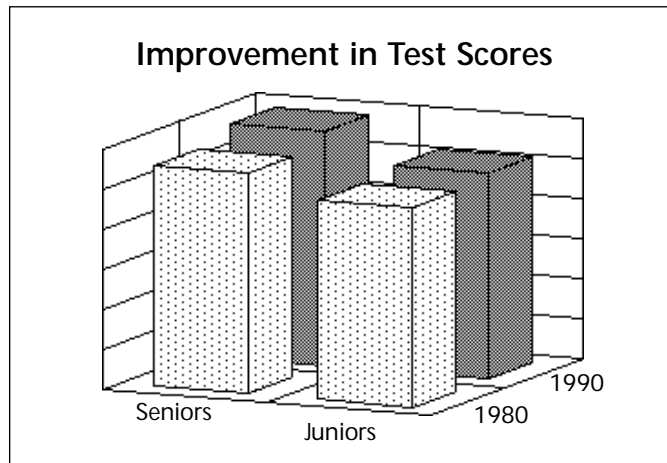
Options

The following options are available for 3D Column graphs:

- **Category Gap/Width** The gap between or width of the categories in the graph. The larger the category gap, the smaller the category width.

- **Series Gap/Width** The gap between or width of the series in the graph. The larger the series gap, the smaller the series width.

- **Tops only** Show only the top side of each column.
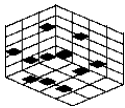
3D Line Graphs

3D Line graphs show trends in your data. They should be used for continuous categories, such as time.

Trends in Widget Imports and Exports

1980   1985   1990   1995

Exports
Imports
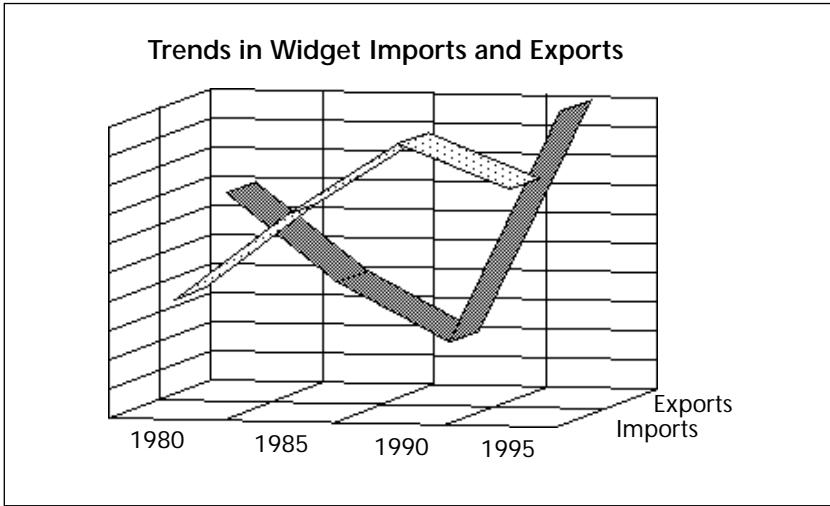
Options

The following option is available for 3D Line graphs:

- **Series Gap/Width** The gap between or width of the series in the graph. The larger the series gap, the smaller the series width.

3D Area Graphs

3D Area graphs emphasize the volume or size of the series over a continuous category, such as time.

Pattern of Rainfall in Simi Valley

Jan   Mar   May   Jul   Sep   Nov
  Feb   Apr   Jun   Aug   Oct   Dec

1992
1991
1990
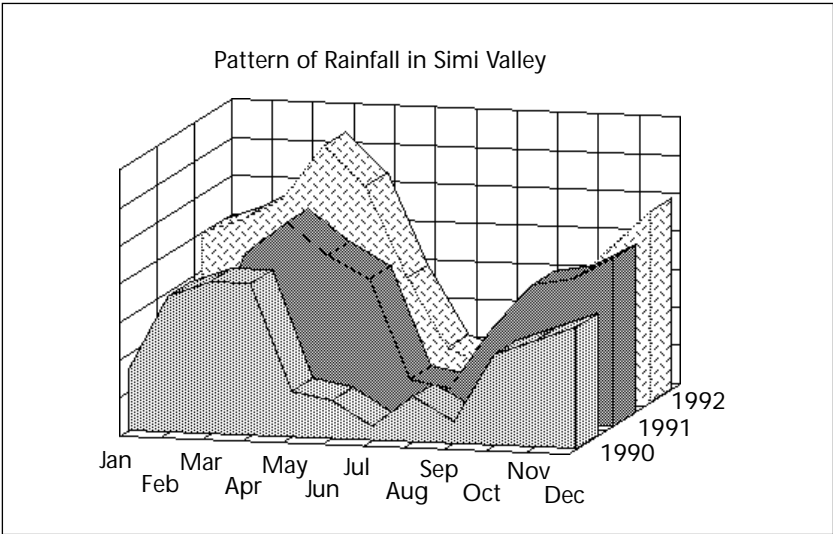
Options

The following option is available for 3D Area graphs:

■ **Series Gap/Width** The gap between or width of the series in the graph. The larger the series gap, the smaller the series width.

3D Surface Graphs

Surface graphs show three-dimensional data where the Z-axis value varies depending on the X- and Y-axis values. Surface graphs are commonly used to graph the results of mathematical formulas.

The following graph was created using a mathematical formula.

$$z = (1 - x)^2 + y^2$$
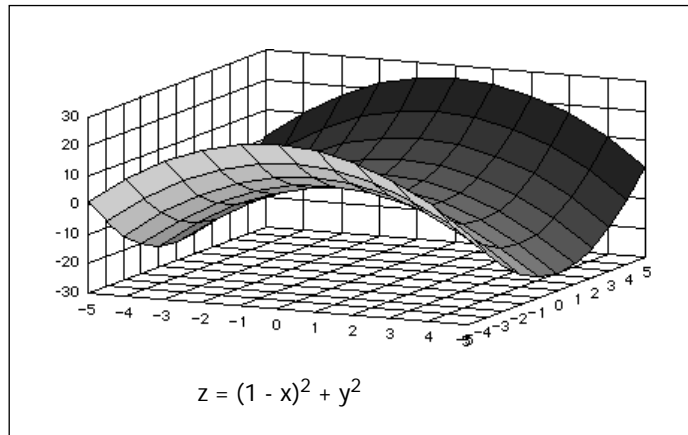
Options

The following option is available for 3D Surface graphs:

■ **Tops only** Show only the top side of the surface, not the sides. This option is used in the previous example graph.

Here is an example of a surface graph with sides.
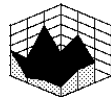
3D Triangle Graphs   3D Triangle graphs compare one item to another, or one or more items over a period of time. 3D Triangle graphs are an alternative to 3D Column graphs.

Annual Number of Visitors
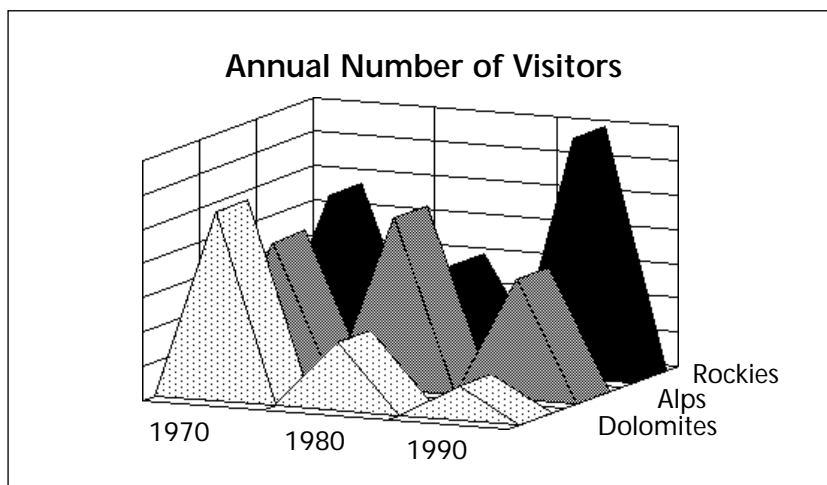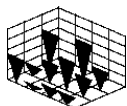
Options   The following options are available for 3D Triangle graphs:

■ **Series Gap/Width** The gap between or width of the series in the graph. The larger the series gap, the smaller the series width.

■ **Flipped** The triangles appear flipped vertically.

■ **Plot Zero Values** If this option is not selected, zero values will be omitted from the graph.

3D Spike Graphs   3D Spike graphs show the intersection of three values. Each data point is connected to the Category plane with a drop line.

Effects of Density and Pressure on Q Factor
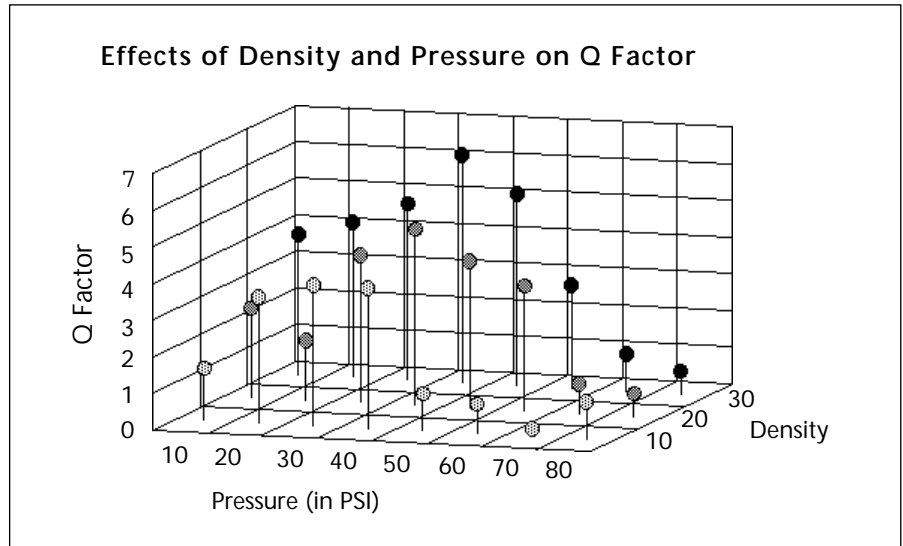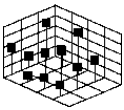
Options   The following option is available for 3D Spike graphs:

■ **Oval/Square Heads** Use this option to specify whether the spike heads are oval or square.

13 Creating a Graph

This chapter includes the basic steps for creating a graph.

After reading this chapter, you will be able to:

■ Create a two-dimensional or three-dimensional graph from data stored in the database or copied to the Clipboard

■ Update a graph created from data in the database

■ Change a graph's type

■ Change the options specific to each graph type

Creating a Graph From Data in the Database

4D Chart allows you to create two-dimensional and three-dimensional graphs based on the data in fields in your database. You can graph the values in the fields themselves, or you can graph the values that result from formulas that use the fields.

Whatever the case, when you create a graph, you select the data that you want to graph on each axis. For each axis, there are certain restrictions on the data types that can be graphed. If a data type cannot be graphed on a certain axis, fields of that type will appear dimmed in the Chart Wizard. The following table provides information on the types of data that can be assigned to the Categories or Series axis and the Values axes.

Data Type	Category or Series Axis?	Values Axis?	Compatible Types on Values Axis
Alphanumeric	Yes	No	-------
Text	Yes	No	-------
Real	Yes	Yes	Integer, Long integer
Integer	Yes	Yes	Real, Long integer
Long integer	Yes	Yes	Real, Integer
Date	Yes	Yes	-------
Time	Yes	No	-------
Boolean	Yes	No	-------
Picture	No	No	-------
Blob	No	No	-------

Creating a Selection of Records to Graph

Before you begin the process of creating a graph, you must create a selection of records to graph.

4D Chart can operate in its own window or in 4D Chart areas on forms. The following sections explain how to generate the selection of records to be graphed, depending on the 4D Chart location.

Creating a Selection of Records in a Plug-in Window

4D Chart graphs the records in the current selection. Before you create a graph in a plug-in window, select the records you want to graph.

4D Chart will not create a graph unless there is at least one record in the current selection of the table whose data you want to graph.

Creating a Selection of Records in an Input Form

A 4D Chart area in an input form can be used to graph data in other tables.

The table whose records you want to graph must have at least one record in its current selection. If the table that contains the form is automatically related to the table you wish to graph, the current record in the input form determines the selection of records in the related table.

Because you have a record loaded in an input form, you should avoid creating graphs from data in the current table. If you want to graph data from the same table as the input form, you must use PUSH RECORD and POP RECORD or create a new process with the New process function. For more information, see the descriptions of these commands in the *4th Dimension Language Reference*.

For more information about adding a 4D Chart area to a form, see the section .

Creating a Two-Dimensional Graph from Data in the Database

For a two-dimensional graph, you specify a field for the horizontal axis (X-axis) and one or more fields or formulas for the vertical axis (referred to in 4D Chart as the Z-axis).

The following example graph shows how 4D Chart uses the information in the database to create a graph. The graph plots the scores on two tests for each of 11 students. The X-axis field is Student ID, and the Z-axis fields are AOC Score and TUC Score.

Name of 1st Z-axis field

Name of 2nd Z-axis field

Scale values generated by 4D Chart from Z-axis values

Value stored in AOC Score field for Student #6

Categories stored in X-axis field
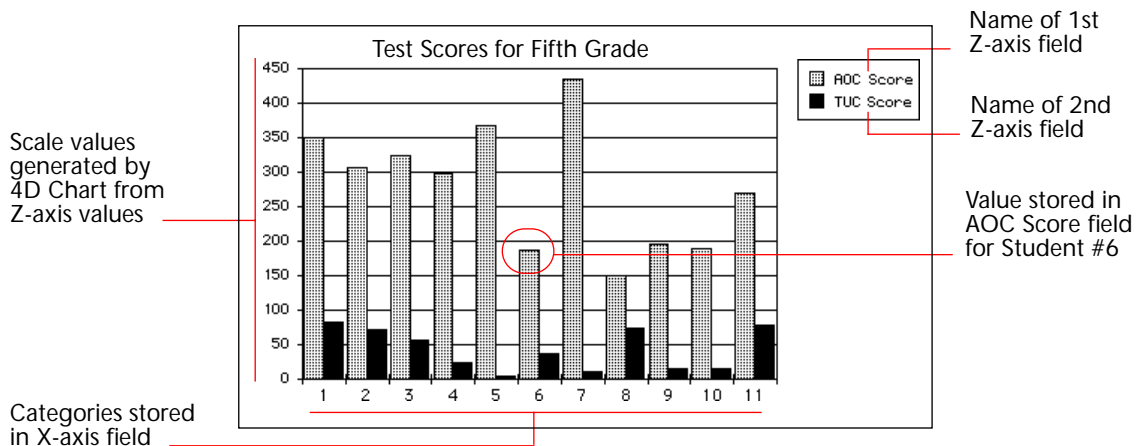
▶ To create a two-dimensional graph from data stored in the database:

1 Make sure that no graph is currently selected in the 4D Chart area.

To deselect a selected graph, click anywhere in the 4D Chart area outside the graph.

2 Click the Graph icon ▥ in the Chart Tool palette.
OR
Choose New Chart from the Chart menu.

The Chart Wizard appears. The Chart Wizard has three pages:

■ Chart Type displays the 12 chart types supported by 4D Chart and lets you choose a graph type.

■ Chart Style displays the variations on the type of graph that you selected in the Chart Type page. The Chart Style page changes depending on your choice of chart type.

■ Data Selection lets you select the table that contains the data you wish to graph and a field list. Use the Data Selection page to assign fields or formulas to the graph axes. The Data Selection page changes depending on the graph type you chose.

You must choose a chart type and use the Data Selection page to assign appropriate fields or formulas to each axis that the chart type requires. You do not need to choose a chart style.

The Chart Type page is shown below.
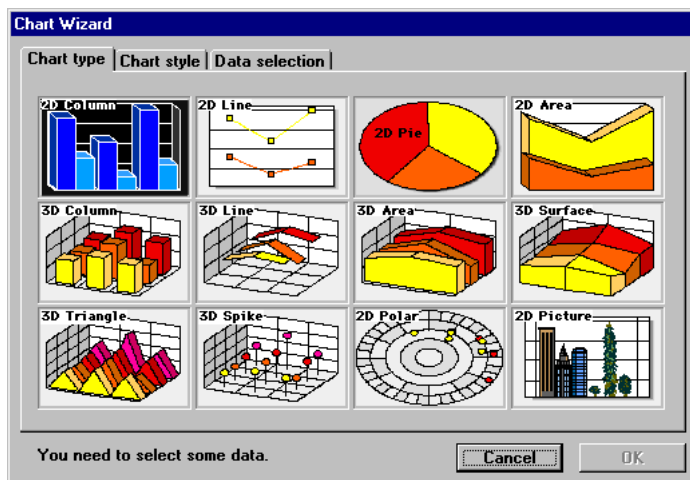
Note If you are creating a graph in a 4D Chart area in an input form, the current table is not listed in the Tables list because you cannot graph data from the current table.

3 Click a chart type.

When you chart type, the Chart Style and Data Selection pages change to match the requirements of the select type.

4 Click the Chart Style tab (Optional).

The styles for the selected chart type appear. The following illustration shows the styles available for the 2D Column chart type.
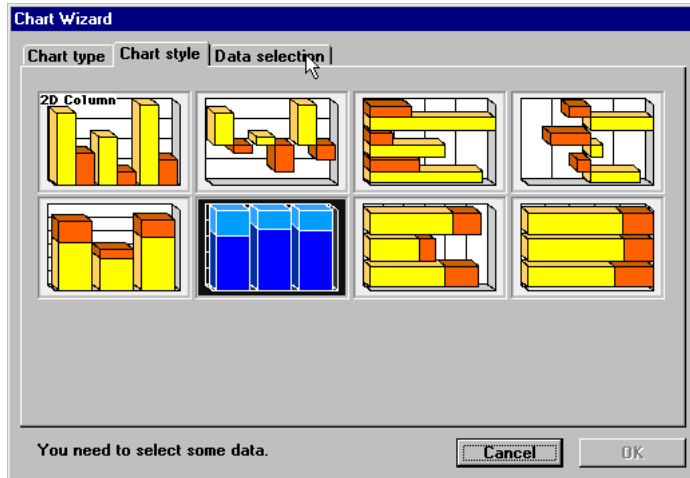
5 Click the desired chart style.

6 Click the Data Selection tab.

The Data Selection page appears, displaying the appropriate options for the selected chart type. The following illustration shows the Data Selection page for the 2D Column chart.

Table drop-down list
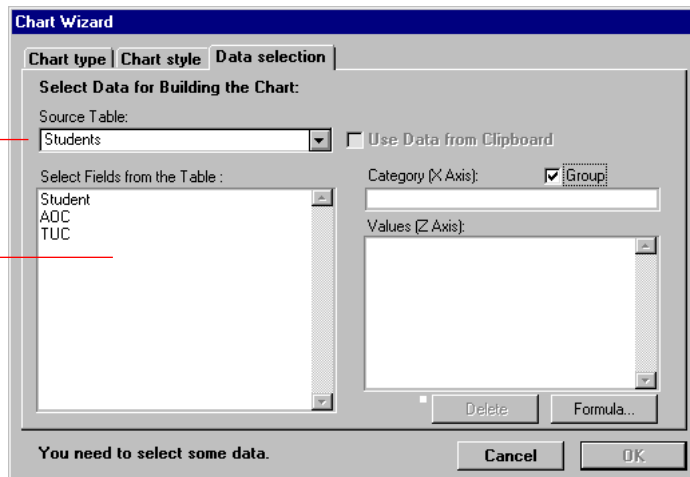
Fields list

7 Choose the desired table from the Table drop-down list.

The Fields list changes to show the fields from the selected table.

8 Drag the field that you want to assign to the Category axis to the Category box or double-click the field.

Note If you make a mistake when choosing the X-axis field, replace the field by dragging the desired to field to Category box.

9 Drag one or more fields or formulas to the Z-axis area or double-click the field.

For instructions on creating a formula, see the section "Adding a Formula" on page 230.

Note If you make a mistake when choosing a Z-axis field, click Delete to remove it.

10 If you want to have the Z-axis values summed for each X-axis category, click the Group check box.

This option is used when the X-axis categories are not unique and you want each category to appear only once, with the values for each instance summed. For more information about this option, see the section "Grouping Non-unique Categories and Series" on page 229.

11 When you have finished designing your graph, click OK.

4D Chart creates the graph and displays it in the 4D Chart area.

Creating a Three-Dimensional Graph from Data in the Database

For a three-dimensional graph, you will specify one field (or formula) each for the X-, Y-, and Z-axes.

The following example graph shows how 4D Chart uses the information in the database to create a graph. The graph shows the average monthly stock value for two companies. The X-, Y-, and Z-axis fields are, respectively: Month, Company Name, and Average Price.

Series stored in
the Y-axis field

☑ Ink, Inc. ▦ Pink, Inc.

Scale values
generated by
4D Chart from
Z-axis values

Value stored in
Z-axis field
for Ink, Inc. in
February

$20
$18
$16
$14
$12
$10
$8
$6
$4
$2
$0

January February March April May June

Categories stored
in the X-axis field
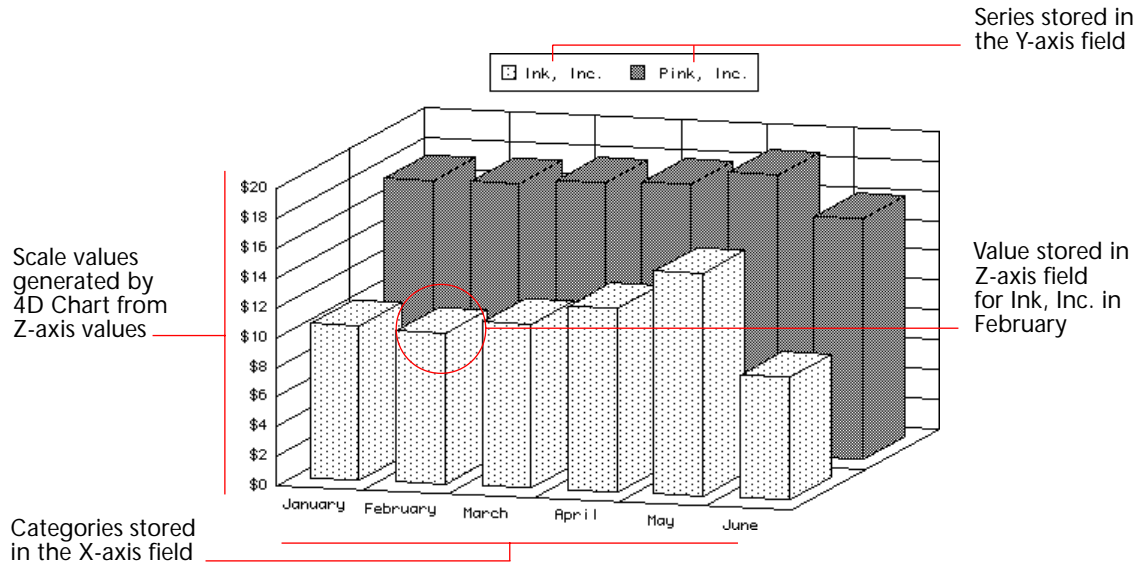
► To create a three-dimensional graph from data stored in the database:

1 **Make sure that there is no graph currently selected in the 4D Chart area.**

   To deselect a selected graph, click anywhere in the 4D Chart area outside the graph.

2 **Click the Graph icon ▦ in the Chart Tool palette.**
   OR
   Choose New Chart from the Chart menu.

   The Chart Type page of the Chart Wizard appears.
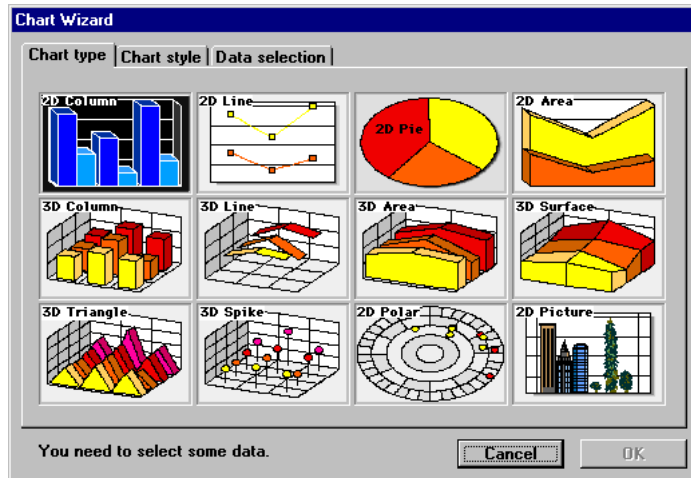
3 Click on a three-dimensional chart type.

The Chart Style and Data Selection pages change to reflect your selection.

4 (Optional) Click the Chart Style page and select a chart style.

The following illustration shows the styles available for 3D Column charts.
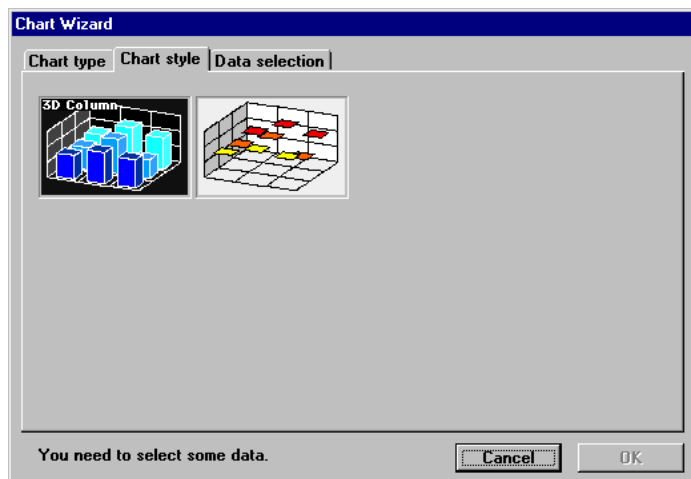
5 Click the Data Selection page to assign fields or formulas to the axes.

The Data Selection page includes boxes for X-, Y-, and Z-axes.
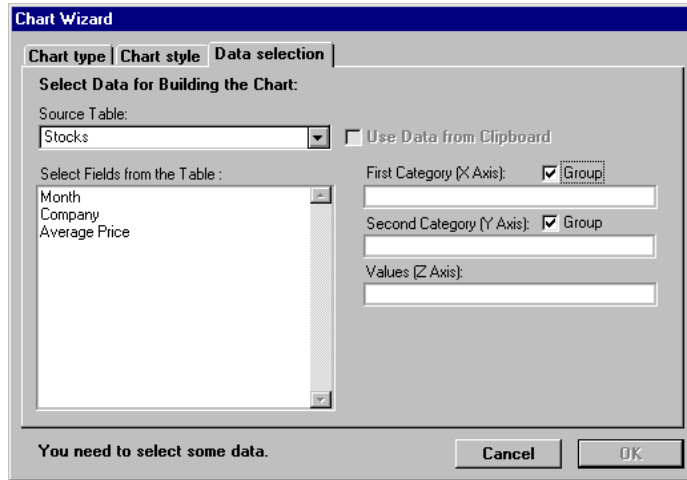
Note If you are creating a graph in a 4D Chart area in an input form, the current table is not listed in the Source Table drop-down list because you cannot graph data from the current table.

6 Select the table from which you want to graph data by choosing it from the Source Table drop-down list.

When you select a table, the fields for that table appear in the Fields list.

7 Drag the Category field to the First Category (X-axis) box or double-click the field.

The name of the field appears in the X-axis (Category) box.

Note If you make a mistake when choosing the X-axis field, replace it by dragging the correct field to the First Category box.

8 Drag the Series field to the Y-axis (Series) box or double-click the field.

The name of the field appears in the Y-axis (Series) box.

Note If you make a mistake when choosing the Y-axis field, replace it by dragging the correct field to the Second Category box.

9 Drag the field containing the values to be graphed to the Values (Z-axis) box or double-click the field.

The name of the field appears in the Z-axis (Values) box.

Note If you make a mistake when choosing the Z-axis field, replace it by dragging the correct field to the Values box.

10 **If you want to have the Z-axis values summed for each X-axis category, click the Group check box.**

This option is used when the X-axis categories are not unique and you want each category to appear only once, with the values for each instance summed. For more information about this option, see the section "Grouping Non-unique Categories and Series" on page 229.

11 **If you want to have the Z-axis values summed for each Y-axis series, click the Group check box.**

This option is used when the Y-axis series are not unique and you want each series to appear only once, with the values for each instance summed. For more information about this option, see the section "Grouping Non-unique Categories and Series" on page 229.

When you have finished specifying all three fields, the Data Selection page should look like this:
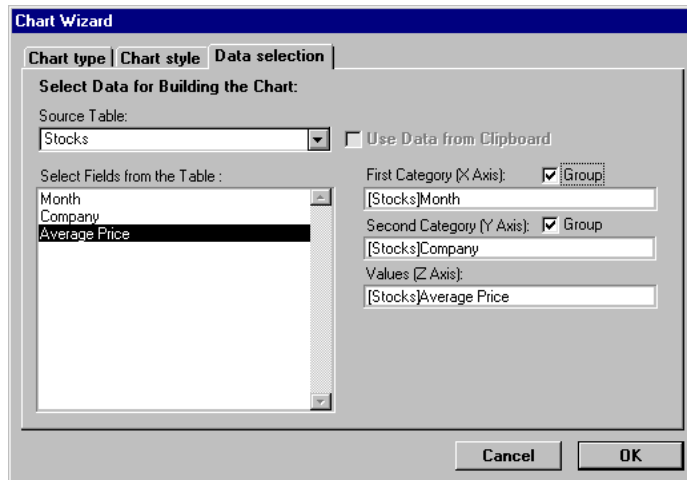
12 **When you have finished specifying your graph, click OK.**

4D Chart creates your graph and displays it in the 4D Chart area.

Updating the Data in a Graph from the Database

When you create a graph from data stored in the database, the data in the graph is static. Although the data in the database may change, the data in the graph remains the same until you update it.

You can tell 4D Chart to update a graph by choosing **Update** from the **Chart** menu. When you choose Update, 4D Chart regenerates the selected graph using the data in the current selection for the table whose fields you are graphing.

You will want to update a graph in the following situations:

■ When you want to include more records in the selection

■ When you want to include fewer records in the selection

■ When you want to include different records in the selection

■ When the data in the selection has been modified

When you use Update, 4D Chart recreates the graph using the new current selection and the settings you chose for the original graph.

Note The Update menu item is available only for graphs created from data in the database.

Creating a Graph From Data on the Clipboard

You can graph data from any application if it is correctly formatted and then copied to the Clipboard. This section describes how to format data in order to use it in a graph, and how to create a 4D Chart graph from this information.

Formatting Data and Copying It to the Clipboard

You can graph data that is formatted in the Tab-Tab-Return (TTR) format.

If you copy cells from any spreadsheet application, they will be in TTR format. You can also use data from a word-processing application if it is formatted with tabs between the fields and carriage returns between the records.

Following are examples of correctly formatted data:

TTR data (word-processing)

Names ➤ Ages ↵
Helen ➤ 25 ↵
Todd ➤ 27 ↵
Norm ➤ 22 ↵
Michele ➤ 23 ↵

Spreadsheet data

Names	Ages
Helen	25
Todd	27
Norm	22
Michele	23

Note The ➤ and ↵ symbols represent the invisible symbols used by many word-processing applications to indicate tabs and carriage returns, respectively.

The first row of data is used as the field names. Each column contains the data for one field.

Note If you want to use dates copied to the Clipboard, the dates must be in the same format as the System-level date format. On Macintosh, the date format is set in the Date and Time Control panel.

When you have prepared the data in your application, select the desired rows and columns and copy them to the Clipboard.

Note The Copy menu item is located in the Edit menu.

Creating a Two-Dimensional Graph from Data on the Clipboard

For a two-dimensional graph, you will specify a field for the X-axis and one or more fields or formulas for the Z-axis.

The following illustration shows how 4D Chart interprets the information from the Clipboard.

Field names ⎯⎯⎯⎯

Names	Ages
Helen	25
Mike	27
Norm	22
Michele	23

Records ⎯⎯⎯⎯

The following example graph shows how 4D Chart uses the information from the Clipboard to create a graph. The X-axis field is Names, and the Z-axis field is Ages.

Name of the Z-axis field

Norm's age

Scale values generated by 4D Chart from Z-axis values

Values stored in the X-axis field
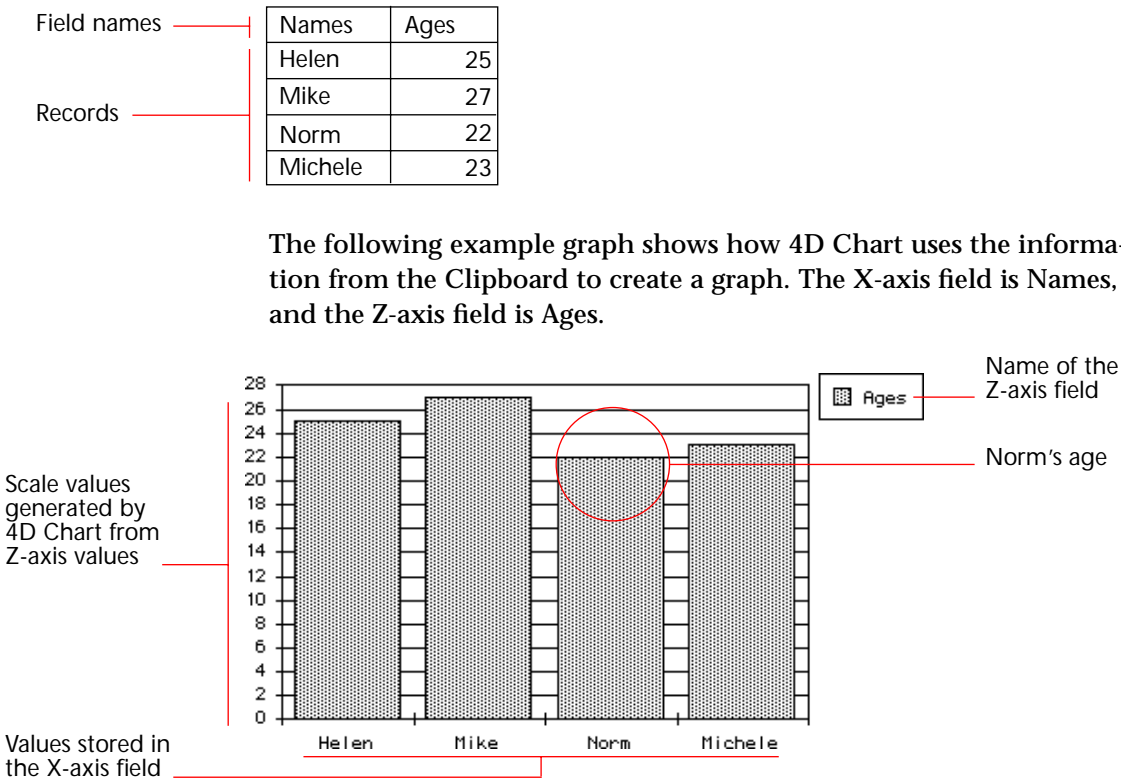
► To create a two-dimensional graph from data stored on the Clipboard:

1 Copy the data to be graphed to the Clipboard, using the format described in this section.

2 Make sure that there is no graph currently selected in the 4D Chart area.

To deselect a selected graph, click anywhere in the 4D Chart area outside the graph.

3 Click the Graph icon [icon] in the Chart Tool palette.
OR
Choose New Chart from the Chart menu.

The Chart Type page of the Chart Wizard appears.
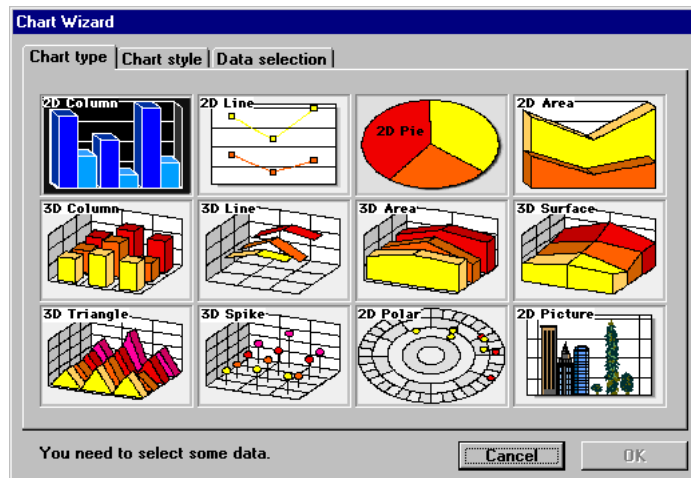
4 Make your selections from the Chart Type and Chart Style pages as described in the section "Creating a Two-Dimensional Graph from Data in the Database" on page 213.

5 Click the Data Selection tab.

The Data Selection page appears, configured for the selected chart type.
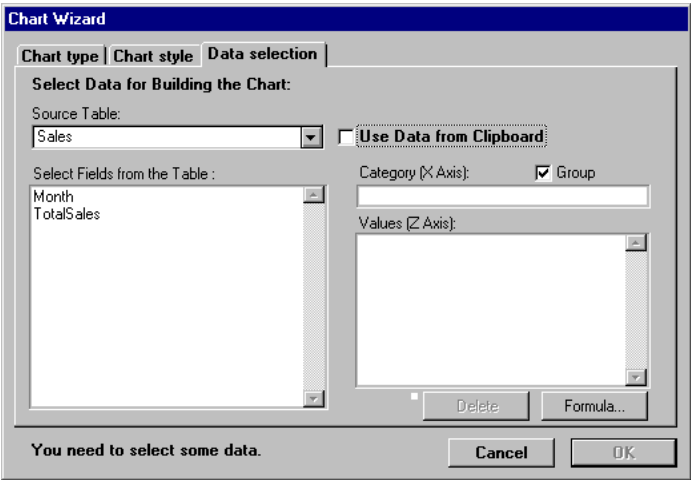
6 **Click the Use Data From Clipboard check box.**

Clicking Use Data From Clipboard disables the Source Table drop-down list and populates the Fields list with the field names from the Clipboard, as shown below.

Disabled Source Table drop-down list ———

Field list from Clipboard ———
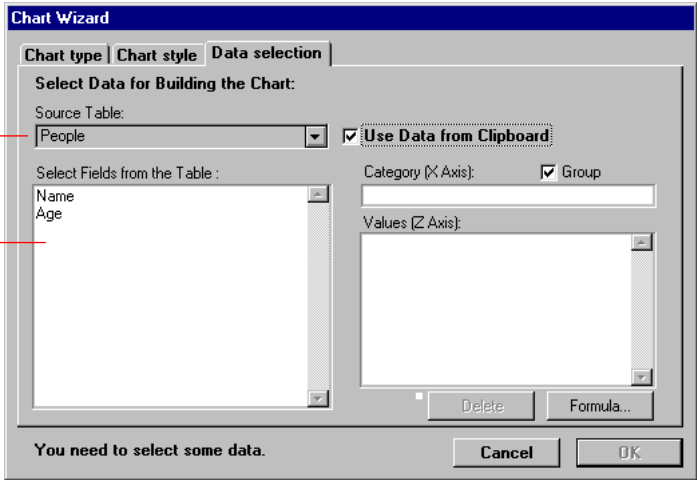
7 **Assign fields to the axes by dragging to the appropriate areas or by double-clicking the fields.**

When all areas have been assigned fields, the **OK** button is enabled.

Note If you make a mistake when choosing the X-axis field, replace it by dragging the correct field to the Category area.

You can add as many fields and formulas to the Z-axis as you like. However, be sure to choose only numeric fields. Do not mix date fields and formulas with number fields and formulas. Each item in the Z-axis (Values) box becomes is plotted in the graph.

Note If you make a mistake, you can clear a Z-axis field or formula by selecting its name in the Z-axis (Values) box and clicking Delete.

8 **If you want to have the Z-axis values summed for each X-axis category, click the Group check box.**

This option is used when the X-axis categories are not unique and you want each category to appear only once, with the values for each instance summed. For more information about this option, see the section "Grouping Non-unique Categories and Series" on page 229.

9 **When you have finished designing your graph, click OK.**
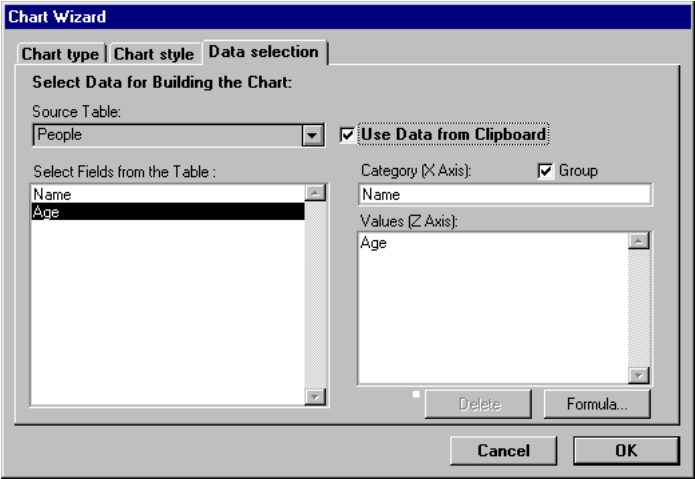
4D Chart creates your graph and displays it in the 4D Chart area.

Creating a Three-Dimensional Graph from Data on the Clipboard

For a three-dimensional graph, you specify one field each for the X-, Y-, and Z-axes.

The following illustration shows the spreadsheet data used for the example graph. The information details the total sales by two different stores to three types of customers.

Categories
Series
Values

Field names

Customer Type	Store Location	Dollar Amount
Contractors	Sunny Valley	7599
Contractors	Fairview	17722.5
Distributors	Sunny Valley	10132
Distributors	Fairview	13900
Retail Stores	Sunny Valley	18997.5
Retail Stores	Fairview	31275

Records

The following example graph shows how 4D Chart uses the information from the Clipboard to create a graph. The graph illustrates the comparative success of the two stores and shows who their best customers are.

Series

Total value of
sales to retail stores
at the Sunny Valley
store location

Categories
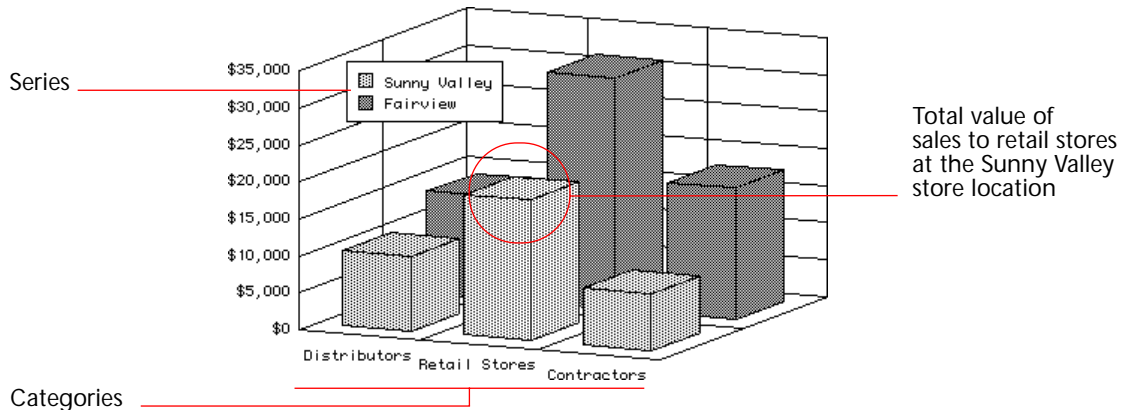
▶ To create a three-dimensional graph from data stored on the Clipboard:

1 Make sure that there is no graph currently selected in the 4D Chart area.

To deselect a selected graph, click anywhere in the 4D Chart area outside the graph.

2 Click the Graph icon [icon] in the Chart Tool palette.
OR
Choose New Chart from the Chart menu.

The Chart Type page of the Chart Wizard appears.
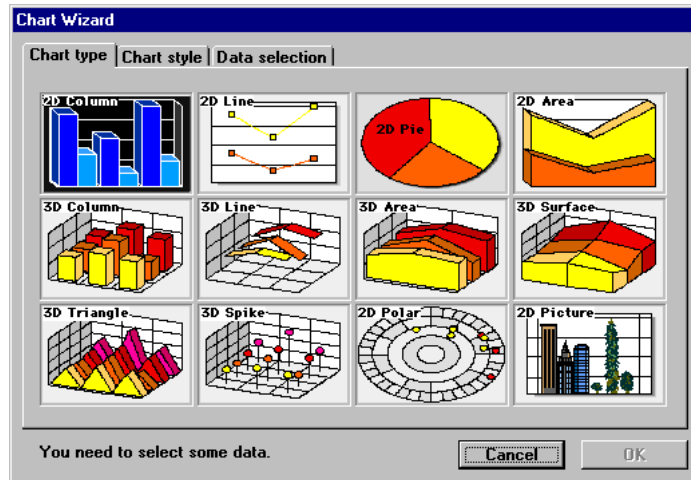
Make your selections from the Chart Type and Chart Style pages as described in the section "Creating a Three-Dimensional Graph from Data in the Database" on page 216.

3 Click the Data Selection tab.

The Data Selection page appears, configured for the selected chart type.
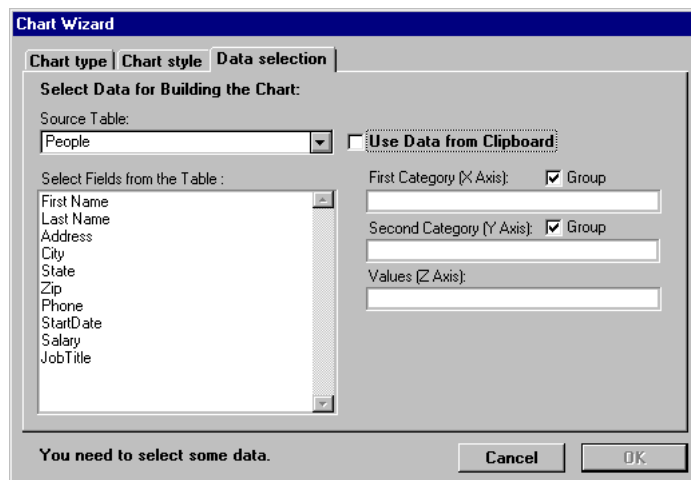
4 Click the Use Data from Clipboard check box.

Clicking Use Data From Clipboard disables the Source Table drop-down list and populates the Field list with the field names from the Clipboard, as shown below.

Disabled Source Table drop-down list —

Field list from Clipboard —
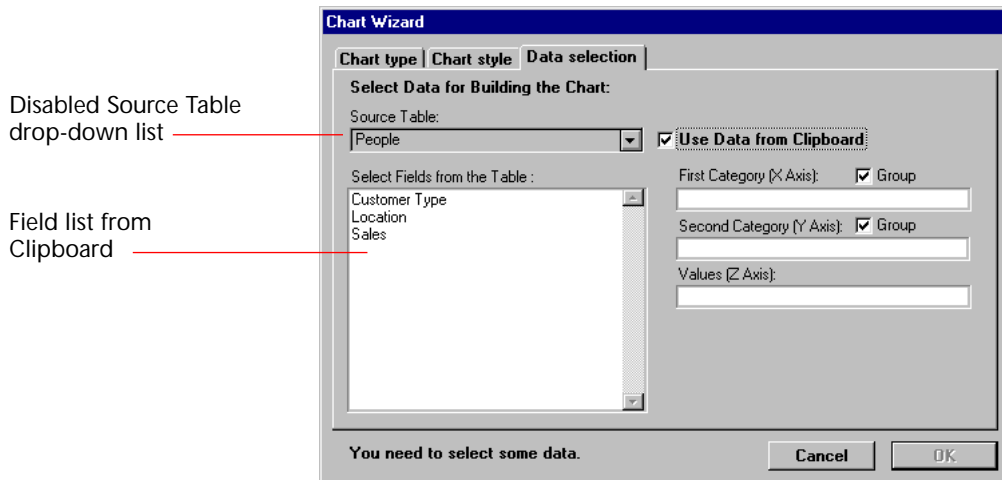
5 Assign fields to the X-, Y-, and Z-axes by dragging to the appropriate areas or double-clicking fields.

Note If you make a mistake when assigning a field to an axis, replace the field by dragging the correct field to the appropriate box.

6 If you want to have the Z-axis values summed for each X-axis or Y-axis category, click the appropriate Group check box.

This option is used when the X-axis or Y-axis categories are not unique and you want each category to appear only once, with the values for each instance summed. For more information about this option, see the section "Grouping Non-unique Categories and Series" on page 229.

7 When you have finished designing your graph, click OK.
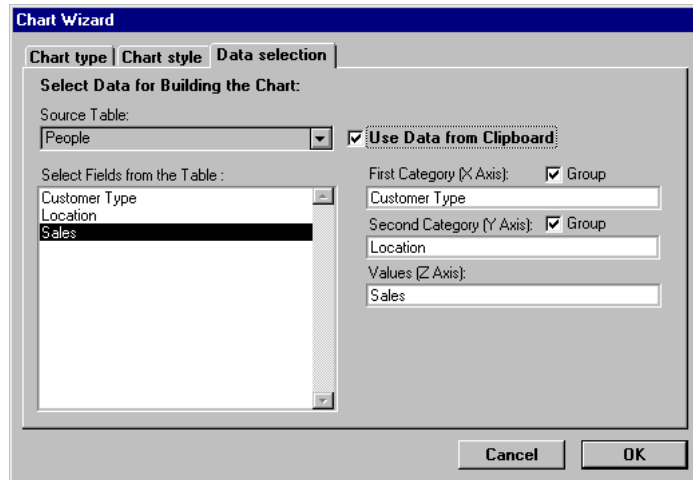
4D Chart creates the graph and displays it in the 4D Chart area.

Grouping Non-unique Categories and Series

Some categories or series may appear more than once in your data. For instance, suppose that you want to graph the total purchases made by each of your customers. Each customer may have made several purchases.

When you create a two-dimensional graph, you can choose to sum the values for non-unique categories, so that each category appears only once on the graph. When you create a three-dimensional graph, you can choose to sum the values for non-unique categories, non-unique series, or both.

To create the graph described in the example above, you might graph from the [Invoices] table, using [Invoices]Customer for the X-axis categories and [Invoices]SalesTotal for the Z-axis values. Because some customers may have more than one invoice, you would want 4D Chart to sum the values in the [Invoices]SalesTotal field so that there would be only one value (the total) for each customer.

The illustrations below show the same basic graph with and without the Group option:

Graph without Group option

Graph with Group option
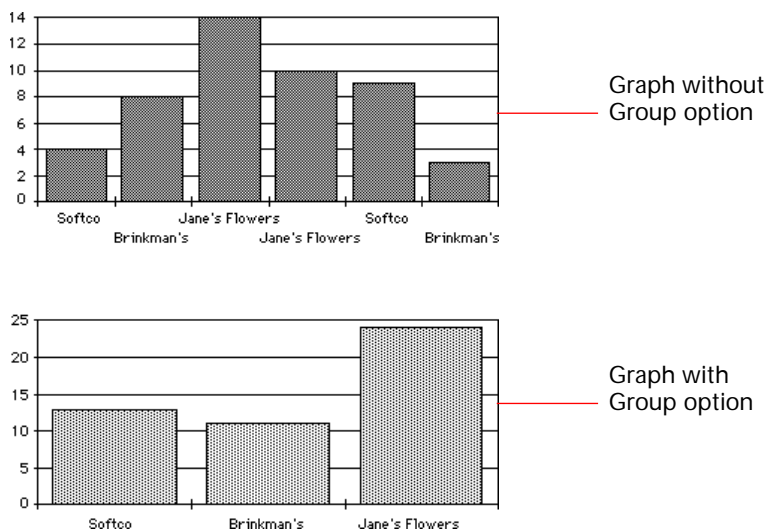
To group data on the Category or Series axis, check the corresponding **Group** check box in the Data Selection page of the Chart Wizard.

Adding a Formula

You can graph values that are not represented in your data but are obtained by performing calculations on the data or on other values in your database. For example, you can graph your profits by graphing the results of a formula that subtracts your unit cost from your retail price.

You can refer to any valid 4th Dimension method and graph the result on the Values axis. The method must return a value to 4D Chart. If the categories are grouped, 4D Chart sums the values returned.

If there are fields or other formulas also being graphed on the Values axis, the data types of all the values must be compatible. For instance, if you are graphing a Date field and a formula on the Values axis, the formula must return a date.

Formulas are available only for two-dimensional graphs.

▶ To use a formula to calculate values for a graph:

1 When you are ready to specify the Values field in the Data Selection page, click the Formula button.

The Formula dialog box appears.
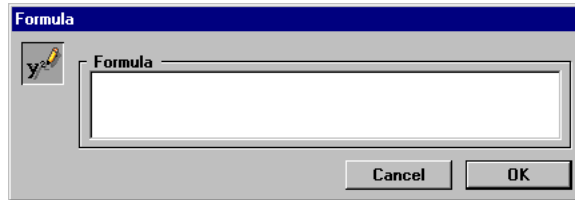
2 Type the formula into the text area.

Following are some examples of formulas:

Formula	Syntax
Month of (**Current date**)	4D function (4D function)
Day of ([Invoices]Invoice date)	4D function (field)
Sin (vX)	4D function (variable)
NumVisits	Method that returns a value in $0

3 Click OK.

4 When you have finished designing the graph, click OK in the Chart Wizard to create the graph.

Changing the Graph Type

You can switch between graph types at any time. You can change from one two-dimensional graph type to another or from one three-dimensional graph type to another. When creating a graph, feel free to experiment with graph types to find the best way to present your data.

▶ To change the graph type:

1 Make sure that the graph is selected.

You select a graph by clicking it. When a graph is selected, the selection handles appear around it.

2 Choose another graph type from the Graph **drop-down list in the Chart Tool palette.**

OR

Choose another graph type from Chart Type item in the Chart menu.

The graph is redrawn using the new graph type.

The Graph drop-down list and the Chart Type item display only the chart type that are appropriate for the selection of data. You cannot, for example, plot 3D data using a 2D graph type. For information on the graph types available in 4D Chart, see Chapter 12, "Choosing a Graph Type" on page 195.

Setting the Graph Type Change Alert

You can have 4D Chart display an alert dialog box when the user attempts to change the type of a graph. The user then has the option to cancel or continue with the change.

▶ To display an alert dialog box when a new graph type is selected:

1 Choose Properties from the 4D Chart Edit menu.

The Properties dialog box appears.

Chart type change alert check box
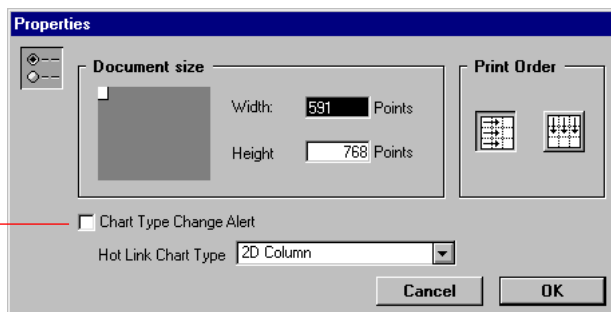
2 Check or uncheck the Chart Type Change Alert check box.

3 Click OK to close the Properties dialog box.

Changing the Options for a Graph Type

Each graph type has a particular set of options that you can change using the Options dialog box. By changing the graph options, you can change a column graph to a bar graph, or show the series in an area graph as proportions of a whole, for example.

▶ To open the Options dialog box for a graph:

■ **Double-click the graph.**
OR
Select the graph and choose Options from the Chart menu.

For more information about the options for each graph type, see

14 Modifying Graph Features

This chapter explains how to modify graph features.

After reading this chapter, you will know how to:

- Resize a graph
- Customize graph axes
- Show and hide grid lines
- Display the series values
- Customize legends
- Add depth to a two-dimensional graph
- Change the perspective of a three-dimensional graph
- Change the graphic attributes of chart objects
- "Explode" a wedge from a pie chart
- Add a picture to a picture chart

Resizing a Graph

You can resize a graph by dragging its selection handles. Selection handles are the black squares that appear around the object when it is selected.

You can resize the height and width at the same time, maintaining the sizing proportion between the two.

▶ To resize a graph:

1 **Select the graph.**

2 **Hold down the mouse button on a selection handle and drag it up, down, or diagonally.**

If you drag a corner, the height and width change. If you drag a side, either the height or the width changes.

To resize the object so that the height and width retain the same proportion to each other, hold down the **Shift** key while you are resizing.

Dragging a selection handle
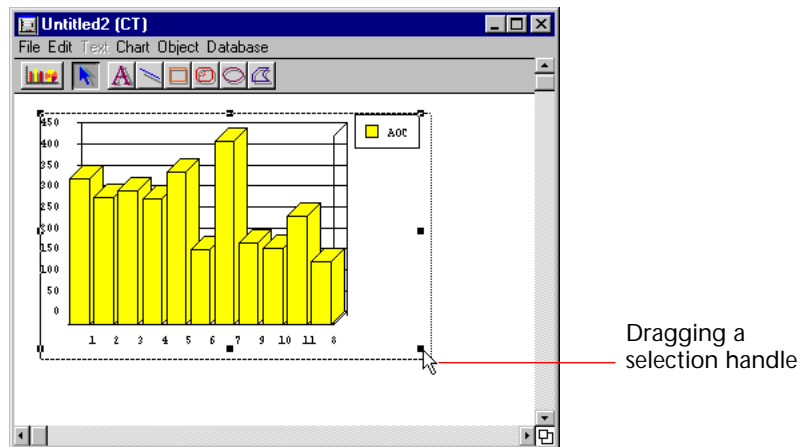
3 **Release the mouse button when you have finished.**

The graph is resized.

Customizing the Axes

You can customize many aspects of each axis of a graph. This section contains information about:

- Customizing the axis labels

- Customizing the tick marks

- Changing the scale of the Values axis

- Reversing the order of data points on an axis

- Positioning the origin

- Adding axis titles

The following table explains the axes available in two-dimensional (2D) and three-dimensional (3D) graphs:

Number of Axes	Axis Name	Axis
Two (2D Graph)	Category	X
	Series	N/A
	Values	Z
Three (3D Graph)	Category	X
	Series	Y
	Values	Z

You can display the Axis dialog box for any axis by choosing the appropriate axis from the **Axis** submenu of the **Chart** menu.
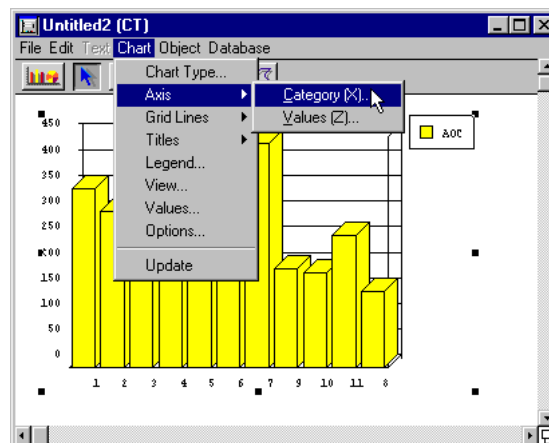
Using the Axis dialog box, you can change the location of the axis labels, tick marks, and origin. You can also change the scale used for the Values axis and reverse the order of the items graphed on each axis.

This section presents the dialog boxes that you use to customize the axes of your graph. It then provides details about each of the options.

The Category Axis dialog box enables you to customize the Category and Series axes:

Labels area
Tick marks drop-down list
Reverse order check box

Cross Axis at check box
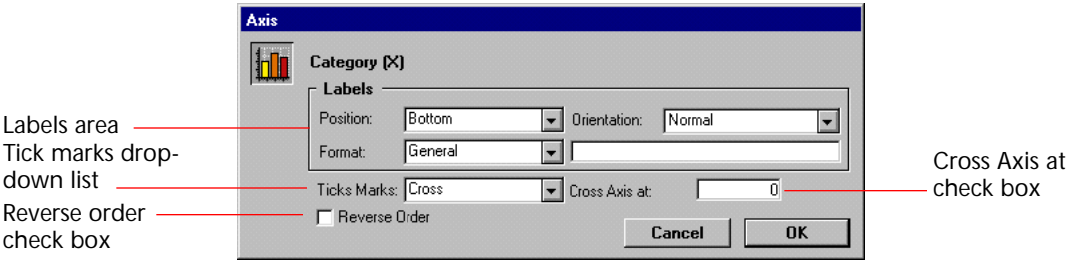
Note The Tick Marks drop-down list, Reverse Order check box, and Cross Axis At text box are not available in the Category or Series Axis dialog box for three-dimensional graphs.

The following dialog box enables you to customize the Values axis:

Tick Marks area

Labels area

Z-axis Crosses at Category box

Scale area

Logarithmic check box

Reverse Value Order check box
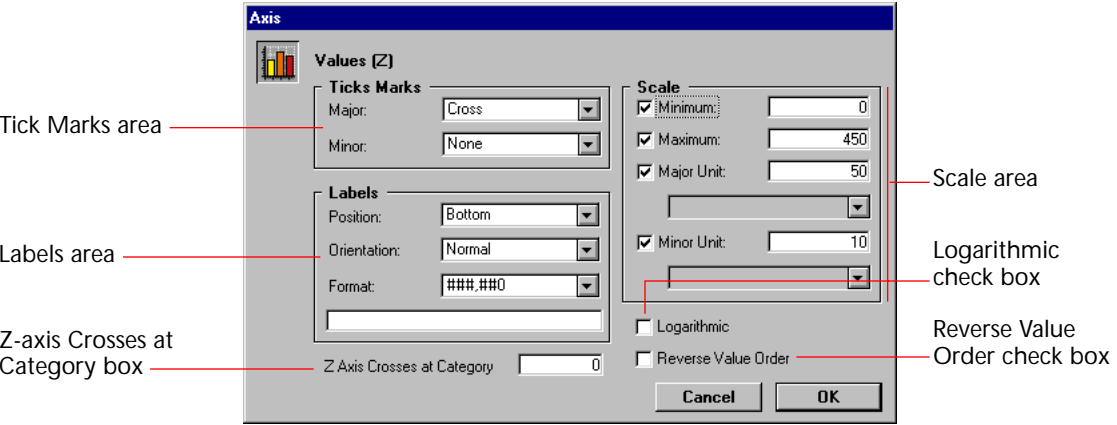
Note Only the Labels and Scale areas are available in the Axis dialog box for three-dimensional graphs. The Date Increment drop-down lists are available only when dates are being graphed on the Values axis.

Customizing the Axis Labels

4D Chart automatically labels the axes when it generates a graph. You can change the position, orientation, and format of the labels, or you can decide not to display them with your graph.

Label Positions

You can choose one of the following label positions from the **Position** drop-down list:

- None

- Top

- Bottom

- Left

- Right

Depending on the orientation of the axis, either Top and Bottom or Left and Right will be unavailable.

When the position is None, the label does not appear on the graph.

Label Orientation

The following label orientations are available for each axis:

	Orientation					
	Normal	**Vertical**	**Rotated Left**	**Rotated Right**	**Staggered**	**Wrap**
R e s u l t	Label	L a b e l	Label	Label	Label1　Label3　Label2	Lab el

Label Formats

You can change the way data in your labels is displayed by using display formats. For instance, you can use a display format to display dollar amounts using the dollar sign ($), commas, and decimals.

The following table shows some examples of the effects of display formats:

Data in Default Format	Display Format	Data in Display Format
3400	$###,##.00	$3,400.00
3/4/94	Month Date, Year	March 4, 1994

When you select one of the formats from the Format drop-down list, it is entered into the Format text box, located to the right of the drop-down list. If you want to use a custom format, you can enter it in that area.

You can use one of 4th Dimension's built-in formats, edit a format, or create one of your own. For more information, see the *4th Dimension Design Reference.*

Labeling Data from Boolean Fields

If you create graphs using Boolean fields from the database, the default axis labels are "0" and "1", corresponding to FALSE and TRUE. You can label your graph more informatively by changing the label format.

To create more meaningful labels for Boolean fields, change the label format to the following:

TrueLabel;;*FalseLabel*

For example, you might change the format to "Female;;Male" or "Experimental;;Control".

Customizing the Tick Marks

Tick marks show the increments of the axes. You can choose among different styles of tick marks, or you can decide not to show the tick marks. You can customize this option for each axis in a two-dimensional graph.

Note You cannot customize the tick marks for a three-dimensional graph.

The following tick mark styles are available:

- Cross (—+—)
- Inside (—ı—)
- Outside (—┬—)

Changing the Values Axis Scale

You can change the minimum and maximum values shown on the Values axis. You can also change the major and minor units of the axis.

If dates are being graphed, you can specify whether the major and minor units are measured in days, weeks, months, or years.

In addition, you can specify that the graph return to the default value for any of these items. To return to the default value, simply check the check box located to the left of the desired option.

In the following graphic, the default minimum and maximum values and the user-specified major and minor units are used.

Scale area

Date increment drop-down list
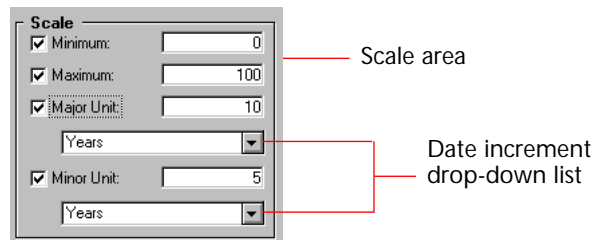
Using a Logarithmic Scale

You can change the scale from normal to logarithmic by checking the **Logarithmic** check box, located in the Values axis dialog box.

Reversing the Order of the Data

You can reverse the order of the data on an axis by checking the **Reverse Order** check box. You can reverse the order of data only in a two-dimensional graph.

Positioning the Origin

You can change the position of the origin — the place where one axis crosses another — for each axis in a two-dimensional graph.

Changing the Origin of the Values (Y) Axis

The origin of the Z-axis is the value at which the Category (X) axis crosses the Z-axis. Usually, the origin is the minimum value on the graph or zero. Sometimes, you will want to change the position of the origin.

▶ To change the origin of the Values axis:

1 **Choose Category (X) from the Axis submenu of the Chart menu.**

The Category (X) dialog box appears.

2 **Enter a value in the Cross Axis At text box.**

The value you enter is the numerical value of the desired origin position.

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

Changing the Origin of the Category (X) Axis

The origin of the X-axis is the category at which the Values axis crosses the X-axis. Usually, the origin is placed to the left of the first category. Sometimes, you will want to move the origin.

▶ To change the origin of the Category (X) axis:

1 Choose Values (Z) from the Axis submenu of the Chart menu.

The Values (Z) dialog box appears.

2 Enter a number in the Z-Axis Cross at Category # text box.

The number you enter is the number of the category at which the origin should cross. The categories are numbered from left to right, (or from bottom to top in a horizontal chart). The Z-axis crosses to the left of the specified category.

To move the origin to the right of the last category on the graph, specify the number of categories plus 1.

If the specified number if higher than the number of categories plus 1, the value is ignored and the origin is reset to the left of the first category.

3 Click OK to close the dialog box.

Adding Axis Titles

You can add a title for each axis. Usually, the titles describe the data graphed on the axis.

▶ To add a title to any axis:

1 Choose the appropriate axis from the Titles submenu of the Chart menu.
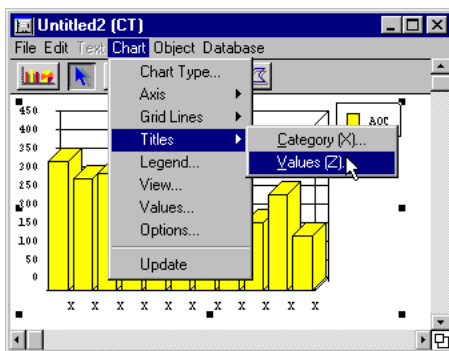
The Titles dialog box appears.
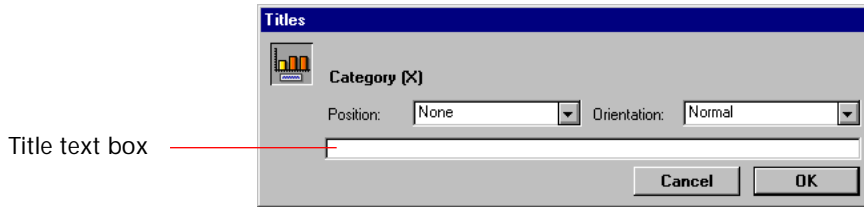
Title text box

2 Type the title into the Title text box.

3 Choose a position for the title from the Position drop-down list.

This specifies the position of the title relative to the graph.

You can choose one of the following title positions:

- None
- Top
- Bottom
- Left
- Right

The default position is None. When the position is None, the title does not appear on the graph.

Depending on the orientation of the axis, either Top and Bottom or Left and Right will be unavailable.

4 Choose an orientation for the title from the Orientation drop-down list.

The following orientations are available for each axis:

- Normal
- Vertical
- Rotated Left
- Rotated Right

5 Click OK.

Showing and Hiding Grid Lines

You can display grid lines for the major and minor increments of each axis. Grid lines can make a graph easier to read.

The major and minor increments are set in the Axis dialog box for the Values axis.

▶ To display the grid lines for any axis:

1 Choose the appropriate axis from the Grid Lines submenu of the Chart menu.
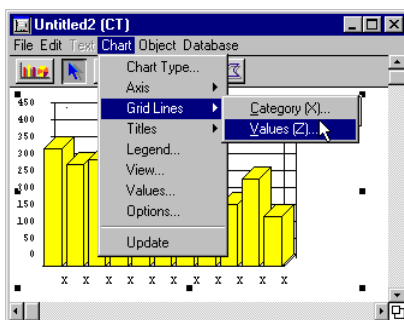
The Grid Lines dialog box appears.

2 Click the desired check boxes and click OK.

Displaying the Series Values

You can display information for each series directly in the graph. You can display the following information:

- **Values** The actual number or date, in Arabic numerals. You can show the values on the graph instead of using labels on the Values axis, or use them to supplement the axis labels.

- **Percentages** The value of the data point divided by the sum of all the values in the category, as a percentage.

- **Categories** The name of the category, identical to the axis label for the category.

The following graph shows the values at the tops of the columns.
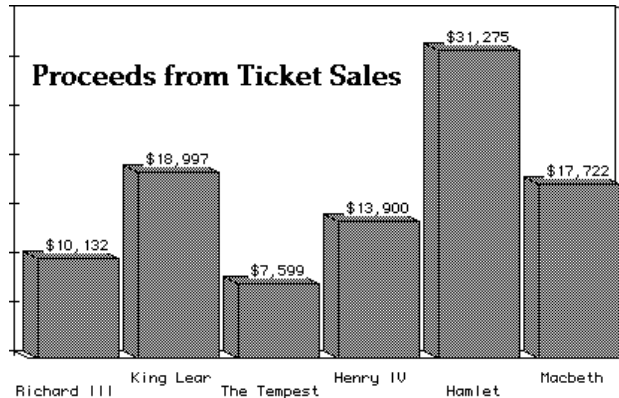
You can select the location at which the values, percentages, or category labels should appear, their orientation, and their format.

This feature is not available for three-dimensional graphs.

▶ To display information about the data in a series:

1 **Choose Values from the Chart menu.**

The Values dialog box appears.
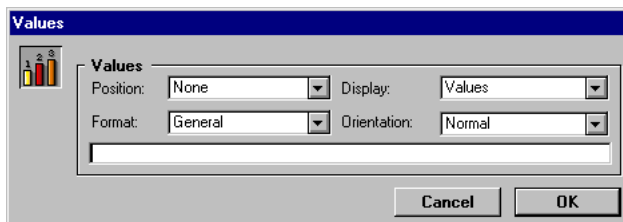
2 **Select the location at which the information should appear.**

You can select one of the following options from the **Position** drop-down list:

Pie Charts	All Other Graph Types
None	None
Inside	Outside Top
Outside	Outside Bottom
	Inside Top
	Inside Centered
	Inside Bottom
	At Axis

3 **Select the type of information you wish to display.**

You can select one of the following options from the Display drop-down list:

■ Values

■ Percentage

■ Category

■ Value & Percent

■ Categories & Percent

4 **If you wish, select a format from the Format drop-down list.**

You can change the way values are displayed by using display formats. For instance, you can use a display format to display dollar amounts using the dollar sign ($), commas, and decimals.

The following table shows some examples of the effects of display formats:

Data in Default Format	Display Format	Data in Display Format
3400	$###,##.00	$3,400.00
3/4/94	Month Date, Year	March 4, 1997

When you select one of the formats from the Format drop-down list, it is entered into the Format text box, located below the drop-down list.

You can use one of 4th Dimension's built-in formats, edit a format, or create one of your own. For more information, see the *4th Dimension Design Reference*.

5 **Select an orientation from the Orientation drop-down list.**

You can select one of the following options:

- Normal
- Vertical
- Rotated Left
- Rotated Right

6 **When you are finished making your selections, click OK.**

Customizing the Legend

4D Chart automatically creates a legend for you when it generates the graph. You can customize the legend's location, order, and text.

Displaying and Hiding the Legend

To display or hide the legend:

1 **Choose Legend from the Chart menu.**

The Legend dialog box appears.
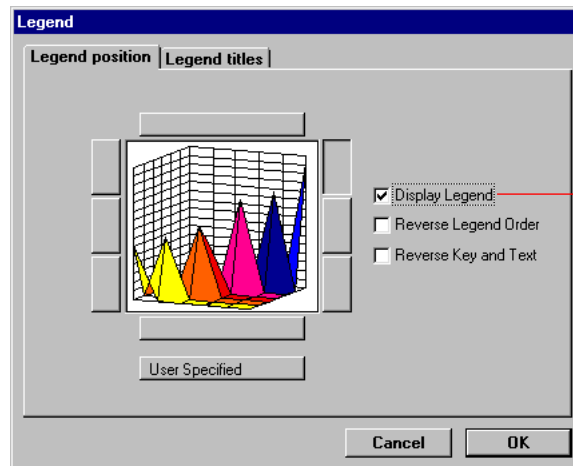
Display Legend check box

2 **Click the Display Legend check box.**

If this check box is checked, the legend is displayed as part of the chart object. If this check box is unchecked, the legend is hidden.

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

The next section explains how to position the legend in the chart object.

Positioning the Legend

The legend is part of the chart object. You can position the legend using the eight built-in legend locations, or you can move it using the mouse. You can move the legend anywhere in the document, including placing it inside the graph itself.

In addition, you can display the legend vertically or horizontally. In other words, the series in the legend can be placed left-to-right or top-to-bottom.

Positioning the Legend Using the Built-in Locations

To use the built-in locations for the legend:

1 Choose Legend from the Chart menu.

The Legend dialog box appears.

Horizontal orientation ───

Vertical orientation ───
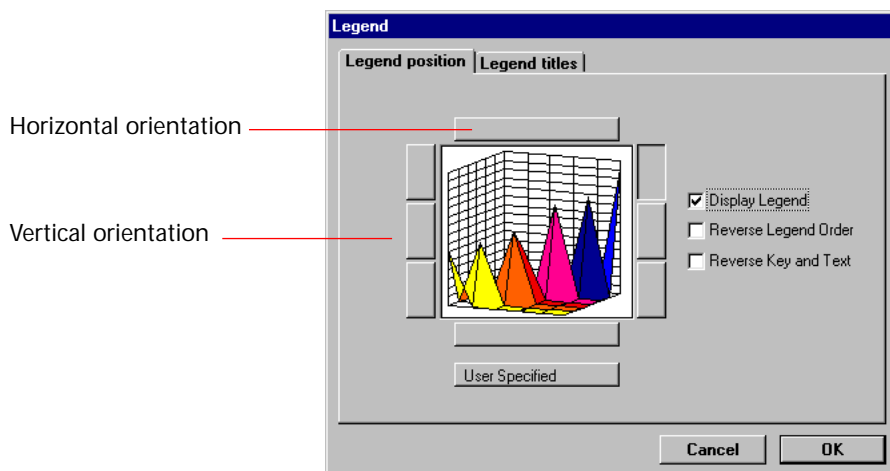
2 Select a legend position by clicking one of the model legends in the Location area.

The location you choose will also determine whether the legend orientation is horizontal or vertical.

3 Click OK to close the dialog box.

Position the Legend with the Mouse

You can position the legend anywhere in the 4D Chart document by moving it with the mouse.

▶ To position the legend with the mouse:

1 Hold down the Ctrl key (⌘ key on Macintosh) and click the legend to select it.

2 While continuing to hold down the Ctrl or ⌘ key, click and drag the legend to the desired location.

3 Release the mouse button and the Ctrl or ⌘ key.

Maintaining the Legend Location

When you use the Legend dialog box, click the User Specified button to maintain the legend location. If you select one of the built-in locations, the User Specified button is automatically released.

Setting the Legend Order

You can reverse the order of the series in the legend. In addition, you can reverse the order of the legend key and legend text.

► To change these options:

1 Choose Legend from the Chart menu.

The Legend dialog box appears.

Reverse Key and Text check box

Reverse Legend Order check box
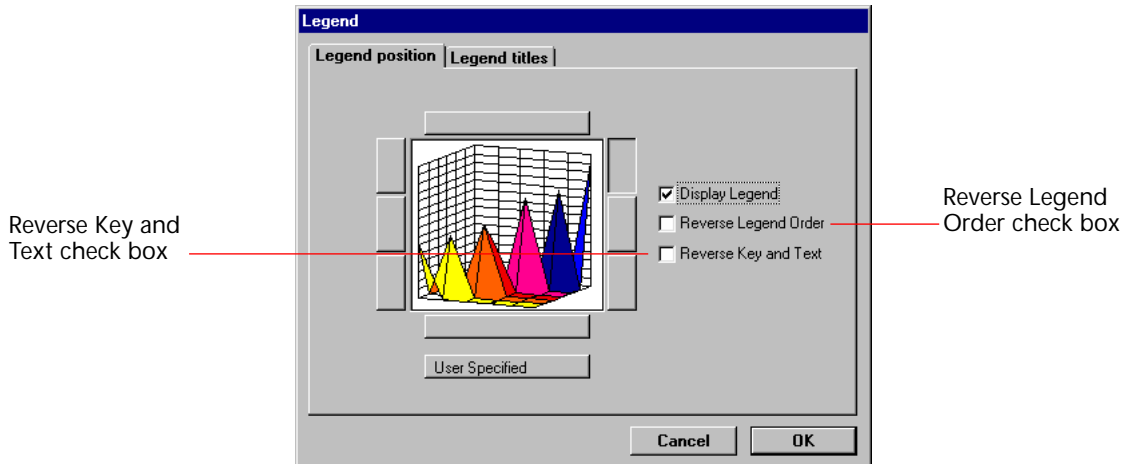
The following options are available in the Legend dialog box:

- **Reverse Legend Order** Reverses the order of the series in the legend.

- **Reverse Key and Text** If this check box is checked, the square containing the color or pattern code for each series is displayed after the series name.

2 Check or uncheck the check boxes as desired.

3 Click OK to close the dialog box.

Customizing the Legend Text

You can customize the text of any or all of the series in a legend.

▶ To customize legend text:

1 Choose Legend from the Chart menu.

The Legend dialog box appears.

2 Click the Legend Titles tab.

The Legend Titles page appears.
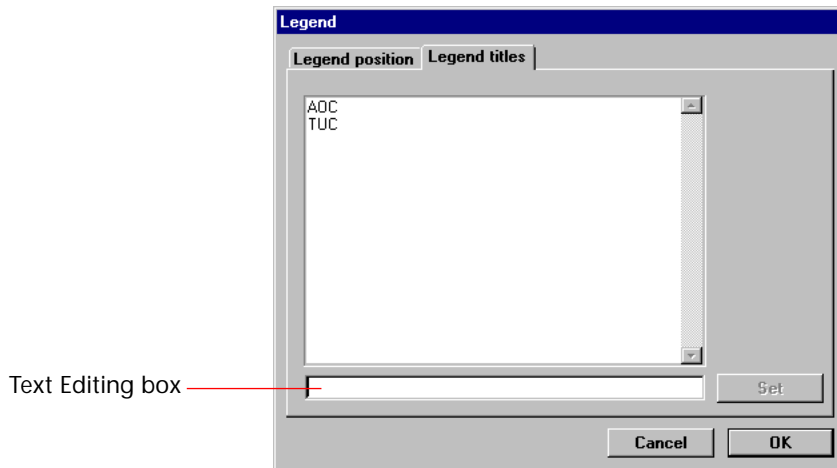
Text Editing box —————

The series labels for the legend are displayed in a list.

3 Choose the series label to edit by clicking its name in the list.

The series label is highlighted in the list and the text of the label appears in the Text Editing box.

4 Edit the text in the Text Editing box.

5 Click the Set button.

You must click Set in order for the change to take effect.

6 Repeat the previous steps until you have made all the changes you want.

7 Click OK.

The Edit Legend dialog box closes. If you are displaying the legend, you will see your changes in the legend text.

Modifying Depth in a Two-dimensional Graph

A three-dimensional graph plots three field or variables in three dimensions. However, you can add the appearance of a third dimension to a two-dimensional graph by adding "depth." The third dimension does not represent the values of any of the fields or formulas plotted in the graph.

By default, 4D Chart adds the illusion of depth to two-dimensional graphs. You can remove it to make the values in the graph easier to read or modify the three-dimensional illusion.

▶ To modify or remove the depth illusion in a two-dimensional graph:

1 **Choose View from the Chart menu.**

This menu item is enabled only when the currently selected object is a graph.

The Depth dialog box appears.
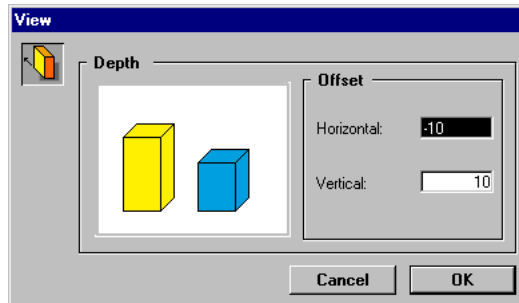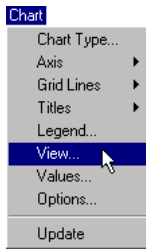
2 **Modify the horizontal and vertical depth, measured in points, by typing values in the appropriate text boxes.**

To remove the depth illusion, enter zeros in both entry areas.

Depth preview area —
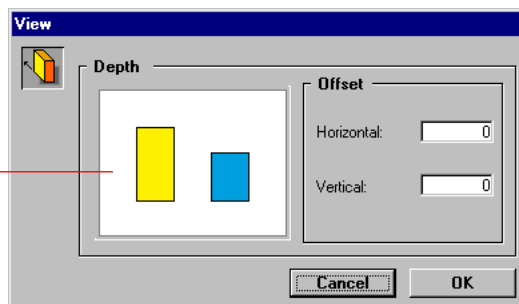
When you press Tab or click outside a text box, the value you have entered is reflected in the Depth preview area.

3 Click OK.

Your Depth specifications are applied to the graph.

Changing the Perspective of a Three-dimensional Graph

You can change the perspective from which a three-dimensional graph is viewed. You can change both the rotation and the elevation of a graph.

▶ To change the perspective from which a three-dimensional graph is viewed:

1 Choose View from the Chart menu.

The View menu item is enabled only when the currently selected object is a graph.

The 3D View dialog box appears.

Elevation slider
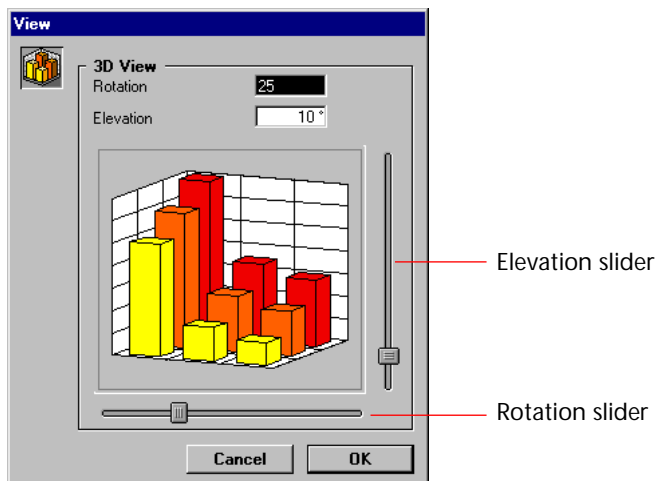
Rotation slider

2 If you wish, you can change the rotation by entering a new value (from 0 to 90) in the Rotation text box or by moving the Rotation slider to the left or right.

Rotation is the rotation of the graph around the Values axis.

The model graph reflects the change you have made.

3 If you wish, you can change the elevation by entering a new value (from 0 to 90) in the Elevation text box or by moving the Elevation slider up or down.

Elevation is the rotation of the graph around a horizontal line, perpendicular to the Values axis.

The model graph reflects the change you have made.

4 Click OK.

Your graph is redrawn from the new perspective.

Changing the Attributes of Chart Objects

This section describes how to select individual chart objects (axis lines, grid lines, series elements, etc.) and change their graphic attributes, such as color, pattern, and line width. You can also change the attributes of chart text objects (such as axis labels and titles); you can change their font, style, and color.

► To select an individual chart object:

■ Hold down the Ctrl key (Command key on Macintosh) and click the object.

The following chart objects can be selected:

■ Each series in a two-dimensional graph

■ Each of the three visible sides of a series in a three-dimensional graph

Note To select all sides of a series in a three-dimensional graph at once, hold down the Shift and Ctrl keys (Command key on Macintosh) and click an object in the series.

■ Each axis (includes the tick marks)

■ Axis labels for each axis

■ Major grid lines for each axis

■ Minor grid lines for each axis

■ Titles for each axis

■ The legend

■ Values displayed for the series

Changing Object Attributes

After you have selected an object, you can modify its graphic attributes using items in the Object menu.

Each of the following object attributes can be changed in the Object menu:

- **Fill Pattern** The pattern displayed inside the border of an object. All objects except lines have fill patterns.
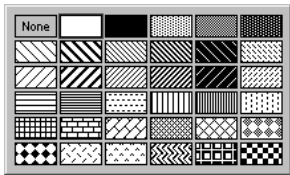
- **Fill Color** The color displayed inside the border of an object.
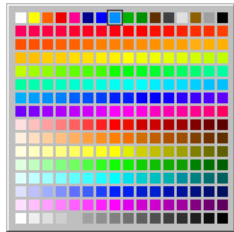
Note The number of colors displayed depends on the number of colors that your monitor currently supports.

- **Line Pattern** The pattern of a line or border. The default line pattern is solid.
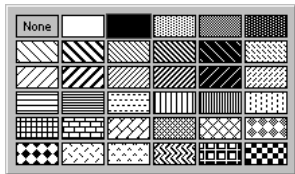
- **Line Color** The color of a line or border. The default line color is black. The color palette used for Fill Color is also used for Line Color.

- **Line Width** The width of a line or border measured in points. The default line width is 0.25 points (also called a hairline).
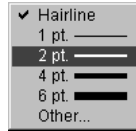
- **Arrowhead** If the selected object is a line, the **Arrowhead** menu item is enabled. The Arrowhead submenu has the following items.
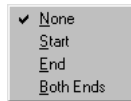
  You can choose to add an arrowhead to either or both ends of the line.

- **Round Corners** If the selected object is a rectangle that you created with a rectangle tool, the **Round Corners** menu item is enabled. When you choose **Round Corners**, the following dialog box appears:
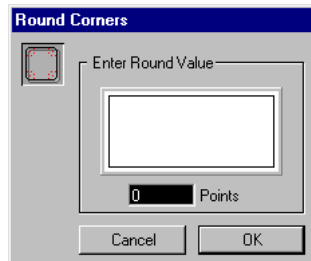
  When you enter a value in the entry area, the preview area shows the effect of the value:
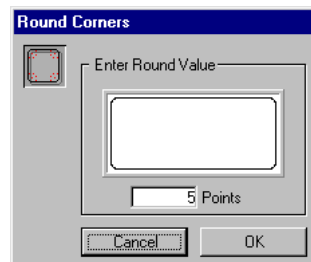
Changing Text Attributes

Text attributes apply only to axis labels, axis titles, legend text, and series values. Each of the following text attributes can be changed in the Text menu:

■ **Font** The typeface of the text.

■ **Size** Font size is measured in points.

■ **Style** Styles include plain, bold, and italic. The default style is plain.

■ **Color** The default color is black.

You cannot change the justification of graph text. You can only change the justification of text added with the Text tool. For more information about adding text with the Text tool, see the section "Adding Text" on page 262.

Exploding Wedges from a Pie Chart

You can "explode" a pie chart by pulling one or more wedges away from the center of the pie.
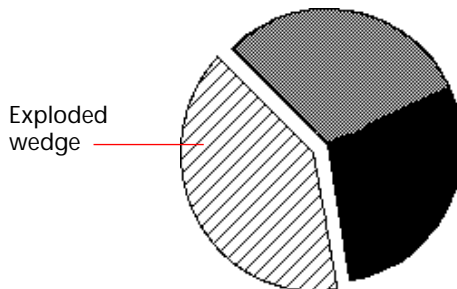
Exploded wedge

▶ To explode a wedge from a pie chart:

1 Hold down the Ctrl key (Command key on Macintosh) and click a wedge of the pie chart to select it.

Selection handles appear around the wedge.

2 While holding down the Ctrl key (Command key on Macintosh), click and drag the wedge away from the center of the pie.

3 When the wedge is where you want it, release the mouse button and the Ctrl key (Command key on Macintosh).

Adding Pictures to a Picture Chart

When you create a picture chart, the columns are filled with a default picture. You can add your own picture for each series by pasting it from the Clipboard.

▶ To paste a picture into the columns for a series:

1 Make sure that the picture you want to paste into the column is on the Clipboard.

2 Choose 2D Picture from the Chart Type submenu.
OR
Choose 2D Picture from the Chart drop-down list .

The columns are replaced by a default picture.

3 Hold down the Ctrl key (Command key on Macintosh) and click a picture column for the desired series.

4 Choose Paste from the 4th Dimension or 4D Chart Edit menu.

The picture is pasted into each column for the series.

You can repeat this process for each series.

Adjusting the Pictures Within the Columns

To customize the proportions of the pictures within the series columns:

1 Double-click the graph to display the Options dialog box for picture graphs.
OR
Select the graph and choose Options from the Chart menu.

The Picture Chart Options dialog box appears.
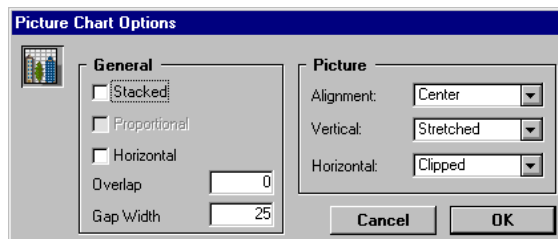
In addition to the chart options, which are discussed in Chapter 12, you will find the following options for aligning and adjusting the pictures:

- **Alignment** This option specifies the horizontal alignment of the picture: center, left, or right.
- **Vertical** This option specifies how the picture uses the vertical space of the column. The options are: clipped, stretched, and stacked. For more information about these options, see the table at the end of this section.
- **Horizontal** This option specifies how the picture uses the horizontal space of the column. The options are: clipped, stretched, and stacked. For more information about these options, see the table at the end of this section.

The following table explains the Vertical and Horizontal options.

Option	Description
Clipped	If the picture is too tall or too wide to be displayed in its entirety, it is truncated at the edges of the column. The proportions of the picture remain unchanged.
Stretched	The picture is stretched or shrunk so that its dimensions match those of the column.
Stacked	If the picture is either too short or too narrow to fill the column, the picture is repeated until the column's height or width is reached. When the edge of the column is reached, the picture is truncated.

2 **Choose the desired options from the drop-down lists and click OK.**

15   Adding Objects and Text

With 4D Chart you can add a variety of objects to your documents, including lines, rectangles, ovals, polygons and text. You can also add dynamic references to fields or to 4th Dimension expressions by inserting expressions in text objects.

The following graph uses objects and text to identify the series.
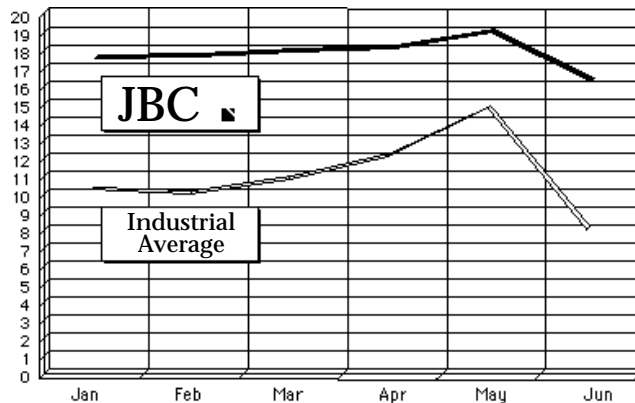
Topics covered in this chapter include:

■ Drawing objects

■ Modifying object attributes

■ Adding text

■ Modifying text attributes

■ Adding a dynamic reference to a 4th Dimension field or expression

■ Resizing objects

■ Arranging objects in a document

Drawing Graphic Objects

You can draw the following objects:

- Lines
- Rectangles
- Rounded rectangles
- Ovals
- Polygons

Selecting a Drawing Tool

To draw an object, you must first select a tool from the Object Tool palette. You make a tool active for drawing when you select it.

The mouse pointer changes depending upon its use. If the Arrow tool is selected, then the pointer is an arrow ⬉. You use the Arrow tool to select menu items and objects.

When you select any of the graphic object tools, the pointer changes to a crosshair +. You use the crosshair to draw graphic objects.

Locking a Drawing Tool

When you select a tool, it is in effect only while you draw one object, after which the Arrow tool is selected. However, you can *lock* a tool so that you can continue to use it as long as you need it, by double-clicking it. When you lock a tool, it remains in use until you select another tool.

Drawing an Object

To draw all objects except polygons:

1 Hold down the mouse button in the document area.

2 Drag the mouse to draw the object.

3 Release the mouse button to finish drawing the object.

Drawing a Polygon

To draw a polygon:

1 Click to anchor the first vertex.

2 Drag the mouse to draw a side and then click to anchor the next vertex.

3 Continue anchoring vertices and drawing sides as necessary.

4 Close the polygon by clicking the first vertex to close the polygon.
OR
Leave an open side to the polygon by double-clicking the mouse
button to anchor the last vertex or by pressing Enter.

Closed polygon _____   _____ Open polygon
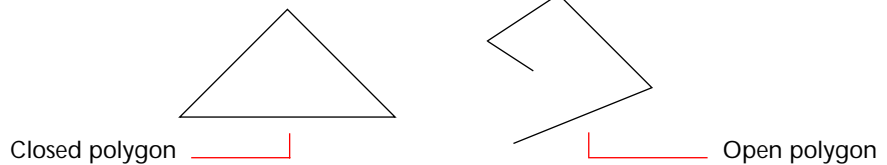
Constraining Graphic Objects As You Draw	By constraining graphic objects as you draw, you can control the drawing process — in particular, the height and width of objects. For example, a square is really just a constrained rectangle.

The following table lists the effects of constraining each object.

Object	Key	Constraint
Lines	Shift	Constrain line to 45° angles
Rectangles	Shift	Draw a square
	V (for *vertical*)	Constrain height
	H (for *horizontal*)	Constrain width
Rounded Rectangles	Shift	Draw a rounded square
	V	Constrain height
	H	Constrain width
Ovals	Shift	Draw a circle
	V	Constrain height
	H	Constrain width
Polygons	Shift	Constrain sides to 45° angles

Changing Object Attributes

Each of the following object attributes can be changed using commands in the Object menu:

- **Fill Pattern** The pattern displayed inside the border of an object. All objects except lines have fill patterns. The default fill pattern is solid white.

- **Fill Color** The color displayed inside the border of an object. All objects except lines have fill color. The default fill color is black.

- **Line Pattern** The pattern of a line or border. The default line pattern is solid.

- **Line Color** The color of a line or border. The default line color is black.

- **Line Width** The width of a line or border measured in points. The default line width is 0.25 points (also called a hairline).

- **Arrowhead** The arrows that appear on one or both ends of a line; only lines have arrowheads. The default is to have no arrowheads.

- **Round Corners** The amount of rounding of the corner of a rounded rectangle. The default rounding is 1/4 inch.

Adding Text

As you have seen in Chapter 14, most of the text that you want to add to a graph — such as axis labels, titles, and legends — can be added using menu items in the Chart menu.

To add extra text to a graph, you must first create a text object and then enter the text. A text object is a container for text.

▶ To create a text object:

1 Select the Text tool ![A].

   The pointer changes to an I-beam ⌶.

2 Hold down the mouse button and drag the mouse to create a rectangular text area.

Text object
I-beam pointer
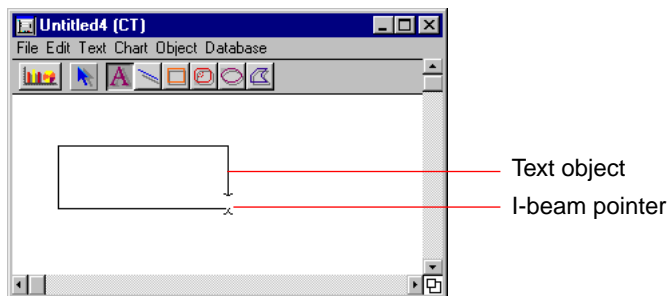
3 **Release the mouse button.**

You can also simply click in the window after you have selected the Text tool to create a text object of default size (three inches in width). The default height is determined by the font and font size you have selected.

4 **If you have not already done so, click inside the text object to insert the pointer.**

When you place the pointer in the text object, it becomes an insertion point |.

Insertion point
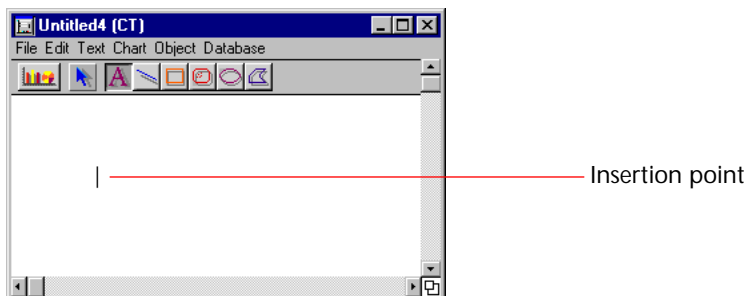
5 **Type your text.**

6 **When you have finished typing the text, select any other tool.**

Unlike other objects, text objects are not selected after you create them.

Once you have created a text object and added text, you can change the text by editing it — for example, copying, cutting, or pasting it. You can also change its attributes, such as its font, size, style, and justification. For more information about changing text attributes, refer to the next section, "Changing Text Attributes".

Changing Text Attributes

Text attributes are applied only to text inside a text object. Each of the following text attributes can be changed in the Text menu:

- **Font** The typeface of the text. The default font is Geneva.

- **Size** Font size is measured in points. The default size is 12 point.

- **Style** Styles include plain, bold, and italic. The default style is plain.

- **Color** The default color is black.

- **Justification** Text can be left, right, or center justified. The default justification is left.

Adding Dynamic References to 4th Dimension

Using field references and 4th Dimension expressions, you can create 4D Chart documents that incorporate information from your database. For example, you can use field information from the records to make chart titles. You can use 4th Dimension expressions to perform tasks such as computing numeric values or concatenating text information.

In this section, you will find information about the following topics:

- Inserting field values into a 4D Chart document,

- Inserting a 4th Dimension expression into a 4D Chart document,

- Displaying field and expression values,

- Formatting field and expression values,

- Changing a dynamic reference to static text.

Understanding Values and References

You can display the information from 4th Dimension as either *values* or *references*. A value is the actual information stored in a field or calculated from an expression. A reference is the name of the field or the text of the expression.

When expressions and fields are displayed as references, they are surrounded by the following symbols: « and ». For example, a reference to the First Name field in the [Stationery Order] table would appear as:

«[Stationery Order]First Name»

4D Chart inserts these symbols when a field is inserted into a text object. When you insert any other type of reference, such as a 4th Dimension function or variable, you must indicate that it is a reference. 4D Chart will then add the « and » symbols to differentiate the reference from normal text. For more information on referencing expressions, see the section "Inserting 4th Dimension Expressions" on page 268.

When references are displayed as values, the « and » symbols do not appear; for example, a field value for First Name might be:

James

The field value appears as standard text.

Field references and 4th Dimension expressions always refer to the current record and are updated whenever the current record changes. If there is no current record, no value is displayed.

Inserting Field References

By inserting a field reference in a 4D Chart document, you add dynamic information to the document. As the field is updated, so is the value in 4D Chart. You can use fields from any table in the database, except subtables.

The field reference or value appears in a text object, except for references to picture fields. The text object containing a reference acts as any other text object; you can change its attributes, move it, and so on.

Using Field References in a Plug-in Window

When you insert a field reference in a 4D Chart plug-in window, the value that is displayed when you choose Show Values from the Database menu is the field's value for the current record. If no record is currently loaded there will be no value displayed in the 4D Chart plug-in window.

In order to show the value stored in a field for a particular record, make sure that the record is loaded — by displaying the record in an input form, for instance. If the current record changes, the value displayed in the field changes.

Using Field References in a 4D Chart Area on a Form

When you insert a field reference in a 4D Chart area on an input form, the value that is displayed when you choose Show Values from the Database menu is the field's value for the current record.

Using the Paste Field Dialog Box

You can use the Paste Field dialog box to paste a field reference into a document.

▶ To paste a field reference into a 4D Chart document:

1 Click the mouse button where you want to insert the reference.

If you click inside a text object, you cannot insert a Picture field.

2 Choose Paste Field from the Database menu.
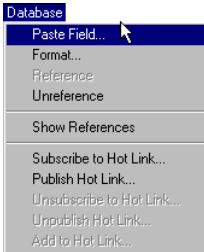
The Paste Field dialog box appears. All tables in the database are listed in the Tables drop-down list. The fields for the selected table are displayed in the Fields list.

Database
Paste Field...
Format...
Reference
Unreference

Show References

Subscribe to Hot Link...
Publish Hot Link...
Unsubscribe to Hot Link...
Unpublish Hot Link...
Add to Hot Link...

Paste Field

Paste Field

People ——————————————— Tables drop-down list

First Name
Last Name
Address ——————————————— Fields list
4DChart_
City
State
Zip
Phone
StartDate
Salary
JobTitle

Cancel   OK
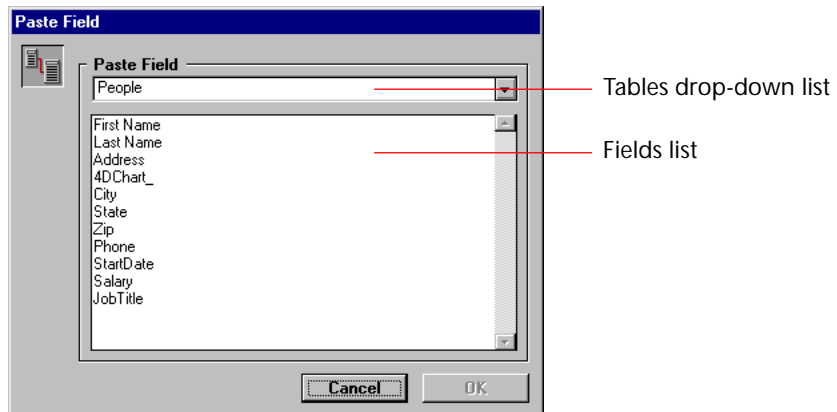
3 Select the table from which you wish to paste a field reference from the Tables drop-down list.

The fields in the selected table are displayed in the Fields list.

4 Select the field you wish to paste from the Fields list and click OK.

A reference to the field is pasted into the document in a text object.

Using a Drop-down List of Fields

You can select fields from a drop-down list containing all available tables and fields. You cannot paste references to Picture fields when you select a field from a drop-down list.

When you are working in a form, you can choose fields from a drop-down list that displays the fields in the current table, or from a drop-down list of fields for all tables in the database. When you use 4D Chart in a plug-in window, the drop-down list always contains both tables and fields.

▶ To insert a field into a 4D Chart document:

1 Create a text object where you want to paste the field.

If you need information about creating text objects, see the section "Adding Text" on page 262.

2 Position the I-beam pointer ⌶ over the text object.

Make sure that the insertion point is in the text object.

3 To choose a field from the same table as the form, hold down the Alt key (Option key on Macintosh) as you press the mouse button.

A pop-up menu of fields for the table in which you are working appears. If you are working in a plug-in window, the pop-up menu contains both tables and fields.

First Name
Last Name
Address
4DChart_
City
State
Zip
Phone
StartDate
Salary
JobTitle

4 To choose a field from another table, hold down the Shift and Option keys while you press the mouse button.

If you are working in a plug-in window, you do not need to hold down the Shift key.

4D Chart displays a hierarchical pop-up menu of the tables in the database. Each table has a submenu containing its fields.

People   ▶
Employees   ▶
Students   ▶   Student
Stocks   ▶   AOC
Sales   ▶   TUC
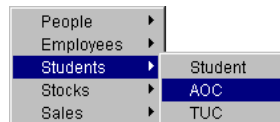
5 Select a field.

A reference to the selected field is pasted into a text object in the 4D Chart document at the insertion point location.

Inserting 4th Dimension Expressions

You can insert any valid 4th Dimension expression into a document. The expression can be a 4th Dimension variable, a 4th Dimension function, a plug-in function, or a method that returns a value.

With expressions you can use the power of 4th Dimension's language within 4D Chart documents. You can perform calculations, concatenate information from several fields, and so on.

The following table contains some examples of expressions:

Expression	Comment
vDate	A variable containing a date
Current date	A 4th Dimension function
Current date–vDate	A statement that performs a calculation
DateCalc	A method that returns a value

An expression is evaluated only when you perform one of the following actions:

■ Open the document

■ Choose **Show Values** from the **Database** menu

■ Print the document

For more information about expressions, refer to the *4th Dimension Language Reference*.

▶ To insert a 4th Dimension expression into a 4D Chart document:

1 Create a text object where you want to place the expression.
Since the expression is created from text, you must first create the text object.

2 Enter the expression text and then select it.

3 Choose Reference from the Database menu.
The text is now enclosed in the « and » symbols, which indicate that it is an expression:

«Current date»

4 When you have finished, select the Arrow tool.
To display the value of the reference, choose **Show Values** from the **Database** menu.

Displaying Values or References

When you display values, you show the actual values stored in referenced fields and the values calculated by referenced 4th Dimension expressions. For example, if the reference is «Current date», today's date is displayed.

► To display values:

■ **Choose Show Values from the Database menu.**

The value of each reference is displayed.

Note The values of all references are displayed, regardless of the selected reference.

► To display references:

■ **Choose Show References from the Database menu.**

The reference for each value is displayed.

Changing the Value in a Reference to Text

You can change the value in a dynamic reference into static text that will not be updated when the value changes.

For instance, you can use the 4th Dimension expression «Current date» to display the date you created a graph, and then change that date to a static text object. No matter what the current date is, the text object will always display the creation date of the graph.

Changing a value to text is called *unreferencing* the value, because the value no longer has a dynamic reference to the database. Once you have unreferenced a value, you cannot change it back to a reference.

► To change a value in a field reference or expression to text:

1 **Choose Show Values from the Database menu to display all values.**

2 **Select the text block containing the value you want to unreference.**

If the text block contains more than one field or expression, select only the value you want to change.

3 **Choose Unreference from the Database menu.**

The value becomes text.

Changing a Reference to Text

You can change a reference into text by unreferencing it. When you change a reference to text, you change the words of the reference, not the value to which the reference refers.

For instance, if you change the reference «Current date» to text, the text object displays the following:

Current date

When you choose **Show Values** from the **Database** menu, this text does not change, and the current date is not displayed, because the text no longer refers to a 4th Dimension expression.

You may want to edit a reference or permanently change it to standard text. If you want to edit a reference, you must unreference it, edit it, and then reference it again.
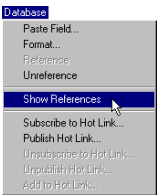
▶ To unreference a field reference or expression:

1 **Choose Show References from the Database menu to display all references.**

2 **Select the text block containing the reference you want to unreference.**
   If the text block contains more than one field or expression, select only the reference you want to change.

3 **Choose Unreference from the Database menu.**
   The « and » symbols are removed, and the reference becomes text.

Formatting References

You can use a display format for the value of any numeric, date, or time field or expression in 4D Chart. For instance, you can use a display format to display dollar amounts using the dollar sign ($), commas, and decimals.

The following table shows some examples of the effects of display formats:

Data in Default Format	Display Format	Data in Display Format
3400	$###,##.00	$3,400.00
3/4/94	Month Date, Year	March 4, 1994

▶ To format a reference:

1 Select the reference.

Since the entire expression is a single value, you can select it by clicking it with the Text tool.

2 Choose Format from the Database menu.

The Field Format dialog box appears.

3 Select an appropriate format from the list.

The format appears in the text box below the list of formats.

Selected format
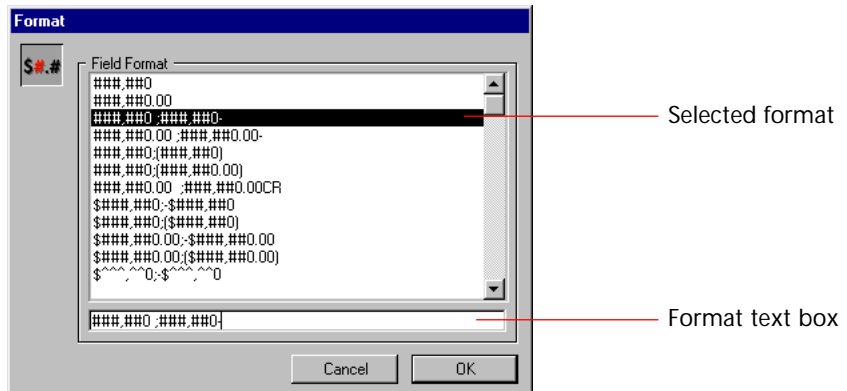
Format text box

If you want, you can edit a number format or enter a new number format in the Format text box. You cannot edit date or time formats.

For more information about display formats, refer to the *4th Dimension Design Reference*.

4 Click OK.

The format is listed after the reference. For instance:

«Current date; Abbr.: Month Day, Year»

When you choose **Show Values**, the value of the reference is displayed using the format.

Resizing Objects

You can make an object larger or smaller by resizing it. You can select one or more objects to resize. If you select more than one object, all selected objects are resized by the same amount.

You can resize the height and width at the same time, maintaining the sizing proportion between the two.

▶ To resize an object:

1 Select the object.

2 Hold the mouse button down on a selection handle and drag it up, down, or diagonally to change the object's size.

If you drag a corner, the height and width change. If you drag a side either the height or the width changes.

To display the object's outline — rather than its rectangular frame — hold down the **Alt** key (**Option** key on Macintosh) while resizing.
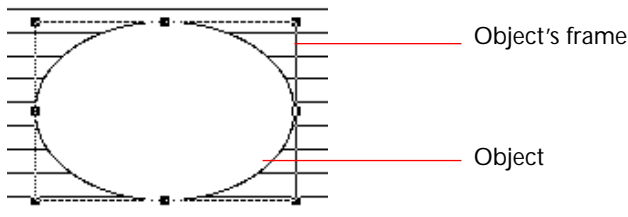
Object's frame

Object

To resize the object so that the height and width retain the same proportion to each other, hold down the **Shift** key while you are resizing.

3 Release the mouse button when you have finished.

The object is resized.

Arranging Objects

When you have two or more objects in a 4D Chart document, you can use the items in the **Arrange** submenu of the **Object** menu to arrange them. The Arrange submenu is shown below.

Bring to Front	Ctrl+]
Send to Back	Ctrl+[
Move Forward	Ctrl+'
Move Backward	Ctrl+;
Align Objects...	Shift+Ctrl+L
Group	Shift+Ctrl+G
Ungroup	Shift+Ctrl+U

You can choose from the following actions in the **Arrange** submenu:

■ Bringing an item to the front

■ Sending an item to the back

■ Moving an item forward one level

■ Moving an item backward one level

■ Aligning objects in relation to each other

■ Grouping a set of objects

■ Ungrouping a set of objects

The following sections describe these actions in more detail.

Changing the Stacking Order

When you draw objects, they can partially or entirely overlap one another. The order in which objects are placed when they overlap one another is called the *stacking order*. The sample screen below displays several objects and their stacking order.

Bottom object
Middle object
Top object
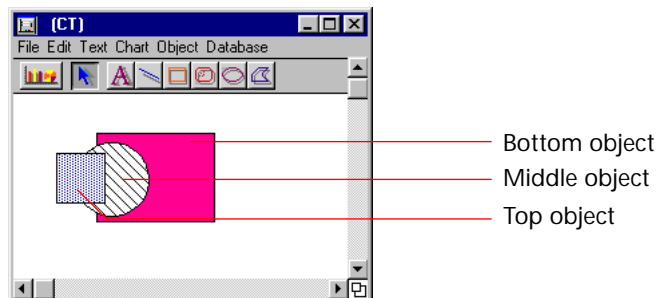
As you work with objects, you may want to change the stacking order of objects; to do so, you can move one or more objects in front of or behind other objects.

Moving an Object in Front of All Others

By moving an object in front of all others, you move it to the top layer.

Moving an Object Behind All Others

By moving an object behind all other objects, you move it to the bottom layer.

Moving One Object in Front of Another

Moving an object in front of another object allows you to move the selected object one layer higher — that is, place it closer to the top layer.

Moving One Object Behind Another

Moving an object behind another object allows you to move the selected object one layer lower — that is, place it closer to the bottom layer.

Aligning Objects

When you align objects to each other, you position them in relation to each other. Aligning objects to each other is useful for ensuring that objects are placed precisely in relation to each other. You can align objects both horizontally and vertically.

The object that is farthest in the selected alignment direction is the reference for object alignment. For example, if you want to align the left sides of several selected objects, the selected object that is furthest to the left remains fixed, and the other objects are aligned to it.

When you select **Align Objects** from the **Arrange** submenu, the Align Objects dialog box appears:

Model objects

Vertical alignments

Horizontal alignments
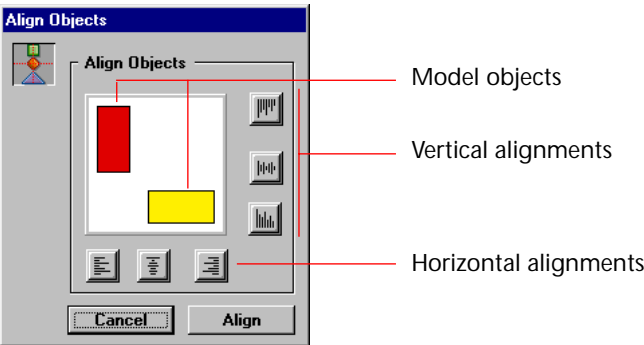
Use the following icons to align the selected objects to each other:

Icon	Meaning
	Align the left edges of selected objects.
	Align the centers of select objects along a vertical axis.
	Align the right edges of selected objects.
	Align the top edges of selected objects.
	Align the centers of select objects along a horizontal axis.
	Align the bottom edges of selected objects.

Select a maximum of one vertical and one horizontal alignment. The model objects move to indicate the effects of the alignment.

Note To deselect an icon, click it again.

Grouping and Ungrouping Objects

By *grouping* objects, you can combine several objects into one. A grouped object acts like a single object when you manipulate or edit it. You can work with a grouped object as you would any other object; you can change its attributes, resize it, and so on.

When you group several objects, all attributes of the individual objects are retained. However, if you change any attribute of the group, that change affects all objects in the group. For example, if you select a new fill pattern for the group, it is applied to each object in the group.

Ungrouping an object breaks it into its component objects. When an object is ungrouped, each piece becomes a separate object again. Ungrouped objects retain any changes made to them while part of a group.

Grouping Objects   You can make a single object from several selected objects by grouping them. Once you create a group, you can manipulate it the same way you would a single object.

▶ To grouped objects:

1 Select all objects to group.

2 Choose Group from the Arrange submenu of the Object menu.
   The objects become one object.

Ungrouping Objects   You can break a grouped object into its separate objects by ungrouping it.

▶ To ungroup objects:

1 Select an object to ungroup.

2 Choose Ungroup from the Arrange submenu of the Object menu.
   The object is ungrouped and each object is selected.

16 Using Hot Links

4D Chart is one of several plug-ins that work together with 4th Dimension. You can use two plug-ins together by creating *hot links* between them. You can also use hot links between documents created with the same plug-in. The system of hot links allows you to exchange data dynamically and interactively between plug-ins.

For instance, you can create a graph in 4D Chart and include it in a letter written in 4D Write. If you update the graph in 4D Chart, it is automatically updated in all the 4D Write documents that use it.

The following 4th Dimension plug-ins can use hot links:

- 4D Calc
- 4D Write
- 4D Draw
- 4D Chart

You will find information about the following topics in this chapter:

- Subscribing to a hot link
- Creating a graph from a hot link
- Unsubscribing to a hot link
- Publishing a hot link
- Editing a hot link
- Unpublishing a hot link
- Using 4D Chart hot links in other plug-ins

Using Hot Links with 4D Chart

A hot link allows you to create a relationship between two plug-ins by displaying dynamic information from one plug-in in another plug-in. The link between the two plug-ins is "hot" because it is dynamic; that is, when information is updated in one plug-in, it is updated in the other. You can edit information only in the document from which the link originated.

You can designate any selected objects as a hot link; this is called *publishing* a hot link. Using the hot link in another document is called *subscribing* to a hot link. The data from the publishing document is transferred into the subscribing document through the hot link.

All of the 4th Dimension plug-ins have the same installation options. For plug-ins to share information using hot links, they must be installed in the same location.

The following table lists the types of hot links each plug-in can use:

Plug-in	Publishes	Subscribes to
4D Chart	Picture	Values and Picture
4D Calc	Values and Picture	Picture
4D Draw	Picture	Picture
4D Write	Picture	Values and Picture

When you have published hot links as values from 4D Calc, you can subscribe to them in 4D Chart. The result is a graph using information from a 4D Calc spreadsheet. If the data in the spreadsheet changes, the graph is updated.

Subscribing to a Hot Link

When you subscribe to a hot link in 4D Chart, you can use a hot link that you have published from another 4th Dimension plug-in.

If you subscribe to a Picture hot link, the picture appears in the 4D Chart area. If you subscribe to a Values hot link, 4D Chart creates a graph from the data in the hot link.

This section includes the steps for subscribing to Pictures and Values hot links.

Subscribing to a Picture Hot Link

When you subscribe to a Picture hot link, the picture is displayed in the 4D Chart area or plug-in window.

▶ To subscribe to a Picture (PICT) hot link:

1 Choose Subscribe to Hot Link from the Database menu.

4D Chart displays the Subscribing to a Hot Link dialog box.
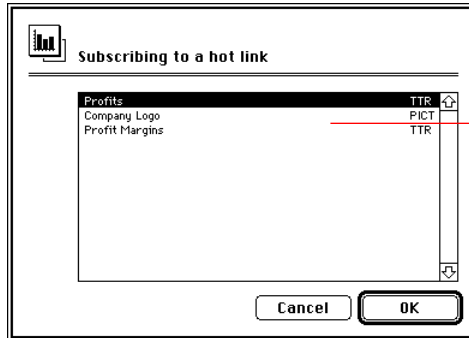
List of available hot links

The scrollable list displays the names of the hot links you have published.

Values hot links are followed by the designation "TTR". Picture hot links are followed by the designation "PICT".

2 Select the PICT hot link to which you want to subscribe.

3 Click OK.

4D Chart displays the hot link in the current document.

Creating a Graph from a Values Hot Link

4D Chart can subscribe to Values hot links published from 4D Calc. When you subscribe to a Values (TTR) hot link, 4D Chart automatically generates a graph from the data.

This section provides a brief description of creating a graph from data hot-linked to 4D Chart from 4D Calc.

Formatting Values Hot Links for Use in 4D Chart

This section contains instructions for formatting a Values hot link so that it can be used to create a graph in 4D Chart. You can publish Values hot links from 4D Calc.

If you want to create a graph from 4D Calc data, you need to publish the hot link from 4D Calc as values. Publishing the hot link as values transfers the values from the spreadsheet so that they can be used by 4D Chart.

Publishing values creates a hot link that ignores the formats, fonts, and graphics included in the hot link area.

When you publish a 4D Calc hot link area as values and then subscribe to it in 4D Chart, the resulting graph treats the information in the following ways:

- The values entered in the first column are used as the category labels. If you want the information in the first column to be placed on the Series axis, click the Transposed check box in 4D Calc's Publish Hot Link dialog box.

- The values entered in the top row are used as the series labels. If there is more than one value, 4D Chart creates identifying patterns for each series. The graph's legend also displays the identifying pattern for each series. If you want the information in the top row to be placed on the Category axis, click the Transposed check box in 4D Calc's Publish Hot Link dialog box.

- Each cell value from the remaining columns and rows is a data point in the graph.

The following illustration shows how information in a 4D Calc Values hot link is used in a graph in 4D Chart.

Hot link area
published as
values
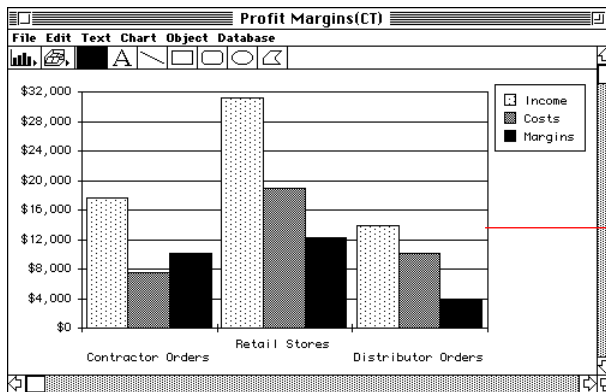
Graph created in
4D Chart

For more information about publishing a hot link from any plug-in,
see the documentation for that plug-in.

Creating a Graph from a Hot Link

This section gives the steps for creating a graph from a hot link. This
section assumes that you have published a Values hot link from
another 4th Dimension plug-in. For more information, see the
previous section, "Formatting Values Hot Links for Use in 4D Chart"
on page 279.

▶ To create a graph from a Values (TTR) hot link:

1 In a 4D Chart plug-in window or a 4D Chart area on a layout, choose
the Subscribe to Hot Link menu item from the Database menu.

The Subscribing to a Hot Link dialog box appears.
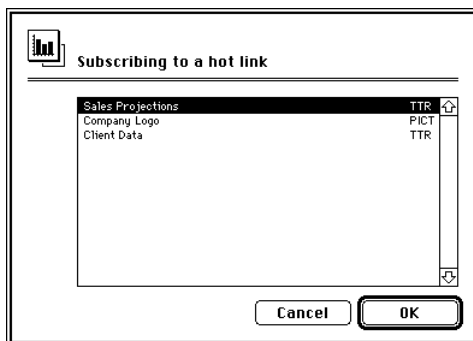
Values hot links are followed by the designation "TTR". Picture hot links are followed by the designation "PICT".

2 **Choose any Values (TTR) hot link from the list by clicking it.**

You can create graphs only from TTR hot links.

3 **Click OK.**

4D Chart automatically generates a graph from the data stored in the hot link, using the default graph type. The next section explains how to change the default graph type.

Updating Data in a Graph from a Hot Link

Hot links dynamically link 4th Dimension's plug-ins using a publish and subscribe system. When you have created a graph from data in a hot link, the graph is automatically updated with changes in the hot-linked data when they occur, as long as the publishing plug-in is still publishing that hot link.

Changing the Default Graph Type for Hot Link Graphs

When you create a graph from a hot link, 4D Chart uses the graph type specified in the Preferences dialog box. By default, the graph type is a two-dimensional Column graph.

▶ To change the default graph type for hot link graphs:

1 **Choose Properties from the 4D Chart Edit menu.**

The Properties dialog box appears. The current default type appears in the Hot Link Chart Type drop-down list.
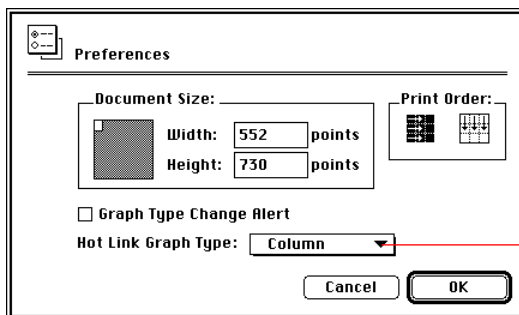
Hot Link Graph Type
pop-up menu

2 Choose the desired default graph type from the Hot Link Graph Type pop-up menu.
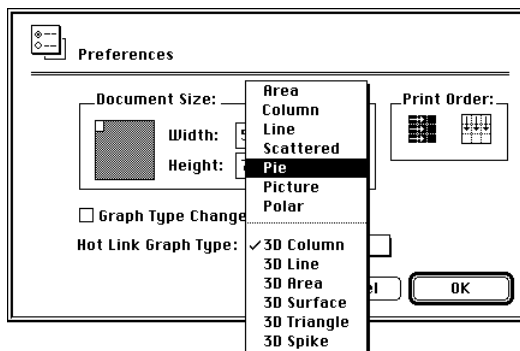
3 Click OK.

Any new graphs you create from hot links will use this graph type.

You can also change the graph type after a graph is generated. For more information, see the section "Changing the Graph Type" on page 231.

Unsubscribing to a Hot Link

When you have finished using the data in a hot link to which you have subscribed, you can unsubscribe to it. When you unsubscribe to a hot link, it remains in existence, available to any plug-in, but it is not used by the unsubscribing document any longer.

▶ To unsubscribe to a hot link:

1 Choose Unsubscribe to Hot Link from the Database menu.

4D Chart displays the Unsubscribe to Hot Link dialog box.

2 Select the hot link you want to remove from the hot link list and click OK.
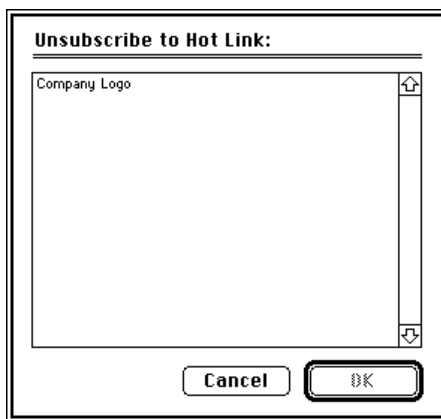
4D Chart removes the hot link from the list and from the document. Any other plug-ins that make use of the hot link are not affected by this action.

Publishing a Hot Link

You can publish as many hot links as you like from any document. When you publish a hot link, you make the selected object or objects available to other 4th Dimension plug-ins. You can then subscribe to these hot links from another plug-in or from within a 4D Chart document. The resulting hot link is a picture in PICT format. You can use hot links published by 4D Chart in 4D Draw, 4D Calc, and 4D Write.

▶ To publish a hot link:

1 Select the objects you want to publish as a hot link.

Database
Paste Field...
Format..
Reference
Unreference

Show References

Subscribe to Hot Link...
Publish Hot Link...
Unsubscribe to Hot Link .
Unpublish Hot Link .
Add to Hot Link..
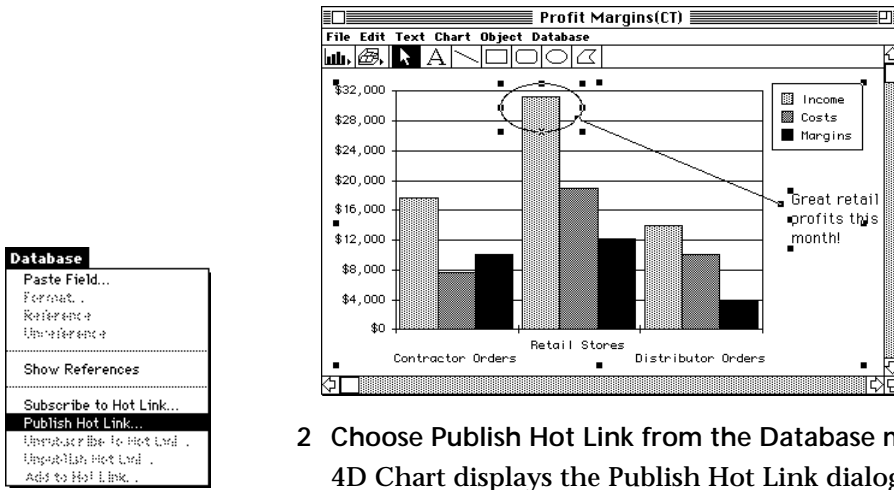
2 Choose Publish Hot Link from the Database menu.

4D Chart displays the Publish Hot Link dialog box.

3 Enter a name for this hot link.
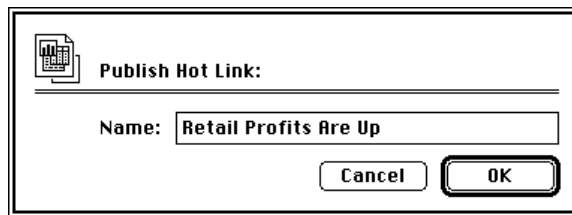
4 Click OK.

4D Chart establishes the hot link. It is now available to be used in another document.

When you publish a 4D Chart hot link and then subscribe to it in 4D Draw, 4D Write, or 4D Calc, the other plug-in treats the area as an object in the document. You can resize it, but you cannot select or edit small portions of it. The features that you have established in 4D Chart remain in effect in the new document.

As with any hot link area, any changes you make in the 4D Chart document are reflected in the subscribing document.

Editing a Hot Link

Hot links are dynamic; that is, if you change the data in a published hot link, the change is immediately reflected in any document that has subscribed to that hot link. Any objects that you change are immediately redrawn in the subscribing documents.

For example, if you change the size of a published hot link, the hot link area automatically adjusts to the size change, and the changes are reflected in any document that has subscribed to that hot link.

Adding to a Hot Link

You can change a hot link by adding an object to it. You make changes to a hot link in the document from which the link was published. Any changes to the hot link are updated in subscribing documents.

▶ To add an object to a hot link:

1 Select the object you want to add to the published hot link.
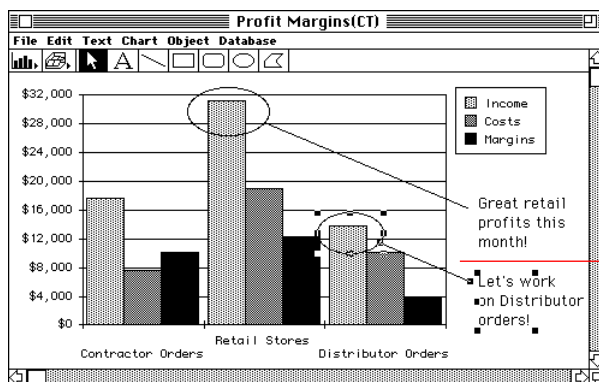
Objects to add
to hot link

2 Choose Add to Hot Link from the Database menu.

The Choose Hot Link dialog box appears.

3 Select a hot link to which you will add the object.

Choose Hot Link:

Retail Profits Are Up

Cancel   OK
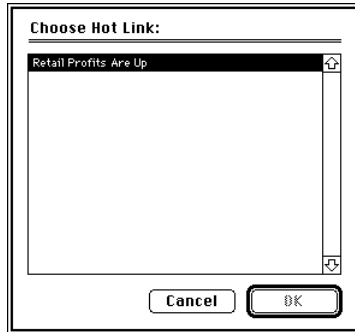
4   Click OK.

The object is added to the link. Any documents subscribing to the link are updated.

Unpublishing a Hot Link

When you have finished using the data in a hot link area, you can unpublish the hot link. When you unpublish a hot link, it no longer exists.

If you unpublish a hot link, the hot linked information will appear in the subscribing document as it was when the hot link was unpublished.

■ If the hot link was a Values hot link, the graph remains as a graph object in the subscribing document, but it is no longer dynamically updated when the values in the 4D Calc document change.

■ If the hot link was a PICT hot link, the picture remains in the subscribing document, but it is no longer dynamically linked to the original.

▶ To unpublish a hot link:

1   Choose Unpublish Hot Link from the Database menu.

4D Chart displays the Unpublish Hot Link dialog box.

2   Select the hot link you want to unpublish and click OK.

Database
Paste Field...
Format .
Reference
Unreference

Show References

Subscribe to Hot Link...
Publish Hot Link .
Unsubscribe to Hot Link .
Unpublish Hot Link...
Add to Hot Link .
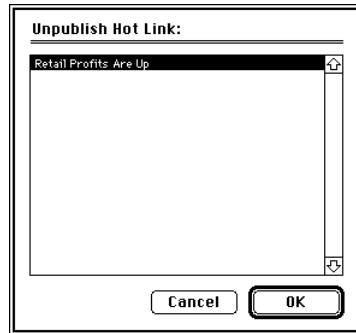
4D Chart removes the hot link from the list. The hot link is no longer available to any other plug-in or any other 4D Chart document. It is no longer updated in any document that had subscribed to it.

17   Executing Methods

The **Execute Method** command in the **Special** menu is used to execute a method from the User environment. You can execute methods to perform tasks such as printing a report, performing a global update, or importing or exporting data. Also, if you are in the process of writing methods, you can test your methods by switching to the User environment and using **Execute Method**.

You can use **Execute Method** to start a new process. If you check the New Process check box in the Execute Method dialog box, the selected method executes in a new process (rather than the User/Custom Menus process).

If you are running the database in client-server mode, you can choose to execute the method on the server machine as a stored procedure. Time-consuming tasks that process data, print reports, or import or export data can be run more efficiently as stored procedures.

A method can also be executed from the Custom Menus environment by assigning it to a menu command on a form menu bar. When you choose a menu command on a menu bar, the associated method is automatically executed. For more information about form menu bars, see the *4th Dimension Design Reference.*

Executing Methods

Use Execute Method to select and execute a method created with the 4th Dimension language. The menu command is dimmed unless at least one method has been written.

For more information about writing methods, see the *4th Dimension Design Reference* and the *4th Dimension Language Reference.*

▶ To execute a method:

1 Choose Execute Method from the Special menu.
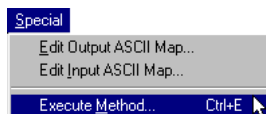
4th Dimension displays the Execute Method dialog box, as shown below.
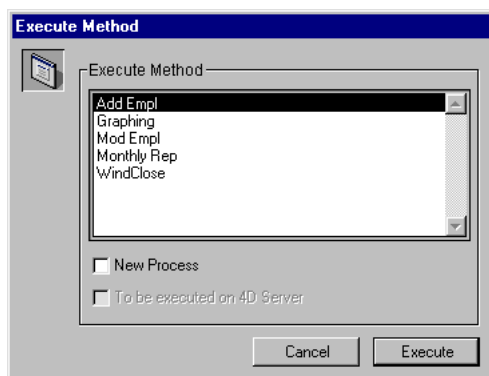
2 Select the name of a method in the list.

3 If you want to start a new process for the method, check the New Process check box.

If you check the New Process check box, the method you selected executes in another process. If the method is performing a time-consuming task such as printing a large set of records, you can continue to work with your database, adding records to a table, creating a graph to display data, and so on.

For a definition of processes, see the section "Multi-tasking in 4th Dimension" on page 7. For a detailed description of processes, including how to create, use, and manage processes, refer to the *4th Dimension Design Reference.*

4D Server If you are using the database on 4D Client, you can choose to run the method on the server machine. To do so, check the **To be Executed on 4D Server** check box. Most methods can be executed on the server machine unless the method must create or modify interface elements on a client workstation.

The **To Be Executed on 4D Server** check box is dimmed if you are not running in client-server mode using 4D Server and 4D Client.

4 **Click the Execute button.**
   OR
   Double-click the method name.
   Double-clicking a method name is a shortcut for selecting a method name and clicking the Execute button.

   4th Dimension executes the method. What happens next depends on what the method does. A method can perform calculations, change the current selection, print reports, and even exit the application and return to the Program Manager or Finder.

18 Importing and Exporting Data

4th Dimension's data importing and exporting capabilities provide a fast and reliable way to transfer information to and from your database. If you are upgrading to 4th Dimension from another database or a spreadsheet, you can avoid the work of re-entering the data from the keyboard by importing your data. You can import data from Windows data management applications or any non-Windows application whose data has been transferred to Windows.

You can also export data from 4th Dimension so that it can be used in other types of programs that process information. For example, you can export data to a specialized graphics or statistics program. You can also transfer the exported data to another type of computer.

You can import or export data using the settings in the appropriate dialog boxes or using a form. Importing or exporting using the dialog boxes is faster than using a form. However, if you use a form you can use object or form methods to process data. When you import or export data using a form, the form and object methods are executed for every record that is processed.

When importing or exporting data, you specify the file format, the field and record delimiters, and the fields to be imported or exported.

Note   You can also use the Quick Report editor to export records. See the section "Disk File" on page 143 for more information.

File Formats

The file format describes the way in which fields and records are arranged. Some file formats also include formatting information. 4th Dimension supports four standard file transfer formats:

- **SYLK** This stands for SYmbolic LinK format.

- **DIF** This stands for Data Interchange Format.

- **dBase** dBase is a file format commonly used in DOS and Windows database applications.

- **Text (ASCII)** This format separates fields within a record by the end-of-field delimiter and records by the end-of-record delimiter. The default field and record delimiters are the Tab and Return, respectively.

Field and Record Delimiters
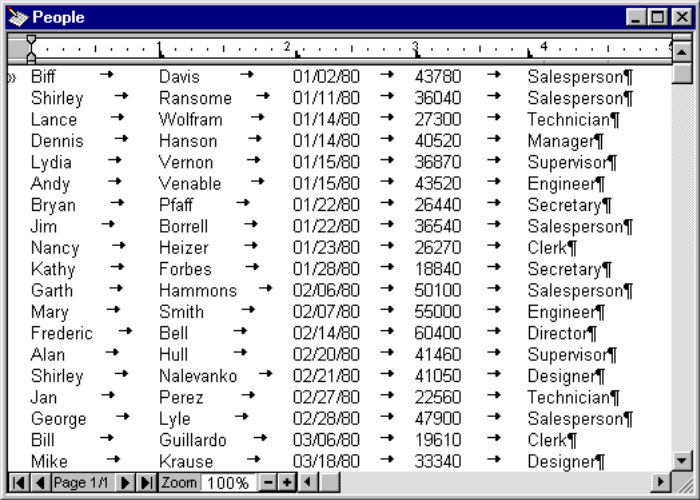
End-of-field delimiters are placed between fields in a record and the end-of-record delimiter is placed after each record. Field and record delimiters are used only when using the Text format.

By default, 4th Dimension uses the Tab character (ASCII code 09) as the field delimiter and the Return character (ASCII code 13) as the record delimiter. Most Macintosh and Windows applications also use these characters. You can usually use the default delimiters when you import or export data.

If you choose ASCII code 13 (Return) when importing a Text file, 4th Dimension automatically converts any instances of Return plus Line Feed to Return only.

Note ASCII codes in 4th Dimension are given in decimal (base 10) numbers. A table of ASCII codes is included in the *4th Dimension Language Reference*.

The following figure shows a text file as displayed in a word processor. This word processor displays the Tab character as an arrow ✦ and the Return character as a paragraph symbol ¶.

When importing data using the Text format, 4th Dimension uses the delimiters embedded in the file to determine where fields and records end. When exporting data, 4th Dimension automatically places these delimiters in the file for you.

Be certain that fields do not contain embedded characters that are also used as field or record delimiters. For example, if the Return character is used as the record delimiter, no field should contain a Return character. When importing data, 4th Dimension will interpret any Return character as a record delimiter. Thus, a Return character inside a field will be erroneously interpreted as the end of that record. An improperly placed Return character will disrupt the importing process.

When you export data that includes a Text field, a Return character might be embedded within a Text field. If this is a possibility, choose another record delimiter or remove the embedded Return characters prior to exporting the data.

Using an ASCII Map

An ASCII map is sometimes needed when transferring information to or from other applications. On both Macintosh and Windows, the internal database engine and the 4th Dimension language work with the Macintosh extended ASCII set.

When entering data in Windows using the keyboard (adding records, editing methods, and so on) 4th Dimension automatically converts what comes from the keyboard (and is therefore expressed using the Windows ASCII set) to the Macintosh ASCII set. However, 4th Dimension automatically converts the data back to Windows ASCII when exporting.

As a result, diacritical characters such as "é" or "ñ" will be correctly converted by 4th Dimension when you import or export data in Windows. You do not need to create an ASCII map when you are importing or exporting data between applications in the Windows environment.

However, if you are importing or exporting data between the Macintosh and Windows environments, you will need to create an ASCII map if your data includes diacritical characters such as those shown above.

You can maintain two types of ASCII maps, input ASCII maps and output ASCII maps. You use an input ASCII map for importing data and an output ASCII map for exporting data. For further information about creating and using ASCII maps, refer to Appendix A on page 305.

▶ To use an ASCII map:

1 **Choose either Edit Input ASCII Map or Edit Output ASCII Map from the Special menu.**

 4th Dimension displays a dialog box you can use to edit an ASCII map.

2 **Load or create your ASCII map.**

 For information on how to load or create an ASCII map, refer to Appendix A.

3 **Click the Use Map button.**

 Any subsequent import or export operations will use the ASCII map.

4 **Choose either Import Data or Export Data from the File menu and follow the steps in the next sections for importing and exporting data.**

An ASCII map can also be used when the language is used to import or export data or to send or receive data using the serial port. For more information about using ASCII maps in connection with the language, refer to the *4th Dimension Language Reference*.

Importing Data

You can import data from files in SYLK, DIF, dBase, or Text formats. If you are importing data that has been exported from another application, see that application's documentation for information about exporting the data in one of these formats. If the other application uses a different format for exporting data, you may need to modify the file in advance using a text editor or word processor.

If you are importing data from another Windows or Macintosh application, first export the data using the other application. Note the order in which the fields were exported, the format the application uses to save the data, and, if the Text format was used, the delimiters used by the application. When importing the data, you must match these settings.

If your database has more than one table, use the List of Tables window or the **Choose Table/Form** menu command to select the table into which you want to import the data. If you need to import data into more than one table, repeat the importing process for each table.

You do not need to build your entire table structure before you import data. You can, for example, create one table, import the data, return to the Design environment, create another table, import the data into the second table, and so forth.

You have the option of selecting the fields for which data will be imported in the Import dialog box or specifying an input form that contains the fields for which data will be imported.
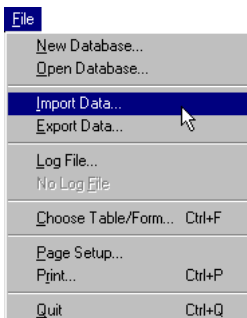
▶ To import data:

1 Make sure the table into which you want to import data is the current table. If you are importing data using a form, make sure you have selected the correct input form.

2 Choose Import Data from the File menu.
4th Dimension displays an open-file dialog box.
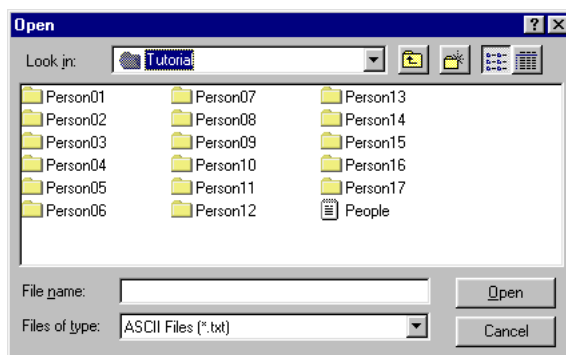
3 Select the file to be imported (Text, DIF, dBase, or SYLK).

If you select a dBase file, 4th Dimension displays a dialog box that allows you to either create a new table in your database or import the dBase file into an existing table. If you wish to create a new table, 4th Dimension automatically creates the new table based on the format of the dBase file.

If you choose to import the dBase file into an existing table, or if you selected a Text, DIF, or SYLK file, 4th Dimension displays the Data Import dialog box. The Data Import dialog box allows you to preview the first four rows of data from the file to be imported and allows you to specify the fields into which the data will be imported.
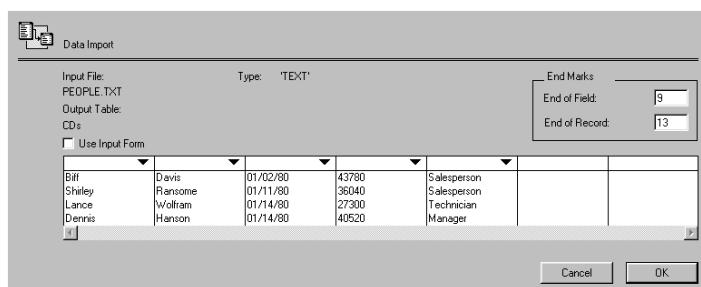
4 Using the drop-down lists located at the top of each column, choose the field in which each column of data will appear.

Tip If the fields in the file to be imported are in the same order as the fields in the table, you can use the following shortcut: Hold down the **Shift** key and choose the first field from the first pop-up menu. All the remaining fields in the import file will be assigned to the successive fields in the table.

Use the horizontal scroll bar to view additional columns. You can skip a column by not choosing a field from that column's drop-down list. You may also skip a column by choosing the same field that you chose in a previous column. For example, if you choose the field "Last Name" in the first column, and choose "Last Name" again in the second column, your second choice overrides your first choice. The "Last Name" field will no longer contain the data in the first column, but will contain the data in the second column.

To import data using a form, click the **Use Input Form** check box. The fields on the current input form will be used in the entry order used in that form.

Note When importing using a form, use a form that contains only the fields and enterable objects into which you want to import data.

5 **If necessary, enter new ASCII codes for the end-of-field and end-of-record delimiters.**

If you choose ASCII code 13 (Return) when importing a Text file, 4th Dimension automatically converts any instances of Return plus Line Feed to Return only.

6 **Click OK to begin importing the disk file.**

4th Dimension displays a progress indicator as it imports the data into your database.

Exporting Data

When you export data, you create a text file that can be opened by or imported to other applications. If you are exporting data for use with another application, see that application's documentation for information about importing data. Choose a file format and delimiters compatible with the other application.

In some cases, you may need to edit the exported text file prior to importing it into the other application. For example, some programs accept the text file format but require that the first record consist of the names of the fields. You can add this record using a word processor.

4th Dimension exports the records in the current selection in the current sort order. For example, if your current selection contains only the records of sales representatives in Arizona, 4th Dimension will export only this set of records.

You have the option of selecting the fields to be exported in the Export Data dialog box or specifying an output form. If you use an output form, the fields on the output form will be exported.

▶ To export data:

1 Set the current selection to include the set of records to export.

2 Choose Export Data from the File menu.

The Export Data dialog box appears.

File
New Database...
Open Database...
Import Data...
Export Data...
Log File...
No Log File
Choose Table/Form... Ctrl+F
Page Setup...
Print... Ctrl+P
Quit Ctrl+Q

File Name area ——

Fields list ——

Export list
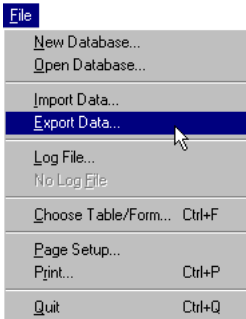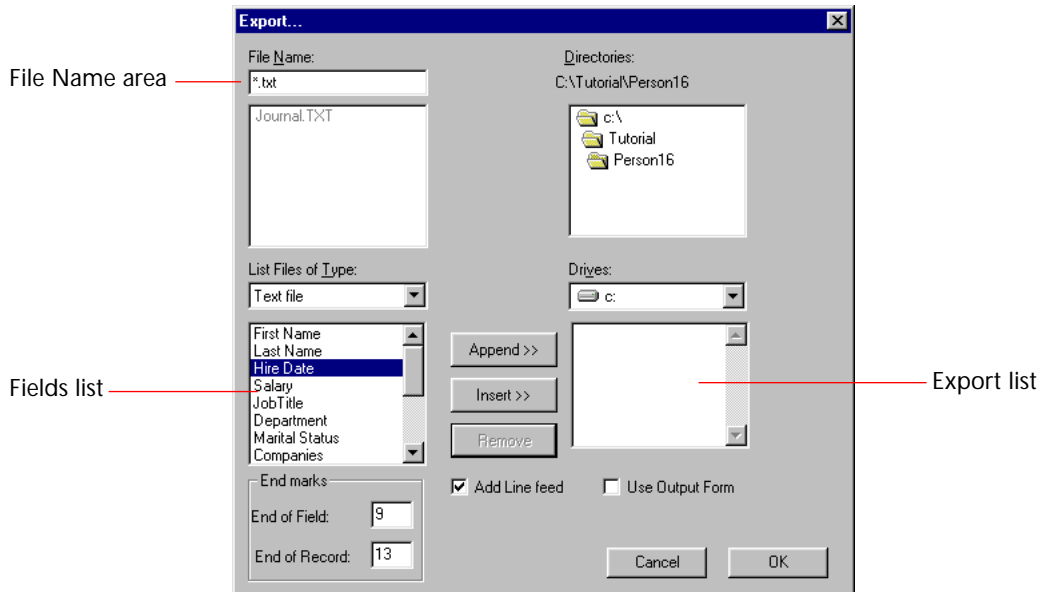
3 Enter a name for the file in the File Name area.

4 Select a file format for the data to be exported (Text, DIF, or SYLK) from the List Files of Type drop-down list.

5 If necessary, enter new ASCII codes for the end-of-field and end-of-record delimiters in the End Marks area.

6 Click field names displayed in the Fields list on the left side of the dialog box and click the Append or Insert buttons to add the field to the Export list or double-click the fields.

The fields will be exported in the order that they appear in the Export list. If you plan to import this file to another application, you must specify the same order when you import the data. To remove a field from the Export list, select the field and click the Remove button.

To use a form, check the Use Output Form check box. The fields on the current form will be used in the order specified by the data entry order. If you use this option, the Export list does not control the fields that will be exported. It can be left blank.

7 If exporting a Text file, check the Add Line Feed check box if you want Line Feeds after Returns.

8 Click OK to export the current selection to the disk file.
4th Dimension displays a progress indicator as it exports the data.

19   Web Server

4th Dimension has the ability to publish databases on the World Wide Web. When a database is published on the Web, a user can access the database using a web browser such as Netscape or Microsoft Explorer. A Web user can perform all the standard data management tasks, such as viewing, adding, modifying, and deleting records. You can design a Web site using 4th Dimension by creating forms that function as Web "pages" and using the 4th Dimension engine as the Web server.

When 4th Dimension publishes a database on the Web, it transparently translates the database's forms and design components into HTML pages. A Web user accesses the database through HTML versions of your custom menus and forms. You can also use 4th Dimension to publish static HTML pages, prepared, for example, using a WYSIWYG HTML generator. You can also encapsulate HTML on a 4th Dimension form. Within the encapsulated HTML, you then can implement JavaScript code that performs actions and data control on the user's Web browser, without requiring a request to be sent back to 4th Dimension.

When they become 4D clients, Web browsers are treated as "normal" database clients. For example, if a Web user modifies a record, 4th Dimension automatically locks the record, preventing any other concurrent user (4th Dimension/4D Client or Web browser) from modifying it. After the user validates or cancels the data entry, 4th Dimension automatically unlocks the record.

For a complete description of the process of setting up and managing a database as a Web site, see the section "Web Services" in the *4th Dimension Language Reference*.

Starting and Stopping Web Service

Web service is not completely automatic; it must be initiated and terminated by a database administrator.

Starting Web Service

There are three ways you can publish a database as a Web server.

■ Use the **Publish Database at Startup** property in the Database Properties dialog box. If this property is selected, the database will be published as a Web server automatically each time it is opened.

■ Choose **Start Web Server** from the **Web Server** menu in the User environment.

Choosing this command publishes the database on the Web immediately.

■ Execute the START WEB SERVER command in a method.

Before you publish your database on the Web, it should have at least one table with input and output forms and one custom menu bar, Menu Bar #1. It should contain menu commands that provide access to the features of the database that you want to make available to Web browsers. By default, this is the menu bar that will be presented to Web users as their first Web page.

Stopping Web Service

There are two ways you can end Web service:

■ Choose **Stop Web Server** from the **Web Server** menu in the User environment.

■ Execute the STOP WEB SERVER command in a method.

Before publishing your first database as a Web server, work through the Web Services sample database and the short Web Server tutorial in the "Web Services" section of the *4th Dimension Language Reference*.

A ASCII Maps

An ASCII map acts as a translation table for interpreting character codes when data is transferred to or from 4th Dimension. The transfer can be a file import or export or a transfer through the computer's serial port.

In 4th Dimension for Windows and Macintosh, the internal database engine and 4th Dimension language use the Macintosh extended ASCII character set. When you edit an ASCII map using the dialog boxes described later in this chapter, the columns show the Macintosh extended ASCII character set by default.

When you import or export data within the Windows environment, 4th Dimension automatically converts the Macintosh ASCII codes to their equivalents in Windows. Since 4th Dimension converts the codes for you, you do not have to create an ASCII map when you are importing or exporting data between 4th Dimension and other Windows applications.

If you are importing or exporting data between the Macintosh and Windows environments, you will need to create an ASCII map. When transferring data between Windows and Macintosh, the conversion can be done either during the import process or the export process. Whether you choose to perform the conversion during the export or import process depends on your own needs and the requirements of your source and destination applications.

4D Server If you are using 4D Server, any ASCII maps you create are stored locally on your client machine.

ASCII codes for Macintosh and Windows are listed in the *4th Dimension Language Reference.*

Creating an ASCII Map

An ASCII map is a tool that 4th Dimension uses to interpret characters as they are transferred to or from another program or source. The map is used only during the transfer process. The transfer can be done in the User environment using the **Import** or **Export** commands in the **File** menu or using the commands in the language.

During the information transfer, the map is placed between 4th Dimension and the source or destination file. The ASCII map is consulted for each character that is processed. For each character that is passed to the ASCII map, the map specifies the character to be returned.

When you create an ASCII map, 4th Dimension first displays a default ASCII map. A default ASCII map always returns the same ASCII character that is passed. You can modify the map by changing the characters the map will return. You can change as few or as many entries in the map as you like.

Use the **Edit Output ASCII Map** and **Edit Input ASCII Map** menu commands to create, edit, load or save ASCII maps. You can create as many ASCII maps as you like.

Note If you create an ASCII map, you should also create a default ASCII map and save it as a disk file. Load the default ASCII map whenever you need to return to standard Windows or Macintosh ASCII.

▶ To create an ASCII map:

1 Choose either the **Edit Output ASCII Map** or **Edit Input ASCII Map** menu command from the Special menu.
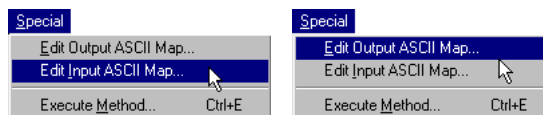
Use the **Edit Output ASCII Map** menu command for exporting data and the **Edit Input ASCII Map** menu command for importing data.

4th Dimension displays either the Input ASCII Map or Output ASCII Map dialog box. In both dialog boxes, a scrollable area displays two sets of ASCII codes and characters in two columns: a 4D column and an ASCII column.

In the Output ASCII Map dialog box, the Mac column represents the characters sent from 4th Dimension during an export and the ASCII column represents the characters received by the other application. Notice that there is a one-to-one correspondence between these columns.
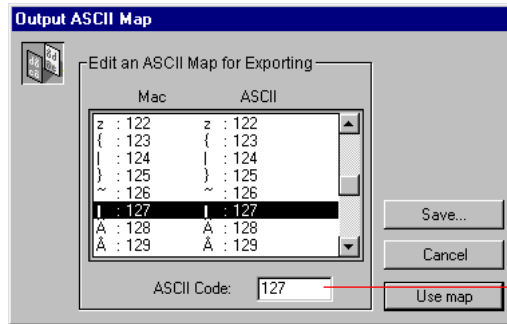
ASCII Code box

In the Input ASCII Map dialog box, the ASCII column represents the characters received from the file being imported and the Mac column represents the characters being stored in the 4th Dimension database.
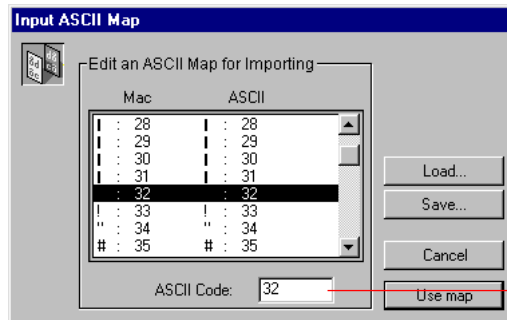
ASCII Code box

2 **Click the ASCII code that you want to map from the column on the left.**

If you are using the Output ASCII Map dialog box, this is the Mac column; otherwise it is the ASCII column.

4th Dimension displays the ASCII code that the map returns in the ASCII Code box.

3 **Enter an ASCII code for the character in the ASCII Code box.**

The ASCII code you entered appears in the ASCII column in the scrollable area.

During data transfer, when 4th Dimension encounters the ASCII code that you mapped, it will substitute the ASCII code that you entered in the ASCII code box.

For example, if you wanted each uppercase "A" character in a file to be replaced by a lowercase "a", you would map ASCII code 97 (lowercase a) to ASCII code 65 (uppercase A). Each time the ASCII map is sent an uppercase "A", it will replace that character with a lowercase "a". Your output file will contain a lowercase "a" in place of every uppercase "A" that was in the original file.

4 Modify as many additional codes as you require.

5 Click the Save button to save the ASCII map to a disk file that can be loaded later for use or for editing.

6 Click the Use Map button to apply the map you have edited or loaded.

When you transfer information after clicking the Use Map button, the current ASCII map will be used.

Loading an ASCII Map

▶ To load and use an ASCII map for exporting or importing data:

1 Choose either the Edit Output ASCII Map or Edit Input ASCII Map menu command from the Special menu.

Use the Edit Output ASCII Map menu command for exporting data and the Edit Input ASCII Map menu command for importing data.

4th Dimension displays either the Input ASCII Map or Output ASCII Map dialog box.

2 Click the Load button.

A standard open-file dialog box appears.

3 Select the ASCII map from the list of files.

The map specified by the file will be represented in either the Input ASCII Map or Output ASCII Map dialog box.

If needed, modify any entries in the map.

4 Click the Use Map button to apply the map.

Note The same map loaded for both input and output carries out the translation in reverse. That is, if a map translates "A" to "a" during an import, it will translate "a" to "A" during an export.

B Keyboard Equivalents for Graphing

Drawing Polygons

To	Windows	MacOS
Delete the last vertex	Delete	Delete
Close polygon at first vertex	Alt-Enter	Option-Enter
End polygon	Enter	Enter

Entering Text

To	Windows	MacOS
Display current table's fields	Alt-click	Option-click
Display all tables and fields	Shift-Alt-click	Shift-Option-click
End text entry mode and select text objects	Enter	Enter

Moving a Selected Object

To move an object	Windows	MacOS
Up one pixel	↑	↑
Down one pixel	↓	↓
Left one pixel	←	←
Right one pixel	→	→

Changing the Size of an Object

To	Windows	MacOS
Decrease height one pixel	Ctrl-↑	⌘-↑
Increase height one pixel	Ctrl-↓	⌘-↓
Decrease width one pixel	Ctrl-←	⌘-←
Increase width one pixel	Ctrl-→	⌘-→

Selecting Objects

To select	Windows	MacOS
One object	Click	Click
One object (or deselect it)	Shift-Click	Shift-Click
All objects inside marquee	Click-Drag	Click-Drag
All objects inside and intersected by the marquee	Ctrl-Click-Drag	⌘-Click-Drag

Shortcuts for Menu Items

To perform the command	Windows	MacOS
New	Ctrl-↑-N	⌘-↑-N
Open	Ctrl-↑-O	⌘-↑-O
Save	Ctrl-↑-S	⌘-↑-S
Print	Ctrl-↑-P	⌘-↑-P
Go to Full Window/Return to Layout	Ctrl-↑-Q	⌘-↑-Q
Select All	Ctrl-↑-A	⌘-↑-A
Copy	Ctrl-↑-C	⌘-↑-C
Paste	Ctrl-↑-V	⌘-↑-V
Cut	Ctrl-↑-X	⌘-↑-X
Duplicate	Ctrl-↑-D	⌘-↑-D
Undo	Ctrl-↑-Z	⌘-↑-Z
Display Menu Bar	Ctrl-↑-M	⌘-↑-M
Display Object Tool Palette	Ctrl-↑-T	⌘-↑-T
Display Scroll Bars	Ctrl-↑-B	⌘-↑-B
Group	Ctrl-↑-G	⌘-↑-G
Ungroup	Ctrl-↑-U	⌘-↑-U
Align Objects	Ctrl-↑-L	⌘-↑-L
Bring to Front	Ctrl-↑-]	⌘-↑-]

To perform the command	Windows	MacOS
Send to Back	Ctrl-⇧-[	⌘-⇧-[
Move Forward	Ctrl-⇧-'	⌘-⇧-'
Move Backward	Ctrl-⇧-;	⌘-⇧-;

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